An Overview of Discards from the Canadian Inshore Scallop Fishery in SFA 28 and SFA 29 West for 2002 to 2009

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ABSTRACT

Sameoto, J.A and Glass, A. 2012. An Overview of Discards from the Canadian Inshore Scallop Fishery in SFA 28 and SFA 29 West for 2002 to 2009. Can. Tech. Rep. Fish. Aquat. Sci. 2979: vi + 39 p.

This study characterizes discards by weight from the inshore scallop fishery in the Maritimes region, Canada, in Scallop Fishing Areas 28 and 29 West from 2002 to 2009. This study builds on a previous overview of discards conducted by Gavaris et al. (2010). The estimates reported are for total discards, discard rates, and discards as a percent of the total fishery catch. No adjustments to the discard estimates for post-release survival and unpermitted discarding were made. Although the discard estimates presented in this report are subject to a number of assumptions, results are sufficient for making broad comparisons as to the relative importance of discard species within the inshore scallop fishery in SFA 28 and SFA 29W and provide a measure of the number and type of species which overlap with this fishery. Specific estimates should not be accepted uncritically. Underlying assumptions and caveats associated with this analysis are provided in detail in the discussion section.

RÉSUMÉ

Sameoto, J.A., Glass, A. 2012. Aperçu des rejets issus de la pêche côtière canadienne du pétoncle dans les ZPP 28 et 29 Ouest de 2002 à 2009. Rapp. tech. can. sci. halieut. aquat. 2979 : vi + 39 p.

Cette étude caractérise les rejets en poids issus de la pêche côtière du pétoncle dans la région des Maritimes (Canada) pour les zones de pêche du pétoncle 28 et 29 Ouest de 2002 à 2009. Cette étude s'appuie sur un aperçu des rejets effectué précédemment par Gavaris et al. (2010). Les estimations rapportées sont les rejets totaux, les taux de rejets et les rejets en pourcentage par rapport à la capture totale. L'ajustement des estimations de rejets, pour la survie après remise à l'eau et le rejet interdit, ne s'inscrit pas dans le cadre de cette analyse et n'a pas été abordé ici. Les rejets présenté dans ce rapport sont soumis à un certain nombre d'hypothèses mais les résultats sont suffisants pour faire des comparaisons générales en ce qui concerne l'importance relative des espèces rejetées dans le cadre de la pêche côtière du pétoncle dans les zones de pêche du pétoncle 28 et 29 Ouest et pour donner une idée du nombre et du type d'espèces qui chevauchent avec cette pêche. Cependant, les estimations particulières ne devraient pas être acceptées sans réserve. Les hypothèses et les limitations associées à cette analyse sont présentés en détail dans la section discussion.

INTRODUCTION

Fishing selects imperfectly for the target species and as a result, many non-target species are incidentally caught. The incidental capture of non-target species is referred to as bycatch. Bycatch may be retained by a fishery and landed, or it may be returned to the water as discards. In February, 2011, the Food and Agriculture Organization (FAO) of the United Nations adopted and endorsed international guidelines for bycatch management and reduction of discards (FAO 2011). This represents another step towards an ecosystem approach (EA) to fisheries through effective management of bycatch and discards. To identify potential conservation concerns associated with discards, the cumulative effects of fisheries on a given species must be considered. As a first step, Gavaris et al. (2010) characterized the discards from Canadian commercial fisheries conducted in the Northwest Atlantic Fisheries Organization (NAFO) divisions 4V, 4W, 4X, 5Y and 5Z using observer and fishery data from 2002 to 2006. The objective of the study was to identify gaps in monitoring and to prioritize potential conservation risks associated with higher discard amounts (Gavaris et al. 2010). In the analysis, discards from the inshore scallop fishery were summarized for 4X5Y from 2002 to 2006, however observer coverage from which the discards were derived were from a relatively small area of the total fished area (Gavaris et al. 2010).

The inshore scallop fishery is licensed by Fisheries and Oceans Canada (DFO) to harvest sea scallop (*Placopecten magellanicus*) in Scallop Fishing Area (SFA) 28, which encompasses the Bay of Fundy and approaches, and Scallop Fishing Area 29 (Figure 1). SFA 28 consists of 6 Scallop Production Areas (SPAs) and is fished by three fleets: Full Bay, Mid Bay and Upper Bay. Scallop Fishing Area 29 encompasses a large inshore area inside the 12-mile territorial sea from the south of Yarmouth to Cape North in Cape Breton, however, the portion of SFA 29 West (SFA 29W) of longitude 65°30´W continuing north to SPA 3 at latitude 43°40´N is managed separately from the rest of SFA 29. Prior to 1986, the Full Bay Scallop Fleet fished in this area. Following the 1986 inshore/offshore scallop fishing agreement, fishing by the Full Bay Fleet was restricted to north of latitude 43°40′N. A limited fishery by the Full Bay Fleet was granted from 1996–98. Access to SFA 29W was granted again to this fleet in 2001. SFA 29W is within Lobster Fishing Area (LFA) 34 and concern over lobster bycatch resulted in mandatory observer coverage of this fishery. Since 2002, DFO has approved access to SFA 29 West by the Full Bay Fleet and to a limited number of eligible Inshore East of Baccaro scallop licence holders. SFA 29 inshore scallop licenses were historically restricted to fishing east of Baccaro (east of longitude 65°30′W). The SFA 29 fishery east of 65°30′W is fished by the Inshore East of Baccaro fleet as a competitive fishery.

Gavaris et al. (2010) used all available observed trips from 2002 to 2006 to estimate total discards for the inshore scallop fishery; however, the majority of these data came from trips in SFA 29W. Observer coverage to monitor bycatch is a mandatory part of the management of the fishery in SFA 29W but it is not a requirement in SFA 28 or SFA 29 East. However, in SFA 28 and SFA 29W, if a vessel's Vessel Monitoring System (VMS) is not working, they are required to take an observer. This situation occurs

infrequently and observed trips due to problems with VMS have only occurred in 2003 and 2004. Given the spatially limited observer coverage, Gavaris et al. (2010) assumed that discard rates derived mainly from SFA 29W observed trips were representative of the rest of the inshore scallop fishery, therefore, these results are sensitive to any spatial variation in the population density of incidentally caught species. SFA 29W and the Bay of Fundy represent geographically distinct areas and it is expected that the discards of incidentally caught species between these areas could vary. This knowledge gap was identified by Gavaris et al. (2010) and resources were provided as part of a Species-At-Risk (SARCEP) project to obtain observer coverage of the inshore scallop fishery in the Bay of Fundy and SFA 29W from June 2008 to March 2009. These observed trips were in addition to the mandatory coverage of one observed day per active vessel as part of the SFA 29W fishery in 2008 and 2009.

The purpose of this study was to characterize the discards, by weight, from the inshore scallop fishery in the Maritimes region. This study builds on the previous overview of discards conducted by Gavaris et al. (2010) and incorporates data collected in 2008 and 2009. The general methods used for this analysis were adapted from Gavaris et al. (2010) so that results may be comparable to the previous analysis. The observer coverage in 2008 and 2009, and thus this analysis is limited to the inshore scallop fishing activity in SFA 28 and 29W which overlaps with NAFO divisions 4X and 5Y (Figure 1). Although SFA 29 extends eastward into NAFO division 4W and 4V (SFA 29 East; Figure 1), this analysis is limited to SFA 28 and SFA 29W due to the availability of observer data. However, the vast majority of fishing activity occurs in SFA 28 and SFA 29W and any fishing effort in SFA 29 East can be considered a relatively small portion of the overall activity. The estimates reported in this study are for total discards, discard rates, and discards as a percent of the total fishery catch. Adjusting the discard estimates for post-release survival, and discarding that is not permitted, is beyond the scope of this analysis and was not addressed here.

METHODS

DATA

Management measures for the SFA 28 and SFA 29W fisheries include the requirement to submit monitoring documents that record fishing activity and retained catches. This information includes estimated retained catch, average tow time, number of tows, and location (latitude/longitude and fishing area), reported on a daily basis. Landings are recorded on the weighout slip section of the monitoring document while discarded catches are not recorded on monitoring documents. The monitoring information for this fishery is maintained by the DFO Maritimes Region in the Maritimes Fisheries Information System (MARFIS) database. For the inshore scallop fishery in SFA 28 (Bay of Fundy and approaches), the only bycatch that is permitted to be retained is monkfish (*Lophius americanus*). If monkfish are retained, its landings are reported and this information is stored in the MARFIS database. In SFA 29W, no bycatch is permitted to be retained, however prior to 2008 there was some confusion by industry concerning

authorized bycatch of monkfish which resulted in some monkfish landings from SFA 29W. This confusion was clarified in 2008. For all areas, all bycatch, other than the before mentioned exception of monkfish in SFA 28, must be immediately returned to the water and where it is alive, in a manner that causes the least harm.

At-sea observers are deployed to monitor and record fishing activities in greater detail than that recorded by the fishery monitoring documents. Observers record the location of the fishing activity and all associated catch information, including both retained and discarded bycatch. At-sea monitoring information is recorded in the Industry Surveys Database (ISDB) which is maintained by DFO Maritimes Region. Observer coverage to monitor bycatch is mandatory in SFA 29W at a requirement of one observed day per active vessel. In SFA 28 and SFA 29W, if a vessel's VMS is not working, they are required to take an observer. Although trips due to nonfunctional VMS are recorded as observed trips, it was not clear if the observer protocol was consistently followed for these trips. Due to this uncertainty, they were excluded from the subsequent analysis. A limited number of observed trips were found to occur in SFA 29 East and these trips had previously been included in the analysis by Gavaris et al. (2010). These trips fell outside the scope of this analysis and were not included.

To allow a comparison with inshore scallop discards in 4X5Y from Gavaris et al. (2010), discards for the combined area of SFA 28 and SFA 29W were calculated. However, the incidental capture of non-target species can be affected by the nature of the fishery, the time of year, and the location fished. To account for some of these effects, discard calculations were also done by year and by SPAs 1, 4 and 5 combined, SPA 3, SPA 6, and SFA 29W. SPAs 1, 4, and 5 were combined due to limited observer coverage; however they represent a similar geographic area (Figure 1). It is possible that there is within year variability and finer spatial variability of discards than accounted for in this study. However, limited observer coverage restricted this analysis from either a temporal or spatial resolution finer than a year or SPA group, respectively. Observed trips were assumed to be representative of the rest of the scallop fishery for the given year and area.

DISCARD ESTIMATION

The weight of discards for the inshore scallop fishery were estimated from information from at-sea observers coupled with information from fishery monitoring as per the methodology described in Gavaris et al. (2010). The procedure for estimating discards involves a ratio estimator (Cochran 1977) based on the observed discard rate. Where the discard rate is:

$$Discard\ Rate_{ijk} = \left(\frac{discards_{ijk}}{x} \right) (1)$$

where $discards_{ijk}$ are the amount of discards observed for a subsample (i.e. the observed portion) of fishing activity x, for species i, year j and area k. The total (i.e. fishery) amount of discards is expressed as:

$$DISCARDS_{ijk} = \mathrm{X}\left(\frac{discards_{ijk}}{x}\right) \quad (2)$$

where X is the total amount of fishing activity for the fishery by year *j* in area *k*. Gavaris et al. (2010) considered four potential measures of fishing activity: effort, landings, target species landings (e.g. sea scallop), and all species landings (e.g. sea scallop and monkfish). Gavaris et al. (2010) chose to use the measure of all species landings for the purpose of their broad scale analysis, thus equation 2 can be modified such that:

$$DISCARDS_{ijk} = ALL\ SPECIES\ LANDINGS_{jk}\left(\frac{discards_{ijk}}{all\ species\ landings_{jk}}\right) \quad (3)$$

To allow for this analysis to be comparable to that of Gavaris et al. (2010), estimated discards were based on equation 3. All necessary information required to calculate discards was obtained from either MARFIS or the ISDB.

