

SUMMARY OF ANALYSES CONDUCTED  
TO DETERMINE AT-SEA MONITORING  
REQUIREMENTS FOR  
MULTISPECIES SECTORS  
FY2018

## INTRODUCTION

The Greater Atlantic Regional Fisheries Office (GARFO) Analysis and Program Support Division, in consultation with Sustainable Fisheries Division staff, recommends that the total monitoring coverage for Northeast multispecies sectors in fishing year (FY) 2018 should be 15 percent of sector trips.

This analysis uses data available through the end of FY 2016 (April 30, 2017). As in previous years, we will publish this summary of the analyses on the GARFO website, along with the supporting data tables.

We expect our recommended coverage level to sufficiently monitor and enforce catch levels for Northeast multispecies sectors in FY 2018. The recommendation relies on an analysis of past performance to provide a reasonable expectation of meeting the requirement of achieving the Coefficient of Variation of 30% (CV30) or better precision at the overall stock level for each groundfish stock.

The Fisheries Sampling Branch (FSB) at the Northeast Fisheries Science Center collects, maintains, and distributes data from fishing trips that carry at-sea monitors. FSB manages two separate but related monitoring programs: the Northeast Fisheries Observer Program (NEFOP) and the At-Sea Monitoring (ASM) Program. Although each program is tailored to meet specific monitoring objectives, the programs function similarly. The NEFOP program's resources are finite, and FSB relies on national priorities (endangered or protected species), fishery management priorities determined by the New England and Mid-Atlantic Fishery Management Councils, and scientific priorities related to stock assessments to determine priorities for the NEFOP observer program. These program priorities, and the Standardized Bycatch Reporting Methodology (SBRM) that identifies relative fleet contribution to discards, guide the allocation of NEFOP coverage resources to fishing trips. In previous years, FSB has provided us with an estimate of the NEFOP coverage rate they expect to achieve for sector vessels in the upcoming fishing year. Federally-funded observer coverage provided by NEFOP to meet SBRM requirements partially satisfies the total monitoring coverage for groundfish sectors.

That estimate is not available at this time, so this recommendation specifies the "total monitoring coverage" we have determined should achieve the desired precision target, whether the coverage is provided by NEFOP or ASM. As in previous years, sectors are required to design, implement, and pay for any portion of trips not covered by NEFOP.

The Council has modified the monitoring requirements for Northeast multispecies sectors several times since they were established in Amendment 16 to the Northeast Multispecies Fishery Management Plan, most recently in Framework 55, which became effective on May 1, 2016. The updated regulatory requirements related to the monitoring coverage rate standard are found at 50 CFR 648.87(b)(1)(v)(B) and require that:

1. Coverage levels must be sufficient to at least meet the standard specified in the Standardized Bycatch Reporting methodology, CV30, at the overall stock level for each stock of regulated species and ocean pout and to monitor sector operations, to the extent practicable, in order to reliably estimate overall catch by sector vessels;
2. The coverage level shall reflect the primary goal of the program, to verify area fished, as well as catch and discards by species and gear type, in the most cost-effective means practicable, as well as the other goals and objectives;
3. The coverage levels will be based on the most recent 3-year average of the total required coverage level necessary to reach the required coefficient of variation for each stock;
4. The coverage level that will apply is the maximum stock-specific level after filtering out healthy stocks;
5. Healthy stocks are defined as those in a given fishing year that are not overfished, with overfishing not occurring according to the most recent available stock assessment, and that in the previous fishing year have less than 75 percent of the sector sub-ACL harvested and less than 10 percent of catch comprised of discards.

The total monitoring coverage, ultimately, should provide confidence that the overall catch estimate is accurate enough to ensure that sector fishing activities are consistent with National Standard 1 requirements to prevent overfishing while achieving on a continuing basis optimum yield from each fishery. To that end, additional uncertainty buffers are established when setting ACLs to help make up for any lack of absolute precision and accuracy in estimating overall catch by sector vessels.