To provide a measure of the contribution of the estimate of fishery level discards for each species to the total fishery catch, the percent discards was calculated from the fishery discard weight relative to the total fishery catch for each species for each year for each area:

$$PERCENT\ DISCARDS_{ijk} = \left(\frac{DISCARDS_{ijk}}{ALL\ SPECIES\ LANDINGS_{jk} + \sum DISCARDS_{jk}}\right) \times 100 \quad (3)$$

LANDINGS

For each year and area *ALL SPECIES LANDINGS* was the sum of all landings (i.e. scallop and monkfish) for all inshore scallop trips and *all species landings* was the sum of all landings (i.e. scallop and monkfish) for all observed trips. At-sea observers record an estimated kept weight for all retained species, however to avoid complications between inconsistent methods in recording weight, all values of *ALL SPECIES LANDINGS* and *all species landings* were derived from MARFIS. This required that each observed trip in the ISDB be matched to its corresponding fishing records in MARFIS. Landings of scallop used in the analysis were based on meat weight, whereas Gavaris et al. (2010) presented landings of scallop as round weight. The use of meat weight or round weight does not affect the estimates of percent observer coverage or discards since a constant (8.3) is used to convert meat weight to round weight and the conversion would be applied to both *all species landings* and *ALL SPECIES LANDINGS*.

DISCARDS

At-sea observers record estimates of all species caught during fishery operations. For some fisheries, the observer records discards at the level of a fishing event, or 'set'. However, in the inshore scallop fishery, a fishing event is a tow and the average tow is approximately 20 minutes. Given the large number of tows that can be made while scallop fishing, it is not feasible to record data for each individual tow event, rather, estimates from a group of tows are aggregated together and recorded as being from a single 'set'. The number of tows that contribute to a 'set' is recorded as the amount of gear associated with a set. A new set is recorded approximately every three hours, every 10th dredge haul, or at every major change in position (~ 5-10 nm). Due to operational constraints, an observer may not witness each tow. If a tow, or group of tows, is not observed, the observer obtains information on the unobserved set (e.g. number of tows, location, etc) from the captain's log and this set is coded as unobserved. Therefore, to estimate the discards for an entire observed trip, the discards from the observed sets were prorated up by the ratio of total number of tows to the observed number of tows.

An assumption that is often made when analyzing at-sea observer data is that an observed trip is a fishing trip. For the inshore scallop fishery, this assumption may not hold since an observed trip can be part of a longer fishing trip. This likely occurs when an observer disembarks when a vessel returns to port during either a non-offload or partial offload. In these situations, the discards from the observed trip must be expanded to the total trip. To prorate the observed trip up to the total fishing trip, the reported daily number of tows from the fishery monitoring documents was used. The total discards from the observed trip were prorated to the total fishing trip by the ratio of the total tows from the fishing trip to the number of tows from the portion of the trip when an observer was present.

RESULTS

FISHERY LANDINGS

The total landings of all species in SFA 28 and 29W combined for the inshore scallop fishery consists of both scallop and monkfish landings. Scallop landings decreased from a high in 2003 through 2007 and remained relatively steady from 2007 to 2009 (Figure 2). The majority of landings came from within the Bay of Fundy (SPA 1, 4, 5), followed by SFA 29W, SPA 3 and SPA 6 (Tables 1 and 2). Monkfish landings represent a relatively minor portion of the total landings for this fishery, having made up 4% or less of the total yearly landings from 2002 to 2009 (Figure 2, Tables 1 and 2).

COVERAGE

From 2002 to 2009, observer coverage, calculated as observed landings over total landings, in SFA 28 and 29W combined has ranged from 0.9% to 4.2% (Table 3), with the two highest levels of coverage occurring in 2008 and 2009 at 3.7% and 4.2%, respectively. However, from 2002 to 2007, the only fishing ground that regularly contributed to coverage was SFA 29W. In SFA 29W, coverage has varied over time, with a low of 4% in 2007 to a high of 12% in 2003. In 2008 and 2009, in the Bay of Fundy and approaches, observer deployments achieved various levels of coverage by SPA. The coverage was lowest in SPA 1,4 and 5 combined, with 2% and 3% in 2008 and 2009, respectively. In both SPA 3 and SPA 6, observed trips only occurred during a single year. In SPA 3, observed trips occurred in 2008 and resulted in coverage of 5%, while in SPA 6, trips in 2009 resulted in coverage of 9%. There has been no observer coverage in SPA 2, however this is a marginal area and fishing can only occur subject to special license conditions.

DISCARDS

Estimated discards in weight, discard rates, and discards as a percentage of total fishery catch, are presented by area, by year, and by discarded species group in Tables 4 through 18. The ordered ranking of the top discards remains the same regardless of which discard metric (e.g. discard weight, rate, or percent) is used.

For all areas, invertebrates comprised the majority of species groups that contributed ≥ 1% of the fishery catches (Tables 6, 9, 12, 15 and 18). There were two fish species that contributed to ≥ 1% of the fishery catches; sea raven and longhorn sculpin in SFA 29W, and sea raven in SPA 3. Also in SPA 3, little/winter skate and thorny skate comprised ≥ 1% of the fishery catches.

Although the top 3 discard species groups varied between areas, the overall main discard species groups were the branching bryozoan *Flustra foliacea* (locally known as lemonweed), sponges, and sea scallop. Sea scallops that are discarded are likely undersized animals. Management measures include a minimum shell height limit of 75 mm in SFA 28 and 100 mm in SFA 29W. Scallops caught with a shell height less than these limits must be returned to the water. In SFA 28 and 29W combined, these three discard species accounted for approximately 18 to 55% of fishery catches in any given year. For SFA 28 and 29W, the amount of each of the top 3 discards is variable between years. For lemonweed, discards were less than 1% prior to 2008, and increased substantively to 36 and 28% in 2008 and 2009, respectively (Table 6). This is due to the observer data prior to 2008 coming exclusively from SFA 29W where catches of lemonweed were negligible (Table 18). However, lemonweed is fairly pervasive in the Bay of Fundy where the observed trips were focused in 2008 and 2009, and this is reflected by the high discard values. For SFA 28 and 29W, sponges ranged between 0 and 18% of the fishery catch between 2002 and 2009. The highest discards of sponges were in SPA 1, 4 and 5 combined, at 47% of the fishery catch, whereas percentages were 6%, 0.1%, and ranged from 0 to 18% in SPA 3, SPA 6, and SFA 29W, respectively. For SFA

28 and 29W, the discards of sea scallop ranged between 15 and 32% between 2002 and 2007, however, this decreased to 5% in 2008 and 2009. Prior to 2008, the discard rate of sea scallop applied to all areas is derived from observed trips just within SFA 29W. Sea scallop discards were the highest in SFA 29W and ranged from 12% to 32% of the fishery catch between 2002 and 2009 (Table 18). In each of the other areas, sea scallop discards were ≤ 5% of the fishery; 5% and 3% in SPA 1, 4, 5 in 2008 and 2009, respectively, 5% in SPA 3, and 4% in SPA 6 (Tables 9, 12, 15).

LICENSED SPECIES

Species were identified as being licensed species if they were identified by Gavaris et al. (2010) as licensed species, or if they were listed as having landings in 2009 in the Scotia-Fundy region (DFO 2009). Only species for which there were observed discards are presented. Due to the overlap in species groups of *Cancer* spp. (Crab), Jonah crab, and Atlantic rock crab, these three groups were combined and presented as a single group: *Cancer* spp. Of the 16 licensed species caught by the inshore scallop fishery, 9 species (cod, haddock, hake, halibut, herring, pollock, redfish, shrimp, and spiny dogfish) each comprised less than 0.2% of the total catch in each area (Figure 3). Lobster, clams, flounder, and sculpins each ranged between 1 and 3% of the total fishery catch in each area.

For SFA 28 and 29W combined, sea scallop discards comprised the largest percent of total catch (18%, Figure 3), however, there was considerable variability in the magnitude and order of the percent of total catch for licensed species within areas. In SPA 1,4,5, the largest percent of total catch was sea scallop at 4% of the total fishery catch, followed by *Cancer* spp. and sea cucumber at 2% and 0.1%, respectively. In SPA 3, *Cancer* spp. comprised 23% of the total fishery catch, followed by sea scallop at 5%. In SPA 6 sea cucumbers comprised 10% of the total fishery catch, followed by *Cancer* spp. and sea scallop at 5% and 4%, respectively. In SFA 29W, sea scallop comprised 21% of the total fishery catch, followed by *Cancer* spp. and sea cucumber at 8% and 6%, respectively (Figure 3).

Although sea urchins were caught as bycatch, they were not distinguished from sand dollars in the 2008 and 2009 observer data and were therefore not included as a licensed species for the purpose of this analysis. However, even if all discards recorded as sand dollars/sea urchins were actually sea urchins, they would comprise less than 5% of the total fishery discards (Table 6).

SPECIES OF POTENTIAL CONCERN

Species listed by COSEWIC, SARA, or that were presented as species of potential concern by Gavaris et al. (2010) were identified here as species of potential concern. Gavaris et al. (2010) identified five species of skate as potential concern. However, due to similar physical characteristics between species, especially for sympatric species such as Little and Winter skates (Coulson et al. 2011), correct

identification based on physical features can be difficult and it has even been suggested that some published results on skates are based on misidentified species (Iglesias et al. 2009). Therefore, for the purpose of this study, when comparing species of potential concern, all species of skate were combined into a single species group.

Five species/species groups were identified as being of potential concern: white hake, cusk, skates, Atlantic wolffish, and American plaice. Each of these species/species groups contributed on average to less than 5% of the total catch in each area, and white hake, cusk, Atlantic wolffish, and American plaice each contributed to less than 1% of the total catch in each area (Figure 4). Coral was observed in only a single year (2006) and this occurred during a single trip in SFA 29W (Tables 4 and 16). There were no observed catches of birds, turtles, or sharks.

SUMMARY

Observed inshore scallop trips in SFA 28 and SFA 29W were used to characterize the discards from the inshore scallop fishery in the Maritime regions. Data collected in 2008 and 2009 in the Bay of Fundy and approaches represent the first systematic collection of bycatch data in SFA 28. These data fill the knowledge gap identified by Gavaris et al. (2010) and allow for the spatial distribution of discards to be presented at a level finer than NAFO area. No adjustments to the discard estimates for post-release survival and unpermitted discarding were made. Results are sufficient for making broad comparisons as to the relative importance of discard species within the inshore scallop fishery in SFA 28 and SFA 29W and provide a measure of the number and type of species which overlap with this fishery. However, these results are subject to a number of assumptions.

The estimates of total discards, discards rates, and percent of total fishery catch, are dependent on information collected at-sea. Although all efforts are taken to ensure the integrity of these data, the discard weights recorded by at-sea observers are typically estimated weights since obtaining absolute weights at-sea is often impractical. Specific estimates should not be accepted uncritically as estimated discards of bycatch species are approximate. Observers generally record the lowest weights as one kilogram, thus the recorded weights of smaller animals or species infrequently caught with actual weights < 1 kg, can be overestimated because of this practice. In addition, some bycatch species may remain attached to rocks and/or retain water when samples weights are recorded. The latter likely occurs for both lemonweed and sponges, therefore the results presented for these two species groups should not be accepted uncritically.

Observers are trained in species identification, however, some species are difficult to identify due to similar morphological traits. Gavaris et al. (2010) identified skates and flounders as groups that may have species confused, particularly at small sizes. This study found 5 species groups where observations were recorded at a coarse taxonomic level: unidentified bivalves, unidentified crustaceans, unidentified flounders, unidentified sculpins, and unidentified skates. Unidentified sculpins and skates comprised the largest

discards of the unidentified species. Other recorded species groups were also found to overlap (e.g. *Cancer* spp. (Crab), Jonah crab, and Atlantic rock crab) therefore, care should be taken in the interpretation of results of particular species that overlap with other species groups.

The incidental capture of non-target species can be affected by the nature of the fishery, the time of year, and the location fished. To account for some of these effects discard calculations were done by year and area. It is possible that there is within year variability and finer spatial variability than accounted for in this study. However, limited observer coverage restricted this analysis from either a temporal or spatial resolution finer than a year or SPA. Observed trips were assumed to be representative of the rest of the scallop fishery for the given year and area.

When interpreting these discard results an examination of the at-sea coverage should be considered. For rarely caught species, low at-sea coverage can result in the species not being caught and therefore not identified as a bycatch species, or, if the species is caught, the expansion to a fishery estimate may exaggerate the estimate (Gavaris et al. 2010). From 2002 to 2009, observer coverage in SFA 28 and SFA 29W combined ranged from 0.9% to 4.2%; however the only systematic observer coverage from 2002 to 2007 was in SFA 29W. The two highest levels of coverage occurred in 2008 and 2009 at 3.7% and 4.2%, respectively, which is expected given the directed observed trips in SFA 28. Overall, the level of observer coverage has been low, $\leq$ 12% for each area in each year (Table 3), therefore there is a high potential that the amount of rarely caught species is exaggerated.

Total discards in weight, discard rate, and discards as a percent of the total fishery catch were reported for this study and were summarized both on a broad (i.e. SFA 28 and SFA 29W combined) and fine spatial scale (i.e. SPAs, SFA 29W). Previous results by Gavaris et al. (2010) presented discards as total discards by weight, and summarized discards by NAFO division. The discard summary for SFA 28 and SFA 29W combined is most comparable to the 4X5Y discards by Gavaris et al. (2010).

For all species estimates, there is expected to be some level of difference between the estimates from this study and those by Gavaris et al. (2010). Both analyses expanded the discards from the witnessed portion of a trip up to the observed portion of the trip, however, Gavaris et al. (2010) assumed that an observed trip was equivalent to a fishing trip. For the inshore scallop fishery, this assumption often does not hold since an observed trip is often only part of a longer fishing trip. This may occur when an observer disembarks when a vessel returns to port during either a non-offload or partial offload. In these situations, for this study, the discards from the observed portion of a trip were expanded to the complete trip including the unobserved portion. If the assumption is made that an observed trip is a fishing trip where in fact this is not true, the discard rate, and thus the calculation of discards, is underestimated.

The level of lobster discards estimated in this study are comparable to that of Gavaris et al. (2010) with the exception of 2003 for which the estimates from this study

were slightly less than twice those of Gavaris et al. (2010). The difference in estimates may be due to not all observed trips being prorated up to a full fishing trip by Gavaris et al. (2010), as discussed above. In addition, in 2003, there were 11 observed trips in the Bay of Fundy as a result of inactive VMS boxes. Since it was not possible to determine if the observer protocol was consistently followed for these trips they were excluded from the current analysis, whereas Gavaris et al. (2010) included these trips.

A major difference between the results of this study and that by Gavaris et al. (2010) is the estimate of discards of lemonweed. Lemonweed (*Flustra foliacea)* is a branching bryozoan that is often mistaken for a brown seaweed. Lemonweed was not identified in the previous analysis but discards of seaweed were estimated and made up a significant portion of the catch in 2003 (Gavaris et al. 2010). Upon review of the observer data in the ISDB and after discussions with the observer company, it was determined that *Flustra foliacea* was misidentified as seaweed in previous observed trips. The analysis presented here found that seaweed was not part of the bycatch by the inshore scallop fishery but that lemonweed comprised a large portion of the discards. However, the lemonweed discard estimates varied spatially with most of the discards of lemonweed coming from the Bay of Fundy. Lemonweed has spread significantly throughout the bay since ~ 1996 and is particularly problematic for clogging up fishing gear in SPA 4 (Smith et al. 1999).

Snow crab was identified by Gavaris et al. (2010) as a bycatch species for the inshore scallop fishery; however it was only caught in 2006. In the current analysis, it was determined that there were no observations of snow crab in SFA 28 and SFA 29W. The observations of snow crab were found to come from observed trips in SFA 29 East and were therefore not part of this analysis.

Discard estimates of sea scallop were on the same order of magnitude as those in Gavaris et al. (2010). Sea scallop discards comprised the largest percent of total catch relative to all other discarded species in SFA 28 and 29W combined (Table 6). However, only SFA 29W received systematic observer coverage from 2002 to 2007, so the discard rates and the percentage of total fishery catch for sea scallop discards for both the combined area and SFA 29W are identical for those years. Estimated scallop discards for 2002 to 2007 for SFA 28 and 29W combined may therefore not reflect the actual levels of discards. In 2008 and 2009 there were directed observer trips in SFA 28. Scallop discards as a percent of fishery catch were higher in SFA 29W than in SFA 28. SFA 29W scallop discards as a percentage of total fishery catch were 12% and 20% in 2008 and 2009, respectively (Table 18), compared to 4%, 5%, and 4% in SPA 1, 4, 5, SPA 3, and SPA 6, respectively (Tables 9,12,15). The higher discards of scallop in SFA 29W may be due in part to a higher minimum shell height limit of 100 mm, compared to the minimum shell height limit of 75 mm in SFA 28, as well as differences in the abundance of recruitment (scallops with a shell height less than the shell height minimum) between these areas.

Gavaris et al. (2010) identified that the highest discards of Jonah crab and sculpin in 4X5Y came from the inshore scallop fishery. Although direct comparisons are difficult

due to this study and that by Gavaris et al. (2010) having slightly different species groups, the average yearly magnitude of discards of combined species groups can be compared. The average yearly discards of Atlantic rock crab, Jonah crab and other crabs combined from Gavaris et al. (2010) was ~ 306 mt whereas average yearly discards of Atlantic rock crab, Jonah crab and Cancer *spp.* from this study was ~ 411 mt. The average yearly discards of sculpin from Gavaris et al. (2010) was ~ 103 mt compared to an average yearly discards amount of ~ 68 mt for all sculpin groups combined from this study.

For species of potential concern, the inshore scallop fishery was identified as having the third highest discards of winter skate by Gavaris et al. (2010). A direct comparison to winter skate is not possible due to the combination of little and winter skate in this study, however an overall comparison of skate discards can be made. From Gavaris et al. (2010) the average yearly discards of all skate species for the inshore scallop fishery was ~ 57 mt. In this study, which uses data from 2002 to 2009, the average yearly discards of skate is ~ 220 mt. This difference is due to two factors. In both 2008 and 2009, the discards of skate in SFA 29W were ~ 6 times the average level observed from 2002 to 2007 (Table 16). In addition, the discard rates of skate species were, on average, higher in SFA 28 than in SFA 29W. This resulted in higher discard estimates for the combined area of SFA 28 and SFA 29W in 2008 and 2009 than in previous years when observed trips were only from SFA 29W (Table 4). However, even with this increase in estimated discards, skate contributed to less than 5% of the total fishery catch in each area (Figure 4).

Although the discard estimates presented in this report are subject to a number of assumptions, they are sufficient for making broad comparisons as to the relative importance of discard species within the inshore scallop fishery in SFA 28 and SFA 29W and provide a measure of the number and type of species which overlap with this fishery. The coverage in SFA 28 as part of the SARCEP project allowed spatial differences in discards between SPAs in SFA 28 and SFA 29W to be examined and this was found to be of particular importance for sea scallop discard estimates.

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Table 1. Landings of sea scallop (mt) in meat weight by area and year.

Area	2002	2003	2004	2005	2006	2007	2008	2009
SPA1,4,5	1841.3	2293.9	1650.1	1076.0	602.6	673.4	704.0	797.6
SPA2	0.1	2.3	0	0	0.9	0	0.2	0
SPA3	30.9	227.8	153.2	220.2	184.7	120.7	79.5	65.0
SPA6	128.2	89.7	82.5	85.4	91.1	68.3	69.0	90.4
SFA29W	710.1	234.6	512.6	253.4	413.2	251.0	255.7	248.7
SFA28&29W	2710.5	2846.1	2398.5	1634.9	1291.6	1113.4	1108.2	1201.6

Table 2. Landings of monkfish (mt) by area and year.

Area	2002	2003	2004	2005	2006	2007	2008	2009
SPA1,4,5	27.07	88.42	55.53	12.14	3.89	2.90	1.06	0.35
SPA2	0	0.50	0	0	0	0	0	0
SPA3	1.63	28.60	13.94	56.70	25.86	1.08	0.14	0
SPA6	0.27	1.11	0.12	0	0	0	0	0
SFA29W	0.04	0	0.02	0	0.06	0.03	0	0
SFA28&29W	29.02	118.63	69.61	68.84	29.80	4.01	1.21	0.35

Table 3. Observed and total landings (mt) of all species by area and year. The percent observed coverage is also indicated. Scallop weight used is in meat weight.

Area	2002	2003	2004	2005	2006	2007	2008	2009
SPA1,4,5	0/1868.4 0%	0/2382.3 0%	0/1705.7 0%	0/1088.1 0%	0/606.5 0%	0/676.2 0%	13.7/705.0 2%	27/797.9 3%
SPA2	0/0.1 0%	0/2.8 0%	0/0 0%	0/0 0%	0/0.9 0%	0/0 0%	0/0 0%	0/0 0%
SPA3	0/32.6 0%	0/256.4 0%	0/167.2 0%	0/276.9 0%	0/210.6 0%	0/121.8 0%	3.8/79.6 5%	0/65.0 0%
SPA6	0/128.5 0%	0/90.9 0%	0/82.6 0%	0/85.4 0%	0/91.1 0%	0/68.3 0%	0/69.0 0%	8.5/90.4 9%
SFA29W	68/710.2 10%	28/234.6 12%	51/512.6 10%	15/253.4 6%	27/413.3 7%	10/251.1 4%	24.0/255.7 9%	15/248.7 6%
SFA28&29W	68/2739.7 2.5%	28/2967.0 0.9%	51/2468.1 2.1%	15/1703.8 0.9%	27/1322.3 2.0%	10/1117.4 0.9%	41.5/1109.4 3.7%	50.9/1202.0 4.2%

Table 4. Inshore scallop fishery discards (kg) in SFA 28 and SFA 29W combined. Scallop discards are in round weight.

Species	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
ALLIGATORFISH	0	0	0	113	0	0	0	1485
AMERICAN EEL	0	0	0	0	0	0	4303	4880
AMERICAN LOBSTER	36284	113127	36961	36410	87207	37795	50919	53370
AMERICAN PLAICE	368	315	77	0	230	1165	9244	43366
ARCTIC STAGHORN SCULPIN	0	0	0	0	0	0	0	3533
ATLANTIC MOONFISH	0	0	0	0	0	0	0	137397
ATLANTIC ROCK CRAB	155423	192239	96365	47383	224843	15519	249094	347350
BARNACLES	0	0	0	0	2608	0	0	0
BARNDOOR SKATE	654	0	0	0	0	0	7295	0
BASKET STARS	4599	152997	117636	0	1642	0	0	129770
BRILL/WINDOWPANE FLOUNDER	0	0	0	0	0	0	97904	8176
BRITTLE STAR	2000	40694	1704701	0	97	0	13764	0
CANCER SPP. (CRAB)	0	0	2432	0	0	72878	79470	0
CEPHALOPODA C.	0	0	432	0	0	0	0	18466
CLAMS	1080	67193	613448	211425	9272	0	26357	0
COD (ATLANTIC)	348	315	115	230	414	781	1441	3019
COMMON MUSSELS	94031	217250	276396	294078	347917	18865	181313	520082
CORALS	0	0	0	0	1883	0	0	0
CUNNER	0	0	0	0	0	0	3958	0
CUSK	0	105	0	0	0	0	19060	7284
EELPOUTS	0	0	0	0	0	0	0	7066
FOURHORN SCULPIN	0	0	0	0	0	0	0	6868
HADDOCK	282	0	0	0	75	0	0	0
HALIBUT (ATLANTIC)	0	1005	52	0	0	0	4680	33485
HERMIT CRABS	49721	43581	45878	23640	25047	145892	65183	80183
HERRING	0	0	0	0	0	0	0	12503
HYDROZOA C.	80	0	0	0	0	0	0	0
ICELAND SCALLOP	147	315	486	0	2511	0	0	0
JELLYFISHES	40	1138	0	0	0	0	0	0
JONAH CRAB	84007	635937	170110	119391	163681	274472	160347	203159
LEMONWEED	160	30705	0	788	2318	0	4150941	4383395
LITTLE,WINTER SKATE	15221	20505	0	30277	19555	1331	148807	98133
LONGHORN SCULPIN	44348	65025	49021	45467	29969	26706	122650	74064
LUMPFISH	0	0	0	118	145	0	3576	19076
MONKFISH	69413	30786	21370	13872	7964	3815	31611	42996
MULLET FISH	1920	0	0	0	0	0	0	0
NORTHERN STONE CRAB	0	0	0	0	0	22102	14590	0
OCEAN POUT	124	210	264	0	145	0	12776	4114
OCEAN QUAHAUG	0	0	0	113	0	0	0	158678
OCTOPUS	0	0	0	0	0	0	22930	1485
POLLOCK	40	0	0	0	0	0	0	0
PRICKLEBACKS	0	0	0	0	48	0	0	0

Table 4 cont'd. Inshore scallop fishery discards (kg) in SFA 28 and 29W combined. Scallop discards are in round weight.