#### OBSERVER COVERAGE REQUIREMENTS ANALYSIS SUMMARY

The recommended total monitoring coverage rate is expected to achieve the required CV30 precision of the discard estimates for each Northeast multispecies stock for all sectors and gears combined and is applied at the same coverage level for each sector. It is derived from an aggregate analysis that uses more refined strata (sector, gear, stock area) data to support annual catch entitlement (ACE) monitoring and ACE trading at the individual sector level. This analysis seeks to set a coverage target that is sufficient to achieve the required CV30 precision level while avoiding impracticably high levels of monitoring coverage and unacceptable costs that would result from a rate derived from strata with limited activity having disproportionately small amounts of total discards.

As in previous years, we conclude that it is not feasible to establish different coverage requirements for each sector or for other sub-stock strata, such as gear type. In FY 2016, there were 15 active sectors, 22 stocks, and 9 gear/mesh groups, as well as 5 exemption strata,

resulting in 11,800 possible strata. Setting different coverage requirements across such large numbers of strata would vastly complicate the required deployment of observers and would require substantial changes to the NEFOP program. For example, if monitoring coverage were determined by gear type used, assuring coverage would require a vessel owner to declare the gear to be used to the NEFOP program in advance of the trip. The vessel owner would then be required to use only that gear on the observed trip to assure that the coverage requirement was met. This would restrict operational flexibility and fishing opportunities for the fishing industry and would increase costs to the NEFOP program.

Different coverage requirements for each sector or other sub-stock strata would also likely increase monitoring coverage costs, the costs may not be equally apportioned between sectors, and it is uncertain that there would be meaningful improvements to catch estimation. Achieving the required CV standard depends on consistency of discard rates on trips within the same strata (sector/gear/stock area). Consistency between such strata does not normally occur and differs by sector. With limited activity in some strata, assuring each individual stratum receives enough monitoring to calculate a discard rate with CV30 through random sampling would require impracticably high levels of monitoring coverage in some strata, with attendant high costs. These high levels of monitoring coverage and costs would likely vary between sectors. Differing economic impacts would affect similar vessel operations due to their choice of different sectors. Last, increasing coverage to achieve the precision standard in a stratum with limited activity increases costs substantially to precisely measure discard rates in a stratum that likely generates a disproportionately small amount of the total discards.

Table 1 shows that the necessary coverage rates to achieve CV30 have varied for individual stocks over the past 7 years. The column headed “CV” shows the realized CV for each stock in each of the fishing years. The column headed “% Cov.” shows the necessary coverage rate to achieve CV30 for each stock in each of the fishing years. For each year, the shaded cells show the stock that this retrospective analysis indicates required the highest level of monitoring coverage to achieve CV30. The highest coverage rate that was necessary to achieve CV30 for any stock in the past 7 years was redfish in FY 2014 and GB winter flounder in FY 2016, both at 38 percent. Based only on the most recent complete fishing year (FY 2016), we would conclude that a total monitoring coverage target rate of 38 percent of trips for the entire sector fishery would be sufficient to achieve CV30 for all stocks. However, there are additional analyses required to make a final coverage rate recommendation.