Species	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
REDFISH UNSEPARATED	0	0	132	0	123	0	0	793
ROCK GUNNEL	0	0	0	0	0	0	0	5876
ROUND SKATE	0	1893	0	225	5355	0	584418	121160
SAND DOLLARS, SEA URCHINS	89773	49926	44001	73728	77160	120535	62915	399135
SAND LANCES	0	105	0	0	0	0	0	0
SEA ANEMONE	200	0	0	0	290	0	0	0
SEA CUCUMBERS	95199	14191	73057	775635	573098	108949	652994	507376
SEA LAMPREY	0	0	62	0	0	0	0	0
SEA PEACH	0	0	0	0	1497	0	0	0
SEA POTATO	0	0	0	0	290	0	0	173827
SEA RAVEN	51863	75031	62161	41308	82347	19186	47411	37407
SEA SCALLOP	746598	2002617	2162088	1942026	726891	658097	616193	751092
SEAROBINS	1320	0	0	0	0	0	2991	1911
SHORTHORN SCULPIN	0	0	0	0	48	0	2013	0
SHRIMP	0	1577	0	113	48	0	38216	11364
SILVER HAKE	0	0	0	0	0	0	4926	16637
SMOOTH SKATE	17507	315	4633	5064	290	0	56248	40219
SNAILS AND SLUGS	1032	0	3318	8553	2637	0	0	541482
SPIDER CRAB	0	0	0	0	0	0	0	167828
SPINY DOGFISH	0	0	0	0	0	0	6039	0
SPONGES	244440	139050	1823626	214990	25011	0	1544291	2944727
SQUIRREL OR RED HAKE	0	0	0	0	0	0	5038	0
STARFISH	492690	269684	318896	486430	466739	311229	821315	748022
STICKLEBACK	0	0	0	0	0	0	0	14395
STRIPED ATLANTIC WOLFFISH	0	0	1263	450	145	0	1642	5808
SUMMER FLOUNDER	0	0	0	0	0	0	39803	28479
THORNY SKATE	2285	37016	27306	4856	16640	40063	150305	71347
TOAD CRAB	59542	0	1039	0	918	0	13241	11743
TUNICATE	0	0	0	0	531	0	1694	0
UNIDENT BIVALVES	1040	10423	0	0	0	0	0	202106
UNIDENT CRUSTACEANS	0	0	0	0	0	0	0	830613
UNIDENT FLOUNDER	0	0	49	0	0	0	0	0
UNIDENT SCULPINS	1781	7923	13923	9491	1014	12768	0	29419
UNIDENT SKATES	16976	28489	21391	7315	330	0	96858	56138
WHELKS	0	0	2239	0	3091	0	0	26034
WHITE HAKE	40	0	0	0	0	0	8664	6976
WINTER FLOUNDER	5170	4845	9803	4519	3326	3110	24418	30930
WITCH FLOUNDER	84	1101	2001	235	531	333	7975	8677
WORMS	0	0	0	0	0	0	30573	0
YELLOWTAIL FLOUNDER	1461	291	2158	450	704	1340	9836	5860

Table 5. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SFA 28 and SFA 29W combined.

Species	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
ALLIGATORFISH	0	0	0	<0.001	0	0	0	0.001
AMERICAN EEL	0	0	0	0	0	0	0.004	0.004
AMERICAN LOBSTER	0.013	0.038	0.015	0.021	0.066	0.034	0.046	0.044
AMERICAN PLAICE	<0.001	<0.001	<0.001	0	<0.001	0.001	0.008	0.036
ARCTIC STAGHORN SCULPIN	0	0	0	0	0	0	0	0.003
ATLANTIC MOONFISH	0	0	0	0	0	0	0	0.114
ATLANTIC ROCK CRAB	0.057	0.065	0.039	0.028	0.170	0.014	0.225	0.289
BARNACLES	0	0	0	0	0.002	0	0	0
BARNDOOR SKATE	<0.001	0	0	0	0	0	0.007	0
BASKET STARS	0.002	0.052	0.048	0	0.001	0	0	0.108
BRILL/WINDOWPANE FLOUNDER	0	0	0	0	0	0	0.088	0.007
BRITTLE STAR	0.001	0.014	0.691	0	<0.001	0	0.012	0
CANCER SPP. (CRAB)	0	0	0.001	0	0	0.065	0.072	0
CEPHALOPODA C.	0	0	<0.001	0	0	0	0	0.015
CLAMS	<0.001	0.023	0.249	0.124	0.007	0	0.024	0
COD (ATLANTIC)	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.003
COMMON MUSSELS	0.034	0.073	0.112	0.173	0.263	0.017	0.163	0.433
CORALS	0	0	0	0	0.001	0	0	0
CUNNER	0	0	0	0	0	0	0.004	0
CUSK	0	<0.001	0	0	0	0	0.017	0.006
EELPOUTS	0	0	0	0	0	0	0	0.006
FOURHORN SCULPIN	0	0	0	0	0	0	0	0.006
HADDOCK	<0.001	0	0	0	<0.001	0	0	0
HALIBUT (ATLANTIC)	0	<0.001	<0.001	0	0	0	0.004	0.028
HERMIT CRABS	0.018	0.015	0.019	0.014	0.019	0.131	0.059	0.067
HERRING	0	0	0	0	0	0	0	0.010
HYDROZOA C.	<0.001	0	0	0	0	0	0	0
ICELAND SCALLOP	<0.001	<0.001	<0.001	0	0.002	0	0	0
JELLYFISHES	<0.001	<0.001	0	0	0	0	0	0
JONAH CRAB	0.031	0.215	0.069	0.070	0.124	0.246	0.145	0.169
LEMONWEED	<0.001	0.010	0	<0.001	0.002	0	3.742	3.647
LITTLE,WINTER SKATE	0.006	0.007	0	0.018	0.015	0.001	0.134	0.082
LONGHORN SCULPIN	0.016	0.022	0.020	0.027	0.023	0.024	0.111	0.062
LUMPFISH	0	0	0	<0.001	<0.001	0	0.003	0.016
MONKFISH	0.025	0.010	0.009	0.008	0.006	0.003	0.028	0.036
MULLET FISH	0.001	0	0	0	0	0	0	0
NORTHERN STONE CRAB	0	0	0	0	0	0.020	0.013	0
OCEAN POUT	<0.001	<0.001	<0.001	0	<0.001	0	0.012	0.003
OCEAN QUAHAUG	0	0	0	<0.001	0	0	0	0.132
OCTOPUS	0	0	0	0	0	0	0.021	0.001
POLLOCK	<0.001	0	0	0	0	0	0	0
PRICKLEBACKS	0	0	0	0	<0.001	0	0	0

Table 5 cont'd. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SFA 28 and SFA 29W combined.

Species	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
REDFISH UNSEPARATED	0	0	<0.001	0	<0.001	0	0	0.001
ROCK GUNNEL	0	0	0	0	0	0	0	0.005
ROUND SKATE	0	0.001	0	<0.001	0.004	0	0.527	0.101
SAND DOLLARS, SEA URCHINS	0.033	0.017	0.018	0.043	0.058	0.108	0.057	0.332
SAND LANCES	0	<0.001	0	0	0	0	0	0
SEA ANEMONE	<0.001	0	0	0	<0.001	0	0	0
SEA CUCUMBERS	0.035	0.005	0.030	0.455	0.434	0.097	0.589	0.422
SEA LAMPREY	0	0	<0.001	0	0	0	0	0
SEA PEACH	0	0	0	0	0.001	0	0	0
SEA POTATO	0	0	0	0	<0.001	0	0	0.145
SEA RAVEN	0.019	0.025	0.025	0.024	0.062	0.017	0.043	0.031
SEA SCALLOP	0.273	0.675	0.876	1.140	0.550	0.589	0.555	0.625
SEAROBINS	<0.001	0	0	0	0	0	0.003	0.002
SHORTHORN SCULPIN	0	0	0	0	<0.001	0	0.002	0
SHRIMP	0	0.001	0	<0.001	<0.001	0	0.034	0.009
SILVER HAKE	0	0	0	0	0	0	0.004	0.014
SMOOTH SKATE	0.006	<0.001	0.002	0.003	<0.001	0	0.051	0.033
SNAILS AND SLUGS	<0.001	0	0.001	0.005	0.002	0	0	0.450
SPIDER CRAB	0	0	0	0	0	0	0	0.140
SPINY DOGFISH	0	0	0	0	0	0	0.005	0
SPONGES	0.089	0.047	0.739	0.126	0.019	0	1.392	2.450
SQUIRREL OR RED HAKE	0	0	0	0	0	0	0.005	0
STARFISH	0.180	0.091	0.129	0.285	0.353	0.279	0.740	0.622
STICKLEBACK	0	0	0	0	0	0	0	0.012
STRIPED ATLANTIC WOLFFISH	0	0	0.001	<0.001	<0.001	0	0.001	0.005
SUMMER FLOUNDER	0	0	0	0	0	0	0.036	0.024
THORNY SKATE	0.001	0.012	0.011	0.003	0.013	0.036	0.135	0.059
TOAD CRAB	0.022	0	<0.001	0	0.001	0	0.012	0.010
TUNICATE	0	0	0	0	<0.001	0	0.002	0
UNIDENT BIVALVES	<0.001	0.004	0	0	0	0	0	0.168
UNIDENT CRUSTACEANS	0	0	0	0	0	0	0	0.691
UNIDENT FLOUNDER	0	0	<0.001	0	0	0	0	0
UNIDENT SCULPINS	0.001	0.003	0.006	0.006	0.001	0.011	0	0.024
UNIDENT SKATES	0.006	0.010	0.009	0.004	<0.001	0	0.087	0.047
WHELKS	0	0	0.001	0	0.002	0	0	0.022
WHITE HAKE	<0.001	0	0	0	0	0	0.008	0.006
WINTER FLOUNDER	0.002	0.002	0.004	0.003	0.003	0.003	0.022	0.026
WITCH FLOUNDER	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.007	0.007
WORMS	0	0	0	0	0	0	0.028	0
YELLOWTAIL FLOUNDER	0.001	<0.001	0.001	<0.001	0.001	0.001	0.009	0.005

Table 6. Inshore scallop fishery discards as a percentage of total fishery catch in SFA 28 and SFA 29W combined.

Species	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
ALLIGATORFISH	0	0	0	<0.01	0	0	0	0.01
AMERICAN EEL	0	0	0	0	0	0	0.04	0.03
AMERICAN LOBSTER	0.71	1.57	0.36	0.60	2.06	1.25	0.45	0.35
AMERICAN PLAICE	0.01	<0.01	<0.01	0	0.01	0.04	0.08	0.28
ARCTIC STAGHORN SCULPIN	0	0	0	0	0	0	0	0.02
ATLANTIC MOONFISH	0	0	0	0	0	0	0	0.89
ATLANTIC ROCK CRAB	3.03	2.66	0.95	0.78	5.31	0.51	2.18	2.26
BARNACLES	0	0	0	0	0.06	0	0	0
BARNDOOR SKATE	0.01	0	0	0	0	0	0.06	0
BASKET STARS	0.09	2.12	1.16	0	0.04	0	0	0.84
BRILL/WINDOWPANE FLOUNDER	0	0	0	0	0	0	0.86	0.05
BRITTLE STAR	0.04	0.56	16.75	0	<0.01	0	0.12	0
CANCER SPP. (CRAB)	0	0	0.02	0	0	2.42	0.70	0
CEPHALOPODA C.	0	0	<0.01	0	0	0	0	0.12
CLAMS	0.02	0.93	6.03	3.46	0.22	0	0.23	0
COD (ATLANTIC)	0.01	<0.01	<0.01	<0.01	0.01	0.03	0.01	0.02
COMMON MUSSELS	1.83	3.01	2.72	4.82	8.21	0.63	1.59	3.38
CORALS	0	0	0	0	0.04	0	0	0
CUNNER	0	0	0	0	0	0	0.03	0
CUSK	0	<0.01	0	0	0	0	0.17	0.05
EELPOUTS	0	0	0	0	0	0	0	0.05
FOURHORN SCULPIN	0	0	0	0	0	0	0	0.04
HADDOCK	0.01	0	0	0	<0.01	0	0	0
HALIBUT (ATLANTIC)	0	0.01	<0.01	0	0	0	0.04	0.22
HERMIT CRABS	0.97	0.60	0.45	0.39	0.59	4.84	0.57	0.52
HERRING	0	0	0	0	0	0	0	0.08
HYDROZOA C.	<0.01	0	0	0	0	0	0	0
ICELAND SCALLOP	<0.01	<0.01	<0.01	0	0.06	0	0	0
JELLYFISHES	<0.01	0.02	0	0	0	0	0	0
JONAH CRAB	1.64	8.80	1.67	1.96	3.86	9.11	1.40	1.32
LEMONWEED	<0.01	0.43	0	0.01	0.05	0	36.34	28.46
LITTLE,WINTER SKATE	0.30	0.28	0	0.50	0.46	0.04	1.30	0.64
LONGHORN SCULPIN	0.86	0.90	0.48	0.75	0.71	0.89	1.07	0.48
LUMPFISH	0	0	0	<0.01	<0.01	0	0.03	0.12
MONKFISH	1.35	0.43	0.21	0.23	0.19	0.13	0.28	0.28
MULLET FISH	0.04	0	0	0	0	0	0	0
NORTHERN STONE CRAB	0	0	0	0	0	0.73	0.13	0
OCEAN POUT	<0.01	<0.01	<0.01	0	<0.01	0	0.11	0.03
OCEAN QUAHAUG	0	0	0	<0.01	0	0	0	1.03
OCTOPUS	0	0	0	0	0	0	0.20	0.01
POLLOCK	<0.01	0	0	0	0	0	0	0
PRICKLEBACKS	0	0	0	0	<0.01	0	0	0

Table 6 cont'd. Inshore scallop fishery discards as a percentage of total fishery catch in SFA 28 and SFA 29W combined.

Species	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
REDFISH UNSEPARATED	0	0	<0.01	0	<0.01	0	0	0.01
ROCK GUNNEL	0	0	0	0	0	0	0	0.04
ROUND SKATE	0	0.03	0	<0.01	0.13	0	5.12	0.79
SAND DOLLARS, SEA URCHINS	1.75	0.69	0.43	1.21	1.82	4.00	0.55	2.59
SAND LANCES	0	<0.01	0	0	0	0	0	0
SEA ANEMONE	<0.01	0	0	0	0.01	0	0	0
SEA CUCUMBERS	1.86	0.20	0.72	12.71	13.52	3.61	5.72	3.29
SEA LAMPREY	0	0	<0.01	0	0	0	0	0
SEA PEACH	0	0	0	0	0.04	0	0	0
SEA POTATO	0	0	0	0	0.01	0	0	1.13
SEA RAVEN	1.01	1.04	0.61	0.68	1.94	0.64	0.42	0.24
SEA SCALLOP	14.56	27.73	21.24	31.82	17.15	21.83	5.39	4.88
SEAROBINS	0.03	0	0	0	0	0	0.03	0.01
SHORTHORN SCULPIN	0	0	0	0	<0.01	0	0.02	0
SHRIMP	0	0.02	0	<0.01	<0.01	0	0.33	0.07
SILVER HAKE	0	0	0	0	0	0	0.04	0.11
SMOOTH SKATE	0.34	<0.01	0.05	0.08	0.01	0	0.49	0.26
SNAILS AND SLUGS	0.02	0	0.03	0.14	0.06	0	0	3.52
SPIDER CRAB	0	0	0	0	0	0	0	1.09
SPINY DOGFISH	0	0	0	0	0	0	0.05	0
SPONGES	4.77	1.93	17.92	3.52	0.59	0	13.52	19.12
SQUIRREL OR RED HAKE	0	0	0	0	0	0	0.04	0
STARFISH	9.61	3.73	3.13	7.97	11.01	10.32	7.19	4.86
STICKLEBACK	0	0	0	0	0	0	0	0.09
STRIPED ATLANTIC WOLFFISH	0	0	0.01	0.01	<0.01	0	0.01	0.04
SUMMER FLOUNDER	0	0	0	0	0	0	0.35	0.18
THORNY SKATE	0.04	0.51	0.27	0.08	0.39	1.33	1.32	0.46
TOAD CRAB	1.16	0	0.01	0	0.02	0	0.12	0.08
TUNICATE	0	0	0	0	0.01	0	0.01	0
UNIDENT BIVALVES	0.02	0.14	0	0	0	0	0	1.31
UNIDENT CRUSTACEANS	0	0	0	0	0	0	0	5.39
UNIDENT FLOUNDER	0	0	<0.01	0	0	0	0	0
UNIDENT SCULPINS	0.03	0.11	0.14	0.16	0.02	0.42	0	0.19
UNIDENT SKATES	0.33	0.39	0.21	0.12	0.01	0	0.85	0.36
WHELKS	0	0	0.02	0	0.07	0	0	0.17
WHITE HAKE	<0.01	0	0	0	0	0	0.08	0.05
WINTER FLOUNDER	0.10	0.07	0.10	0.07	0.08	0.10	0.21	0.20
WITCH FLOUNDER	<0.01	0.02	0.02	<0.01	0.01	0.01	0.07	0.06
WORMS	0	0	0	0	0	0	0.27	0
YELLOWTAIL FLOUNDER	0.03	<0.01	0.02	0.01	0.02	0.04	0.09	0.04
SEA SCALLOP AND MONKFISH LANDINGS	**53.41**	**41.05**	**24.25**	**27.92**	**31.18**	**37.07**	**9.71**	**7.80**

Table 7. Inshore scallop fishery discards (kg) in SPA 1, 4, 5. Scallop discards are in round weight.

Species	*2008*	*2009*
AMERICAN EEL	7081	3240
AMERICAN LOBSTER	22096	24538
AMERICAN PLAICE	6448	23091
ARCTIC STAGHORN SCULPIN	0	2345
ATLANTIC MOONFISH	0	91208
ATLANTIC ROCK CRAB	181675	156464
BRILL/WINDOWPANE	62220	5427
BRITTLE STAR	13982	0
COD (ATLANTIC)	2578	3315
CUSK	12113	4836
EELPOUTS	0	4691
HALIBUT(ATLANTIC)	3104	22228
HERMIT CRABS	55193	32341
HERRING	0	2204
JONAH CRAB	72794	104484
LEMONWEED	2637986	3091722
LITTLE,WINTER SKATE	149746	66242
LONGHORN SCULPIN	25021	44092
MONKFISH	27817	0
MUSSELS	36277	278262
OCEAN POUT	8119	5696
OCTOPUS	14572	0
ROCK GUNNEL	0	3900
ROUND SKATE	371407	80429
SAND DOLLARS, SEA URCHINS	60164	70076
SEA CUCUMBERS	5130	19121
SEA RAVEN	18873	12096
SEA SCALLOP	507427	362912
SEAROBIN	1901	1268
SHRIMP	24287	7060
SILVER HAKE	6790	0
SMOOTH SKATE	44818	21913
SPINY DOGFISH	3838	0
SPONGES	5864066	5315134
SQUIRREL OR RED HAKE	3202	0
STARFISH	315607	475616
STICKLEBACK	0	9556
STRIPED ATLANTIC WOLFFISH	0	2150
SUMMER FLOUNDER	25295	19712
THORNY SKATE	119636	50586
UNIDENT BIVALVES	0	134164
UNIDENT CRUSTACEANS	0	551383
UNIDENT SCULPINS	0	13113
UNIDENT SKATES	0	22417

Table 7 cont'd. Inshore scallop fishery discards (kg) in SPA 1, 4, 5. Scallop discards are in round weight.

Species	*2008*	*2009*
WHITE HAKE	5506	8467
WINTER FLOUNDER	20991	20141
WITCH FLOUNDER	7120	8613
WORMS	19430	0
YELLOWTAIL FLOUNDER	5784	2154

Table 8. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SPA 1, 4, 5.

Species	*2008*	*2009*
AMERICAN EEL	0.010	0.004
AMERICAN LOBSTER	0.031	0.031
AMERICAN PLAICE	0.009	0.029
ARCTIC STAGHORN SCULPIN	0	0.003
ATLANTIC MOONFISH	0	0.114
ATLANTIC ROCK CRAB	0.258	0.196
BRILL/WINDOWPANE	0.088	0.007
BRITTLE STAR	0.020	0
COD (ATLANTIC)	0.004	0.004
CUSK	0.017	0.006
EELPOUTS	0	0.006
HALIBUT(ATLANTIC)	0.004	0.028
HERMIT CRABS	0.078	0.041
HERRING	0	0.003
JONAH CRAB	0.103	0.131
LEMONWEED	3.742	3.875
LITTLE,WINTER SKATE	0.212	0.083
LONGHORN SCULPIN	0.035	0.055
MONKFISH	0.039	0
MUSSELS	0.051	0.349
OCEAN POUT	0.012	0.007
OCTOPUS	0.021	0
ROCK GUNNEL	0	0.005
ROUND SKATE	0.527	0.101
SAND DOLLARS, SEA URCHINS	0.085	0.088
SEA CUCUMBERS	0.007	0.024
SEA RAVEN	0.027	0.015
SEA SCALLOP	0.720	0.455
SEAROBIN	0.003	0.002
SHRIMP	0.034	0.009
SILVER HAKE	0.010	0
SMOOTH SKATE	0.064	0.027
SPINY DOGFISH	0.005	0
SPONGES	8.317	6.661

Table 8 cont'd. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SPA 1, 4, 5.

Species	*2008*	*2009*
SQUIRREL OR RED HAKE	0.005	0
STARFISH	0.448	0.596
STICKLEBACK	0	0.012
STRIPED ATLANTIC WOLFFISH	0	0.003
SUMMER FLOUNDER	0.036	0.025
THORNY SKATE	0.170	0.063
UNIDENT BIVALVES	0	0.168
UNIDENT CRUSTACEANS	0	0.691
UNIDENT SCULPINS	0	0.016
UNIDENT SKATES	0	0.028
WHITE HAKE	0.008	0.011
WINTER FLOUNDER	0.030	0.025
WITCH FLOUNDER	0.010	0.011
WORMS	0.028	0
YELLOWTAIL FLOUNDER	0.008	0.003

Table 9. Inshore scallop fishery discards as a percentage of total fishery catch in SPA 1, 4, 5.

Species	*2008*	*2009*
AMERICAN EEL	0.06	0.03
AMERICAN LOBSTER	0.19	0.20
AMERICAN PLAICE	0.06	0.19
ARCTIC STAGHORN SCULPIN	0	0.02
ATLANTIC MOONFISH	0	0.76
ATLANTIC ROCK CRAB	1.58	1.31
BRILL/WINDOWPANE	0.54	0.05
BRITTLE STAR	0.12	0
COD (ATLANTIC)	0.02	0.03
CUSK	0.11	0.04
EELPOUTS	0	0.04
HALIBUT(ATLANTIC)	0.03	0.19
HERMIT CRABS	0.48	0.27
HERRING	0	0.02
JONAH CRAB	0.63	0.87
LEMONWEED	22.99	25.82
LITTLE,WINTER SKATE	1.30	0.55
LONGHORN SCULPIN	0.22	0.37
MONKFISH	0.24	0
MUSSELS	0.32	2.32
OCEAN POUT	0.07	0.05
OCTOPUS	0.13	0
ROCK GUNNEL	0	0.03
ROUND SKATE	3.24	0.67

Table 9 cont'd. Inshore scallop fishery discards as a percentage of total fishery catch in SPA 1, 4, 5.

Species	***2008***	***2009***
SAND DOLLARS, SEA URCHINS	0.52	0.59
SEA CUCUMBERS	0.04	0.16
SEA RAVEN	0.16	0.10
SEA SCALLOP	4.42	3.03
SEAROBIN	0.02	0.01
SHRIMP	0.21	0.06
SILVER HAKE	0.06	0
SMOOTH SKATE	0.39	0.18
SPINY DOGFISH	0.03	0
SPONGES	51.10	44.38
SQUIRREL OR RED HAKE	0.03	0
STARFISH	2.75	3.97
STICKLEBACK	0	0.08
STRIPED ATLANTIC WOLFFISH	0	0.02
SUMMER FLOUNDER	0.22	0.16
THORNY SKATE	1.04	0.42
UNIDENT BIVALVES	0	1.12
UNIDENT CRUSTACEANS	0	4.60
UNIDENT SCULPINS	0	0.11
UNIDENT SKATES	0	0.19
WHITE HAKE	0.05	0.07
WINTER FLOUNDER	0.18	0.17
WITCH FLOUNDER	0.06	0.07
WORMS	0.17	0
YELLOWTAIL FLOUNDER	0.05	0.02
SEA SCALLOP AND MONKFISH LANDINGS	**6.14**	**6.66**

Table 10. Inshore scallop fishery discards (kg) in SPA 3. Scallop discards are in round weight.