Table 1. Realized CVs and Percent Coverage Needed to Achieve CV30\*

STOCK	FY2010		FY2011		FY2012		FY2013		FY2014		FY2015		FY2016	
	CV	% Cov.	CV	% Cov.	CV	% Cov.	CV	% Cov.	CV	% Cov.	CV	% Cov.	CV	% Cov.
GB Cod East	9.73	4	15.44	12	20.44	11	48.86	29	24.60	15	28.05	18	76.38	53
GB Cod West	6.27	3	9.85	5	12.26	5	15.43	7	17.11	10	12.78	5	22.94	6
GB Cod	5.61	2	8.39	4	10.55	4	14.80	6	14.65	8	12.17	4	24.24	7
GOM Cod	4.74	2	4.74	2	9.89	4	6.07	2	11.16	6	18.80	10	14.41	3
Plaice	4.96	2	4.36	1	5.52	1	6.51	2	7.35	2	7.74	2	10.50	1
GB Winter Flounder	16.29	9	27.67	22	21.30	9	23.02	11	20.79	12	41.57	26	64.45	38
GOM Winter Flounder	10.56	7	8.81	4	8.96	3	15.10	7	29.06	26	13.16	6	31.43	14
Witch Flounder	5.76	2	5.11	2	8.74	3	7.41	2	8.96	3	8.67	2	10.65	1
CC/GOM Yellowtail Flounder	8.66	5	6.90	3	7.80	2	9.31	3	14.10	8	9.80	3	12.03	2
GB Yellowtail Flounder	11.13	5	10.36	4	15.98	6	24.84	13	21.16	12	26.15	13	40.67	20
SNE/MA Yellowtail Flounder	13.95	11	9.39	5	12.91	5	31.45	22	23.20	17	20.15	9	38.44	21
GB Haddock East	12.73	7	17.36	14	35.04	25	30.17	14	10.64	4	19.89	10	19.81	7
GB Haddock West	13.31	10	10.10	5	27.08	18	13.00	5	9.95	4	10.58	3	8.68	1
GB Haddock	9.40	5	10.22	5	21.77	12	11.95	4	8.44	3	9.47	3	8.02	1
GOM Haddock	9.94	6	9.11	4	12.27	5	12.98	5	12.03	6	10.67	4	14.92	4
White Hake	9.21	5	7.76	3	13.00	5	11.81	4	15.36	8	15.44	6	30.15	10
Pollock	8.01	4	6.91	2	7.71	2	7.55	2	9.71	4	9.17	3	27.17	9
Redfish	11.51	7	8.98	4	13.85	5	21.23	10	41.69	38	15.59	6	16.44	3
SNE/MA Winter Flounder	10.61	8	12.85	8	15.44	8	21.21	13	16.69	11	10.66	4	20.51	5
Southern Windowpane	9.12	5	8.22	4	10.70	3	7.98	2	8.26	3	11.26	3	15.61	4
Northern Windowpane	13.22	9	9.04	4	11.01	4	16.69	7	12.75	5	16.49	7	15.76	3
Ocean Pout	9.69	5	9.38	4	11.70	4	11.57	3	16.50	8	19.01	8	36.05	14
Halibut	6.34	3	6.95	2	6.68	2	7.51	2	6.67	2	12.06	4	18.86	4
Wolffish	6.66	3	7.00	2	8.35	2	9.58	3	9.75	4	12.00	4	13.00	2

\* Coverage levels are determined at the overall stock level.

*Using prior 3 years of data to determine coverage rate*

In previous years, information from the most recent full fishing year was used to recommend the total monitoring coverage target for the upcoming fishing year. The approach was developed in the initial years of the monitoring program, when multiple years of data were not available. Since FY 2016, our recommendation is based on the most recent 3 years of data that are averaged to smooth assumed random inter-annual fluctuations of the discard variability estimates for each stock.

Table 2 presents the results of the averaging method—if this was the final step in developing our recommendation, the coverage requirement would be 25 percent of trips, based on the result for Georges Bank winter flounder. However, the final step in developing this recommendation filters out healthy stocks, and that filter will change this result.

Table 2. Three-year Average of Required Coverage

STOCK	3-year Average of Required Coverage		
	FY2012 - FY2014	FY2013 - FY2015	FY2014 - FY2016
GB Cod East	18	21	28
GB Cod West	7	7	7
GB Cod	6	6	6
GOM Cod	4	6	6
Plaice	2	2	2
GB Winter Flounder	11	16	25
GOM Winter Flounder	12	13	15
Witch Flounder	2	2	2
CC/GOM Yellowtail Flounder	4	5	4
GB Yellowtail Flounder	10	13	15
SNE/MA Yellowtail Flounder	15	16	15
GB Haddock East	14	9	6
GB Haddock West	9	4	2
GB Haddock	6	3	2
GOM Haddock	6	5	4
White Hake	6	6	8
Pollock	3	3	5
Redfish	18	18	15
SNE/MA Winter Flounder	11	9	6
Southern Windowpane	3	3	3
Northern Windowpane	5	6	5
Ocean Pout	5	7	10
Halibut	2	3	3
Wolfish	3	3	3

*Filtering out healthy stocks*

Healthy stocks are defined as those in a given fishing year that are not overfished, with overfishing not occurring, according to the most recent available stock assessment, and; that in the previous fishing year less than 75 percent of the sector sub-ACL was harvested with less than 10 percent of catch comprised of discards.