Species	***2008***
AMERICAN LOBSTER	7633
ATLANTIC ROCK CRAB	25821
CANCER SPP. (CRAB)	9372
CLAM	6953
CUNNER	284
HERMIT CRABS	3923
JONAH CRAB	18559
LITTLE,WINTER SKATE	3868
LONGHORN SCULPIN	4382
MONKFISH	1960
MUSSELS	22725
SAND DOLLARS, SEA URCHINS	657
SEA RAVEN	3284
SEA SCALLOP	11724
SMOOTH SKATE	1960
SPONGES	15073
STARFISH	6261
THORNY SKATE	4870
WINTER FLOUNDER	1595
WITCH FLOUNDER	1361
YELLOWTAIL FLOUNDER	680

Table 11. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SPA 3.

Species	***2008***
AMERICAN LOBSTER	0.096
ATLANTIC ROCK CRAB	0.324
CANCER SPP. (CRAB)	0.118
CLAM	0.087
CUNNER	0.004
HERMIT CRABS	0.049
JONAH CRAB	0.233
LITTLE,WINTER SKATE	0.049
LONGHORN SCULPIN	0.055
MONKFISH	0.025
MUSSELS	0.285
SAND DOLLARS, SEA URCHINS	0.008
SEA RAVEN	0.041
SEA SCALLOP	0.147
SMOOTH SKATE	0.025
SPONGES	0.189
STARFISH	0.079
THORNY SKATE	0.061
WINTER FLOUNDER	0.020
WITCH FLOUNDER	0.017
YELLOWTAIL FLOUNDER	0.009

Table 12. Inshore scallop fishery discards as a percentage of total fishery catch in SPA 3.

Species	***2008***
AMERICAN LOBSTER	3.28
ATLANTIC ROCK CRAB	11.10
CANCER SPP. (CRAB)	4.03
CLAM	2.99
CUNNER	0.12
HERMIT CRABS	1.69
JONAH CRAB	7.98
LITTLE,WINTER SKATE	1.66
LONGHORN SCULPIN	1.88
MONKFISH	0.84
MUSSELS	9.77
SAND DOLLARS, SEA URCHINS	0.28
SEA RAVEN	1.41
SEA SCALLOP	5.04
SMOOTH SKATE	0.84
SPONGES	6.48
STARFISH	2.69
THORNY SKATE	2.09
WINTER FLOUNDER	0.69
WITCH FLOUNDER	0.59
YELLOWTAIL FLOUNDER	0.29
SEA SCALLOP AND MONKFISH LANDINGS	**34.23**

Table 13. Inshore scallop fishery discards (kg) in SPA 6. Scallop discards are in round weight.

Species	*2009*
AMERICAN LOBSTER	7649
ATLANTIC ROCK CRAB	49208
CEPHALOPODA C.	1347
FOURHORN SCULPIN	517
HERMIT CRABS	11613
HERRING	2829
JONAH CRAB	35794
LEMONWEED	259776
LITTLE,WINTER SKATE	10970
LONGHORN SCULPIN	3877
LUMPFISH	1436
MONKFISH	2205
MUSSELS	258386
OCEAN QUAHAUG	11938
REDFISH UNSEPARATED	60
SAND DOLLARS, SEA URCHINS	131852
SEA CUCUMBERS	153716
SEA POTATO	13078
SEA RAVEN	4890
SEA SCALLOP	58658
SEA URCHINS	4340
SHRIMP	1109
SILVER HAKE	1252
SMOOTH SKATE	399
SNAILS AND SLUGS	326785
SPIDER CRAB	12626
SPONGES	2205
STARFISH	79718
STRIPED ATLANTIC WOLFFISH	801
SUMMER FLOUNDER	614
THORNY SKATE	2558
TOAD CRAB	883
UNIDENT SCULPINS	6547
UNIDENT SKATES	5280
WHELKS	1436
WINTER FLOUNDER	5718
YELLOWTAIL FLOUNDER	61

Table 14. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SPA 6.

Species	***2009***
AMERICAN LOBSTER	0.085
ATLANTIC ROCK CRAB	0.544
CEPHALOPODA C.	0.015
FOURHORN SCULPIN	0.006
HERMIT CRABS	0.128
HERRING	0.031
JONAH CRAB	0.396
LEMONWEED	2.873
LITTLE,WINTER SKATE	0.121
LONGHORN SCULPIN	0.043
LUMPFISH	0.016
MONKFISH	0.024
MUSSELS	2.857
OCEAN QUAHAUG	0.132
REDFISH UNSEPARATED	0.001
SAND DOLLARS, SEA URCHINS	1.458
SEA CUCUMBERS	1.700
SEA POTATO	0.145
SEA RAVEN	0.054
SEA SCALLOP	0.649
SEA URCHINS	0.048
SHRIMP	0.012
SILVER HAKE	0.014
SMOOTH SKATE	0.004
SNAILS AND SLUGS	3.614
SPIDER CRAB	0.140
SPONGES	0.024
STARFISH	0.882
STRIPED ATLANTIC WOLFFISH	0.009
SUMMER FLOUNDER	0.007
THORNY SKATE	0.028
TOAD CRAB	0.010
UNIDENT SCULPINS	0.072
UNIDENT SKATES	0.058
WHELKS	0.016
WINTER FLOUNDER	0.063
YELLOWTAIL FLOUNDER	0.001

Table 15. Inshore scallop fishery discards as a percentage of total fishery catch in SPA 6.

Species	***2009***
AMERICAN LOBSTER	0.49
ATLANTIC ROCK CRAB	3.15
CEPHALOPODA C.	0.09
FOURHORN SCULPIN	0.03
HERMIT CRABS	0.74
HERRING	0.18
JONAH CRAB	2.29
LEMONWEED	16.63
LITTLE,WINTER SKATE	0.70
LONGHORN SCULPIN	0.25
LUMPFISH	0.09
MONKFISH	0.14
MUSSELS	16.54
OCEAN QUAHAUG	0.76
REDFISH UNSEPARATED	<0.01
SAND DOLLARS, SEA URCHINS	8.44
SEA CUCUMBERS	9.84
SEA POTATO	0.84
SEA RAVEN	0.31
SEA SCALLOP	3.75
SEA URCHINS	0.28
SHRIMP	0.07
SILVER HAKE	0.08
SMOOTH SKATE	0.03
SNAILS AND SLUGS	20.91
SPIDER CRAB	0.81
SPONGES	0.14
STARFISH	5.10
STRIPED ATLANTIC WOLFFISH	0.05
SUMMER FLOUNDER	0.04
THORNY SKATE	0.16
TOAD CRAB	0.06
UNIDENT SCULPINS	0.42
UNIDENT SKATES	0.34
WHELKS	0.09
WINTER FLOUNDER	0.37
YELLOWTAIL FLOUNDER	<0.01
SEA SCALLOP AND MONKFISH LANDINGS	**5.79**

Table 16. Inshore scallop fishery discards (kg) in SFA 29W. Scallop discards are in round weight.

Species	2002	2003	2004	2005	2006	2007	2008	2009
ALLIGATORFISH	0	0	0	17	0	0	0	307
AMERICAN EEL	0	0	0	0	0	0	212	0
AMERICAN LOBSTER	9406	8954	7676	5414	27273	8492	10525	12876
AMERICAN PLAICE	95	25	16	0	72	262	1392	26303
ATLANTIC ROCK CRAB	40289	15215	20014	7046	70318	3487	49027	56938
BARNACLES	0	0	0	0	816	0	0	0
BARNDOOR SKATE	170	0	0	0	0	0	1682	0
BASKET STARS	1192	12109	24431	0	514	0	0	26847
BRITTLE STAR	518	3221	354042	0	30	0	2734	0
CANCER SPP. (CRAB)	0	0	505	0	0	16375	15687	0
CEPHALOPODA C.	0	0	90	0	0	0	0	3944
CLAMS	280	5318	127404	31440	2900	0	1953	0
COD (ATLANTIC)	90	25	24	34	130	176	299	292
COMMON MUSSELS	24375	17194	57403	43732	108808	4239	62008	36750
CORALS	0	0	0	0	589	0	0	0
CUSK	0	8	0	0	0	0	0	0
HADDOCK	73	0	0	0	23	0	0	0
HALIBUT (ATLANTIC)	0	80	11	0	0	0	995	0
HERMIT CRABS	12889	3449	9528	3516	7833	32780	13198	22749
HYDROZOA C.	21	0	0	0	0	0	0	0
ICELAND SCALLOP	38	25	101	0	785	0	0	0
JELLYFISHES	10	90	0	0	0	0	0	0
JONAH CRAB	21776	50333	35329	17754	51190	61670	38639	46686
LEMONWEED	41	2430	0	117	725	0	0	0
LITTLE,WINTER SKATE	3946	1623	0	4502	6116	299	19030	17651
LONGHORN SCULPIN	11496	5147	10181	6761	9373	6001	43003	17701
LUMPFISH	0	0	0	18	45	0	824	3944
MONKFISH	17993	2437	4438	2063	2491	857	4775	8964
MULLET FISH	498	0	0	0	0	0	0	0
NORTHERN STONE CRAB	0	0	0	0	0	4966	3363	0
OCEAN POUT	32	17	55	0	45	0	0	229
OCEAN QUAHAUG	0	0	0	17	0	0	0	0
OCTOPUS	0	0	0	0	0	0	0	307
POLLOCK	10	0	0	0	0	0	0	0
PRICKLEBACKS	0	0	0	0	15	0	0	0
REDFISH UNSEPARATED	0	0	27	0	38	0	0	0
ROUND SKATE	0	150	0	33	1675	0	0	0
SAND DOLLARS, SEA URCHINS	23271	3952	9138	10964	24131	27082	11620	29657
SAND LANCES	0	8	0	0	0	0	0	0
SEA ANEMONE	52	0	0	0	91	0	0	0
SEA CUCUMBERS	24677	1123	15173	115343	179232	24479	157074	67353
SEA LAMPREY	0	0	13	0	0	0	0	0
SEA PEACH	0	0	0	0	468	0	0	0

Table 16 cont'd. Inshore scallop fishery discards (kg) in SFA 29W. Scallop discards are in round weight.

Species	2002	2003	2004	2005	2006	2007	2008	2009
SEA POTATO	0	0	0	0	91	0	0	0
SEA RAVEN	13444	5938	12910	6143	25754	4311	13662	14498
SEA SCALLOP	193534	158502	449034	288794	227330	147865	134726	229622
SEAROBINS	342	0	0	0	0	0	0	0
SHORTHORN SCULPIN	0	0	0	0	15	0	464	0
SHRIMP	0	125	0	17	15	0	0	0
SILVER HAKE	0	0	0	0	0	0	381	0
SMOOTH SKATE	4538	25	962	753	91	0	6164	15778
SNAILS AND SLUGS	267	0	689	1272	825	0	0	9923
SPONGES	63364	11005	378740	31971	7822	0	54329	66023
STARFISH	127715	21345	66230	72336	145969	69928	210365	142954
STRIPED ATLANTIC WOLFFISH	0	0	262	67	45	0	378	0
THORNY SKATE	592	2930	5671	722	5204	9002	17604	13714
TOAD CRAB	15435	0	216	0	287	0	3052	0
TUNICATE	0	0	0	0	166	0	391	0
UNIDENT BIVALVES	270	825	0	0	0	0	0	0
UNIDENT FLOUNDER	0	0	10	0	0	0	0	0
UNIDENT SCULPINS	461	627	2892	1411	317	2869	0	0
UNIDENT SKATES	4401	2255	4443	1088	103	0	22327	14313
WHELKS	0	0	465	0	967	0	0	5554
WHITE HAKE	10	0	0	0	0	0	0	921
WINTER FLOUNDER	1340	383	2036	672	1040	699	4421	3717
WITCH FLOUNDER	22	87	415	35	166	75	212	926
YELLOWTAIL FLOUNDER	379	23	448	67	220	301	2308	1581

Table 17. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SFA 29W.

Species	2002	2003	2004	2005	2006	2007	2008	2009
ALLIGATORFISH	0	0	0	<0.001	0	0	0	0.001
AMERICAN EEL	0	0	0	0	0	0	0.001	0
AMERICAN LOBSTER	0.013	0.038	0.015	0.021	0.066	0.034	0.041	0.052
AMERICAN PLAICE	<0.001	<0.001	<0.001	0	<0.001	0.001	0.005	0.106
ATLANTIC ROCK CRAB	0.057	0.065	0.039	0.028	0.170	0.014	0.192	0.229
BARNACLES	0	0	0	0	0.002	0	0	0
BARNDOOR SKATE	<0.001	0	0	0	0	0	0.007	0
BASKET STARS	0.002	0.052	0.048	0	0.001	0	0	0.108
BRITTLE STAR	0.001	0.014	0.691	0	<0.001	0	0.011	0
CANCER SPP. (CRAB)	0	0	0.001	0	0	0.065	0.061	0
CEPHALOPODA C.	0	0	<0.001	0	0	0	0	0.016
CLAMS	<0.001	0.023	0.249	0.124	0.007	0	0.008	0
COD (ATLANTIC)	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001
COMMON MUSSELS	0.034	0.073	0.112	0.173	0.263	0.017	0.242	0.148
CORALS	0	0	0	0	0.001	0	0	0
CUSK	0	<0.001	0	0	0	0	0	0
HADDOCK	<0.001	0	0	0	<0.001	0	0	0
HALIBUT (ATLANTIC)	0	<0.001	<0.001	0	0	0	0.004	0
HERMIT CRABS	0.018	0.015	0.019	0.014	0.019	0.131	0.052	0.091
HYDROZOA C.	<0.001	0	0	0	0	0	0	0
ICELAND SCALLOP	<0.001	<0.001	<0.001	0	0.002	0	0	0
JELLYFISHES	<0.001	<0.001	0	0	0	0	0	0
JONAH CRAB	0.031	0.215	0.069	0.070	0.124	0.246	0.151	0.188
LEMONWEED	<0.001	0.010	0	<0.001	0.002	0	0	0
LITTLE,WINTER SKATE	0.006	0.007	0	0.018	0.015	0.001	0.074	0.071
LONGHORN SCULPIN	0.016	0.022	0.020	0.027	0.023	0.024	0.168	0.071
LUMPFISH	0	0	0	<0.001	<0.001	0	0.003	0.016
MONKFISH	0.025	0.010	0.009	0.008	0.006	0.003	0.019	0.036
MULLET FISH	0.001	0	0	0	0	0	0	0
NORTHERN STONE CRAB	0	0	0	0	0	0.020	0.013	0
OCEAN POUT	<0.001	<0.001	<0.001	0	<0.001	0	0	0.001
OCEAN QUAHAUG	0	0	0	<0.001	0	0	0	0
OCTOPUS	0	0	0	0	0	0	0	0.001
POLLOCK	<0.001	0	0	0	0	0	0	0
PRICKLEBACKS	0	0	0	0	<0.001	0	0	0
REDFISH UNSEPARATED	0	0	<0.001	0	<0.001	0	0	0
ROUND SKATE	0	0.001	0	<0.001	0.004	0	0	0
SAND DOLLARS, SEA URCHINS	0.033	0.017	0.018	0.043	0.058	0.108	0.045	0.119
SAND LANCES	0	<0.001	0	0	0	0	0	0
SEA ANEMONE	<0.001	0	0	0	<0.001	0	0	0
SEA CUCUMBERS	0.035	0.005	0.030	0.455	0.434	0.097	0.614	0.271
SEA LAMPREY	0	0	<0.001	0	0	0	0	0

Table 17 cont'd. Inshore scallop fishery discard rates (kg discard (round weight) per kg landed (scallop meat weight + monkfish round weight)) in SFA 29W.

Species	2002	2003	2004	2005	2006	2007	2008	2009
SEA PEACH	0	0	0	0	0.001	0	0	0
SEA POTATO	0	0	0	0	<0.001	0	0	0
SEA RAVEN	0.019	0.025	0.025	0.024	0.062	0.017	0.053	0.058
SEA SCALLOP	0.273	0.675	0.876	1.140	0.550	0.589	0.527	0.923
SEAROBINS	<0.001	0	0	0	0	0	0	0
SHORTHORN SCULPIN	0	0	0	0	<0.001	0	0.002	0
SHRIMP	0	0.001	0	<0.001	<0.001	0	0	0
SILVER HAKE	0	0	0	0	0	0	0.001	0
SMOOTH SKATE	0.006	<0.001	0.002	0.003	<0.001	0	0.024	0.063
SNAILS AND SLUGS	<0.001	0	0.001	0.005	0.002	0	0	0.040
SPONGES	0.089	0.047	0.739	0.126	0.019	0	0.212	0.266
STARFISH	0.180	0.091	0.129	0.285	0.353	0.279	0.823	0.575
STRIPED ATLANTIC WOLFFISH	0	0	0.001	<0.001	<0.001	0	0.001	0
THORNY SKATE	0.001	0.012	0.011	0.003	0.013	0.036	0.069	0.055
TOAD CRAB	0.022	0	<0.001	0	0.001	0	0.012	0
TUNICATE	0	0	0	0	<0.001	0	0.002	0
UNIDENT BIVALVES	<0.001	0.004	0	0	0	0	0	0
UNIDENT FLOUNDER	0	0	<0.001	0	0	0	0	0
UNIDENT SCULPINS	0.001	0.003	0.006	0.006	0.001	0.011	0	0
UNIDENT SKATES	0.006	0.010	0.009	0.004	<0.001	0	0.087	0.058
WHELKS	0	0	0.001	0	0.002	0	0	0.022
WHITE HAKE	<0.001	0	0	0	0	0	0	0.004
WINTER FLOUNDER	0.002	0.002	0.004	0.003	0.003	0.003	0.017	0.015
WITCH FLOUNDER	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	0.004
YELLOWTAIL FLOUNDER	0.001	<0.001	0.001	<0.001	0.001	0.001	0.009	0.006

Table 18. Inshore scallop fishery discards as a percentage of total fishery catch in SFA 29W.

Species	2002	2003	2004	2005	2006	2007	2008	2009
ALLIGATORFISH	0	0	0	<0.01	0	0	0	0.03
AMERICAN EEL	0	0	0	0	0	0	0.02	0
AMERICAN LOBSTER	0.71	1.57	0.36	0.60	2.06	1.25	0.90	1.12
AMERICAN PLAICE	0.01	<0.01	<0.01	0	0.01	0.04	0.12	2.29
ATLANTIC ROCK CRAB	3.03	2.66	0.95	0.78	5.31	0.51	4.21	4.96
BARNACLES	0	0	0	0	0.06	0	0	0
BARNDOOR SKATE	0.01	0	0	0	0	0	0.14	0
BASKET STARS	0.09	2.12	1.16	0	0.04	0	0	2.34
BRITTLE STAR	0.04	0.56	16.75	0	<0.01	0	0.23	0
CANCER SPP. (CRAB)	0	0	0.02	0	0	2.42	1.35	0
CEPHALOPODA C.	0	0	<0.01	0	0	0	0	0.34
CLAMS	0.02	0.93	6.03	3.46	0.22	0	0.17	0
COD (ATLANTIC)	0.01	<0.01	<0.01	<0.01	0.01	0.03	0.03	0.03
COMMON MUSSELS	1.83	3.01	2.72	4.82	8.21	0.63	5.32	3.20
CORALS	0	0	0	0	0.04	0	0	0
CUSK	0	<0.01	0	0	0	0	0	0
HADDOCK	0.01	0	0	0	<0.01	0	0	0
HALIBUT (ATLANTIC)	0	0.01	<0.01	0	0	0	0.09	0
HERMIT CRABS	0.97	0.60	0.45	0.39	0.59	4.84	1.13	1.98
HYDROZOA C.	<0.01	0	0	0	0	0	0	0
ICELAND SCALLOP	<0.01	<0.01	<0.01	0	0.06	0	0	0
JELLYFISHES	<0.01	0.02	0	0	0	0	0	0
JONAH CRAB	1.64	8.80	1.67	1.96	3.86	9.11	3.32	4.07
LEMONWEED	<0.01	0.43	0	0.01	0.05	0	0	0
LITTLE,WINTER SKATE	0.30	0.28	0	0.50	0.46	0.04	1.63	1.54
LONGHORN SCULPIN	0.86	0.90	0.48	0.75	0.71	0.89	3.69	1.54
LUMPFISH	0	0	0	<0.01	<0.01	0	0.07	0.34
MONKFISH	1.35	0.43	0.21	0.23	0.19	0.13	0.41	0.78
MULLET FISH	0.04	0	0	0	0	0	0	0
NORTHERN STONE CRAB	0	0	0	0	0	0.73	0.29	0
OCEAN POUT	<0.01	<0.01	<0.01	0	<0.01	0	0	0.02
OCEAN QUAHAUG	0	0	0	<0.01	0	0	0	0
OCTOPUS	0	0	0	0	0	0	0	0.03
POLLOCK	<0.01	0	0	0	0	0	0	0
PRICKLEBACKS	0	0	0	0	<0.01	0	0	0
REDFISH UNSEPARATED	0	0	<0.01	0	<0.01	0	0	0
ROUND SKATE	0	0.03	0	<0.01	0.13	0	0	0
SAND DOLLARS, SEA URCHINS	1.75	0.69	0.43	1.21	1.82	4.00	1.00	2.58
SAND LANCES	0	<0.01	0	0	0	0	0	0
SEA ANEMONE	<0.01	0	0	0	0.01	0	0	0
SEA CUCUMBERS	1.86	0.20	0.72	12.71	13.52	3.61	13.49	5.87
SEA LAMPREY	0	0	<0.01	0	0	0	0	0
SEA PEACH	0	0	0	0	0.04	0	0	0

Table 18 cont'd. Inshore scallop fishery discards as a percentage of total fishery catch in SFA 29W.

Species	2002	2003	2004	2005	2006	2007	2008	2009
SEA POTATO	0	0	0	0	0.01	0	0	0
SEA RAVEN	1.01	1.04	0.61	0.68	1.94	0.64	1.17	1.26
SEA SCALLOP	14.56	27.73	21.24	31.82	17.15	21.83	11.57	20.01
SEAROBINS	0.03	0	0	0	0	0	0	0
SHORTHORN SCULPIN	0	0	0	0	<0.01	0	0.04	0
SHRIMP	0	0.02	0	<0.01	<0.01	0	0	0
SILVER HAKE	0	0	0	0	0	0	0.03	0
SMOOTH SKATE	0.34	<0.01	0.05	0.08	0.01	0	0.53	1.37
SNAILS AND SLUGS	0.02	0	0.03	0.14	0.06	0	0	0.86
SPONGES	4.77	1.93	17.92	3.52	0.59	0	4.67	5.75
STARFISH	9.61	3.73	3.13	7.97	11.01	10.32	18.06	12.46
STRIPED ATLANTIC WOLFFISH	0	0	0.01	0.01	<0.01	0	0.03	0
THORNY SKATE	0.04	0.51	0.27	0.08	0.39	1.33	1.51	1.19
TOAD CRAB	1.16	0	0.01	0	0.02	0	0.26	0
TUNICATE	0	0	0	0	0.01	0	0.03	0
UNIDENT BIVALVES	0.02	0.14	0	0	0	0	0	0
UNIDENT FLOUNDER	0	0	<0.01	0	0	0	0	0
UNIDENT SCULPINS	0.03	0.11	0.14	0.16	0.02	0.42	0	0
UNIDENT SKATES	0.33	0.39	0.21	0.12	0.01	0	1.92	1.25
WHELKS	0	0	0.02	0	0.07	0	0	0.48
WHITE HAKE	<0.01	0	0	0	0	0	0	0.08
WINTER FLOUNDER	0.10	0.07	0.10	0.07	0.08	0.10	0.38	0.32
WITCH FLOUNDER	<0.01	0.02	0.02	<0.01	0.01	0.01	0.02	0.08
YELLOWTAIL FLOUNDER	0.03	<0.01	0.02	0.01	0.02	0.04	0.20	0.14
SEA SCALLOP AND MONKFISH LANDINGS	**53.41**	**41.05**	**24.25**	**27.92**	**31.18**	**37.07**	**21.96**	**21.67**