The most recent stock assessment status determinations (Table 3) indicate that GB winter flounder is not overfished, and overfishing is not occurring for the stock. The final FY 2016 catch accounting indicates that only 71.6 percent of the GB winter flounder sector sub-ACL was harvested (<https://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/nemultispecies.html>, Table 1). Finally, Figure 1 below indicates that discards comprise less than 10 percent of catch in FY 2016. As a result, GB winter flounder is filtered out for the purposes of making the total monitoring coverage recommendation. The next highest 3-yr average for required coverage (15 percent) includes SNE/MA yellowtail flounder and GB yellowtail flounder, both stocks that are overfished with overfishing occurring. Therefore, these stocks are the basis of our recommended coverage level.

Table 3. Stock status

Stock	2016 Assessment	
	Overfishing?	Overfished?
GB Cod	Unknown	Yes
GOM Cod	Yes	Yes
GB Haddock	No	No
GOM Haddock	No	No
GB Yellowtail Flounder	Yes	Yes
SNE/MA Yellowtail Flounder	Yes	Yes
CC/GOM Yellowtail Flounder	Yes	Yes
American Plaice	No	No
Witch Flounder	Unknown	Yes
GB Winter Flounder	No	No
GOM Winter Flounder	No	Unknown
SNE/MA Winter Flounder	No	Yes
Acadian Redfish	No	No
White Hake	No	No
Pollock	No	No
Northern Windowpane Flounder	No	Yes
Southern Windowpane Flounder	No	No
Ocean Pout	No	Yes
Atlantic Halibut*	No	Yes
Atlantic Wolffish	No	Yes

\* not yet available for 2016; status listed from 2015

## ADDITIONAL INFORMATION

While a total monitoring coverage target level is expected to generate a 30-percent CV on discard estimates, there is no guarantee that the required coverage level will be met or result in a 30-percent CV across all stocks due to changes in fishing effort and observed fishing activity that may happen in a given fishing year. Due to fluctuations in fishing activity, it is difficult to deploy observers throughout the fishing year to sufficiently ensure that target coverage levels are attained. As Table 2 indicates, the realized level of coverage was below the target each year, though only slightly in FY 2014. Since the start of the monitoring program in 2010, the realized annual coverage levels far exceeded the 30-percent CV requirement for a vast majority of the 20 groundfish stocks. While only three stocks had a realized CV above 30 from 2010–2015, there were 6 stocks in 2016 alone that did not meet the threshold. In FY 2013, SNE/MA yellowtail flounder realized a CV = 31.45, in FY 2014 redfish had a CV = 41.69, and in FY 2015 GB winter flounder as a CV = 41.57. In FY 2016, GB winter flounder (CV = 64.45), GOM winter flounder (CV = 38.44), GB yellowtail flounder (CV = 40.67), SNE/MA yellowtail flounder (CV = 38.44), white hake (CV = 30.15), and ocean pout (CV = 36.05) all failed to meet the threshold.

Table 4. Target and realized coverage levels, FY 2010-FY2017.

Fishing Year	NEFOP target coverage level	ASM target coverage level	Total target coverage level	Realized coverage level
FY 2010	8 %	30 %	38 %	32 %
FY 2011	8 %	30 %	38 %	27 %
FY 2012	8 %	17 %	25 %	22 %
FY 2013	8 %	14 %	22 %	20 %
FY 2014	8 %	18 %	26 %	25.7%
FY 2015	4 %	20 %	24 %	19.8%
FY 2016	4 %	10 %	14 %	11.1%
FY 2017	4 %	12 %	16 %	n/a*

\*FY 2016 realized coverage not available; fishing year still underway.