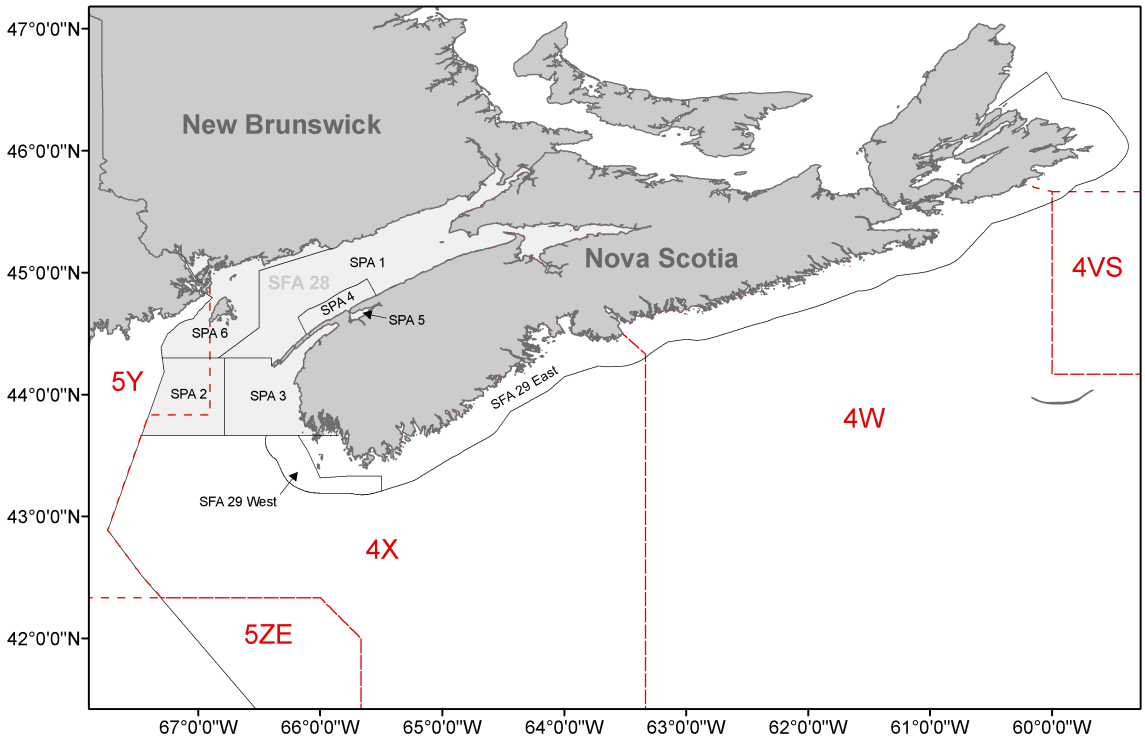

Figure 1. Inshore Scallop Fishing Areas, Scallop Production Areas, and NAFO divisions in the DFO Maritimes Region, Canada.

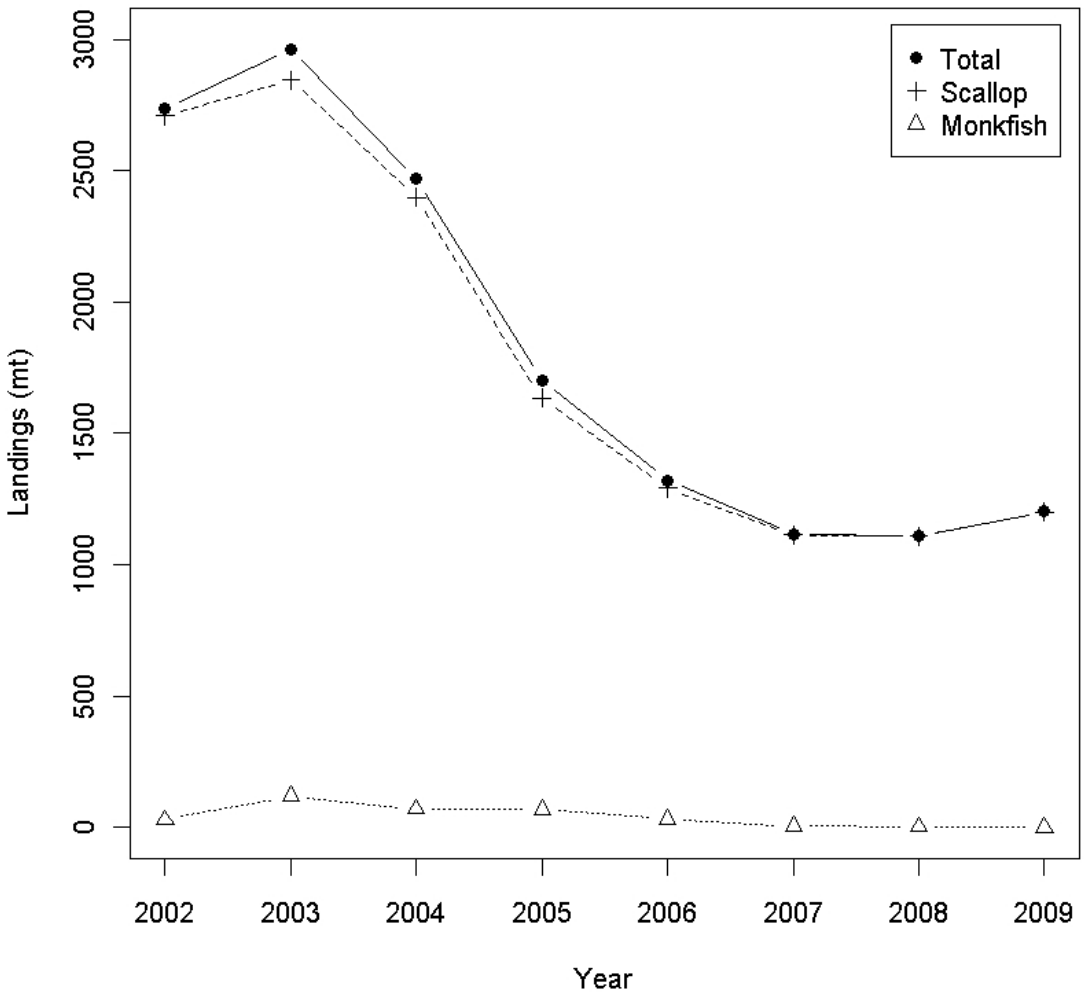

Figure 2. Total landings by the inshore scallop fishery in SFA 28 and SFA 29W combined for all species (scallop + monkfish), scallop, and monkfish.

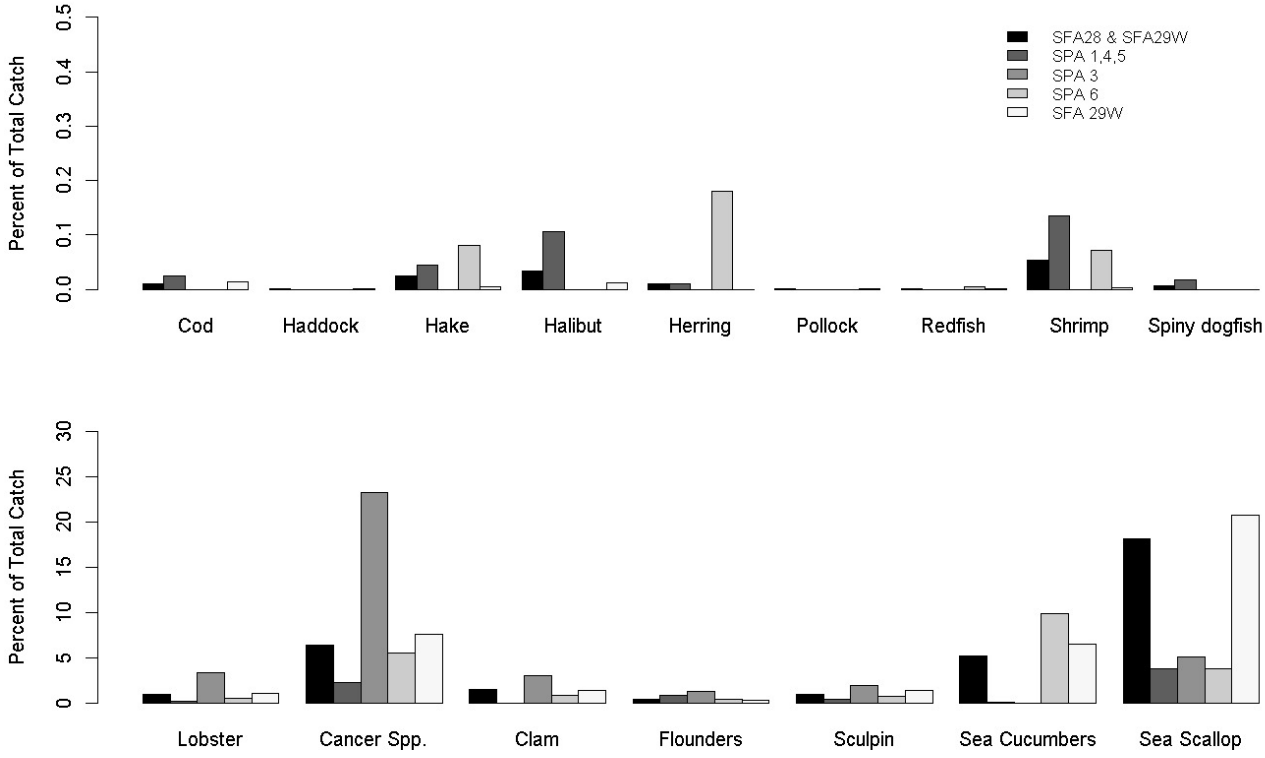

Figure 3. Average percent of total fishery catch for licensed species.

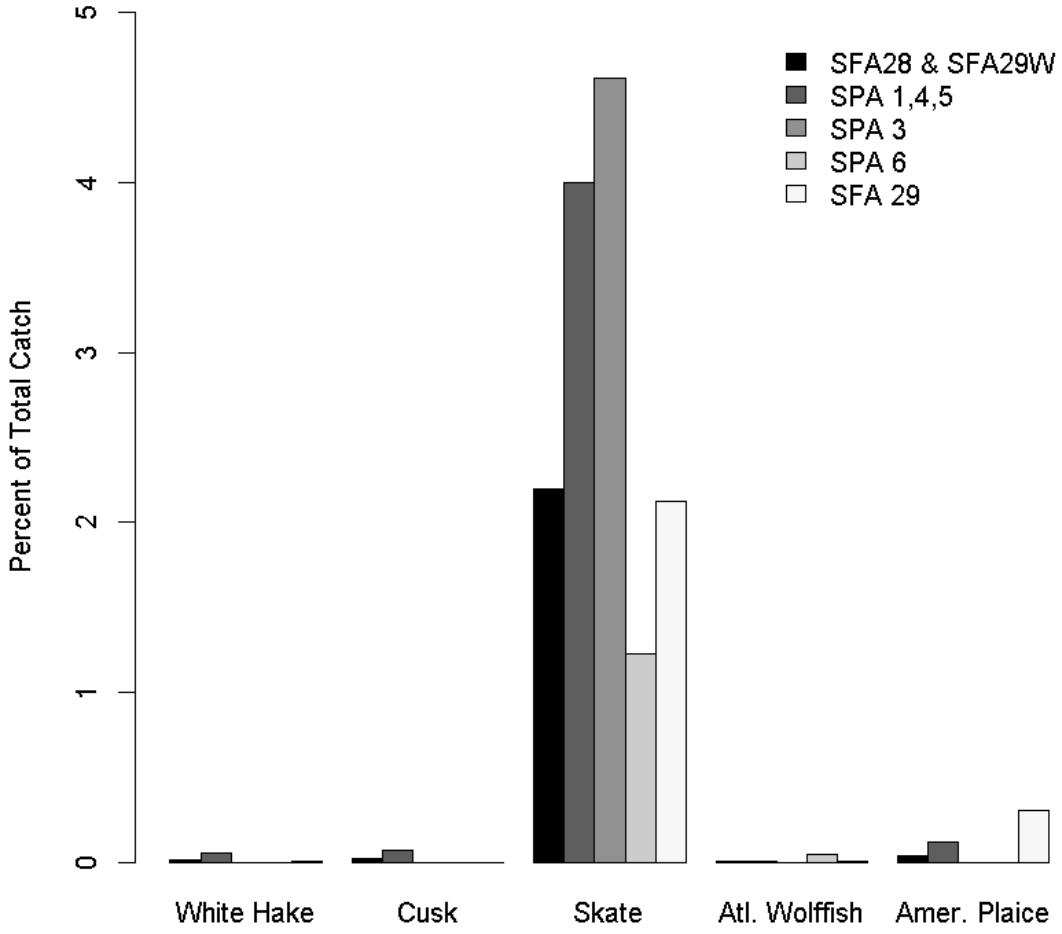

Figure 4. Average percent of total fishery catch for species of potential concern.