We examined FY 2016 data in detail to evaluate the extent to which unobserved discards affect total catch by sectors. In FY 2016 (Figure 1), the total discards of the allocated groundfish stocks ranged from 0.29% of the total calculated catch for Georges Bank winter flounder to 21.5% for Georges Bank Haddock. Both Georges Bank cod and haddock are further subdivided into Eastern and Western components, and those values are also presented, despite the fact the total monitoring coverage recommendation is made at the overall stock level. Figure 1 illustrates the fact that 91 percent or more of the total catch of each of the allocated stocks is comprised of dealer-reported landings, with the remaining 9 percent or less comprised of observed and unobserved discards. Figure 1 shows that the discarded poundage (observed and unobserved) represents a relatively small percentage of the total stock-level sub-ACLs allocated to the sectors as a group.

Note that the catch of non-allocated groundfish stocks is theoretically composed entirely of discards, because no landings are allowed. The exception is Atlantic halibut because limited

landings are allowed; for that stock the catch was 64% discard in FY 2016. Discards as a percentage of sector sub-ACLs are given in Figures 2A and 2B. Figure 3 further examines FY 2016 discards by showing pounds by stock, and percent of total discards for each stock.

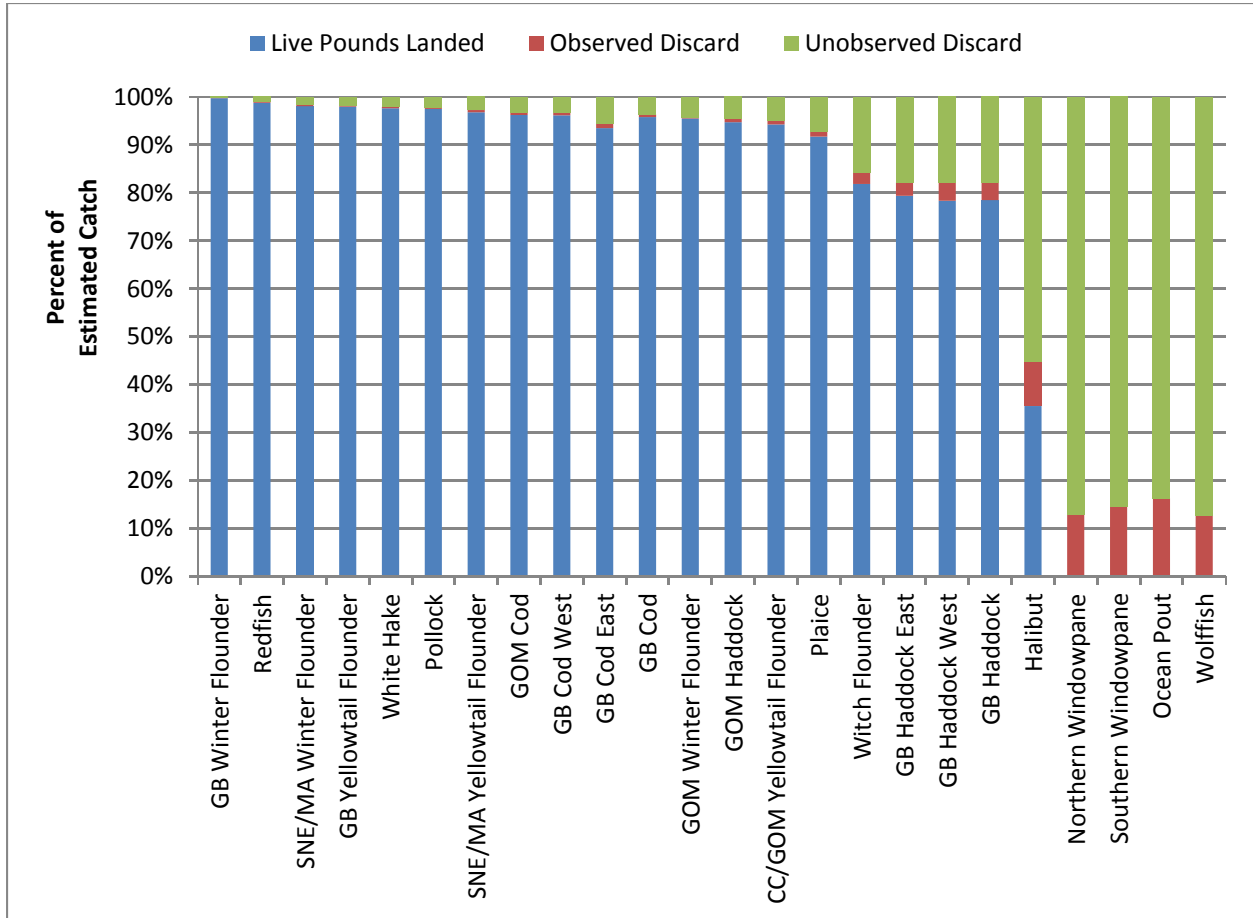


Figure 1: Fishing Year 2016 Groundfish Discards as a Percentage of Catch



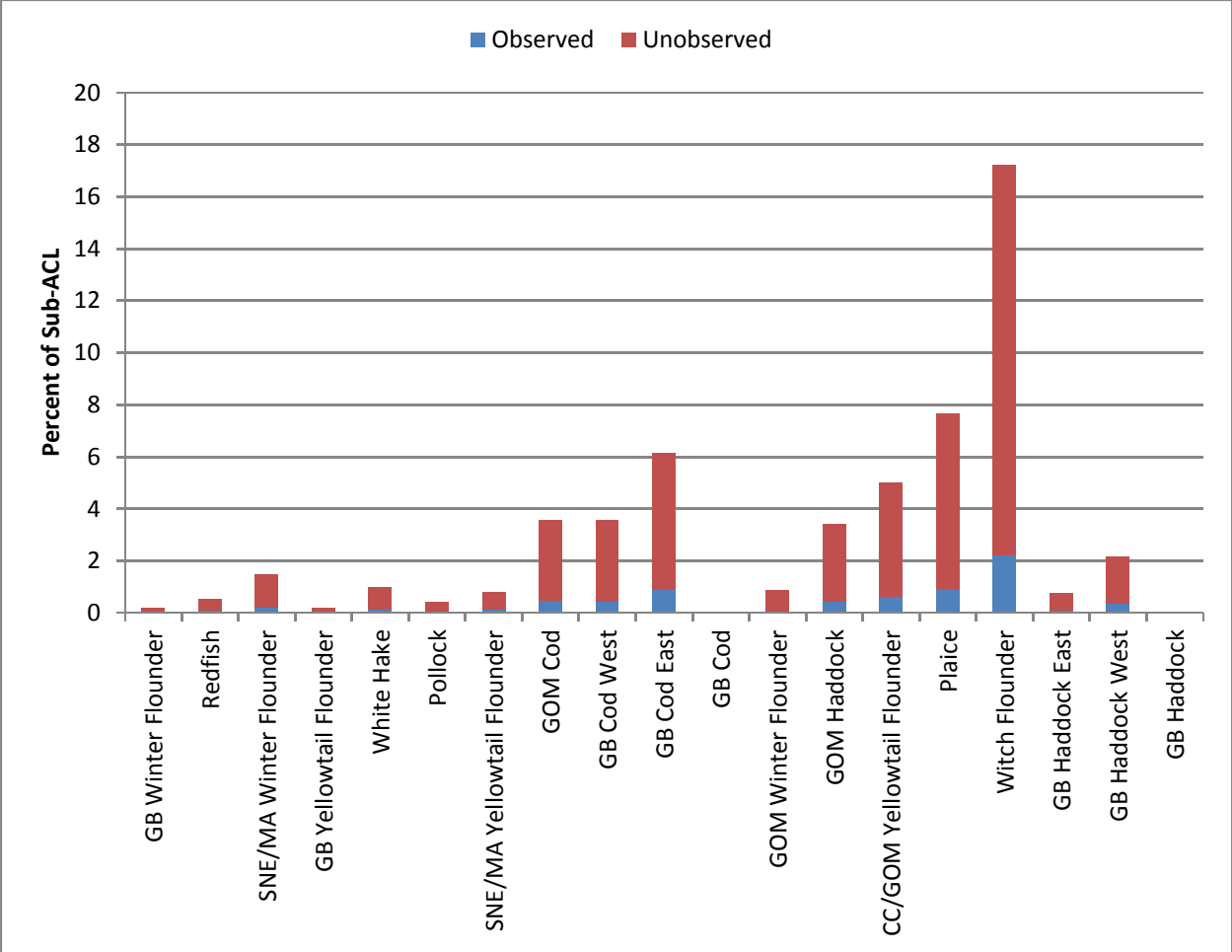


Figure 2A: Fishing Year 2016 Allocated Groundfish Discards as a Percentage of Sub-ACL

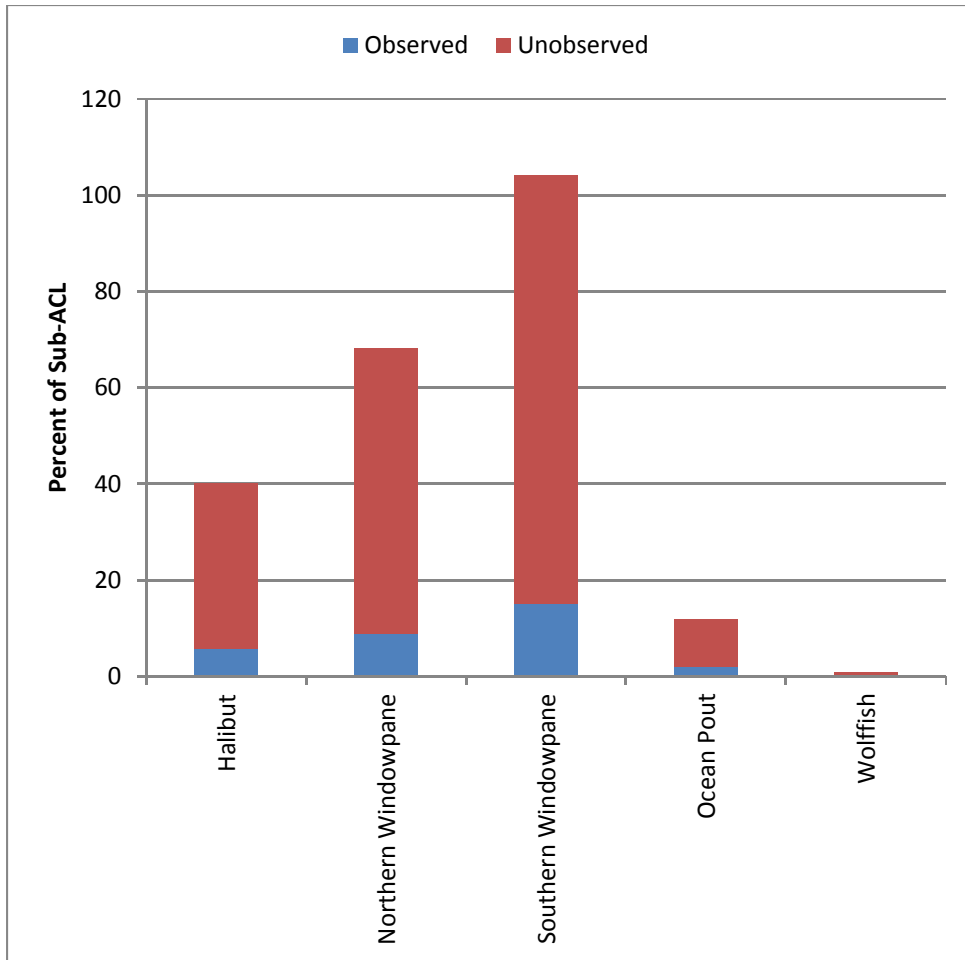


Figure 2B: Fishing Year 2016 Non-allocated Groundfish Discards as a Percentage of Sub-ACL

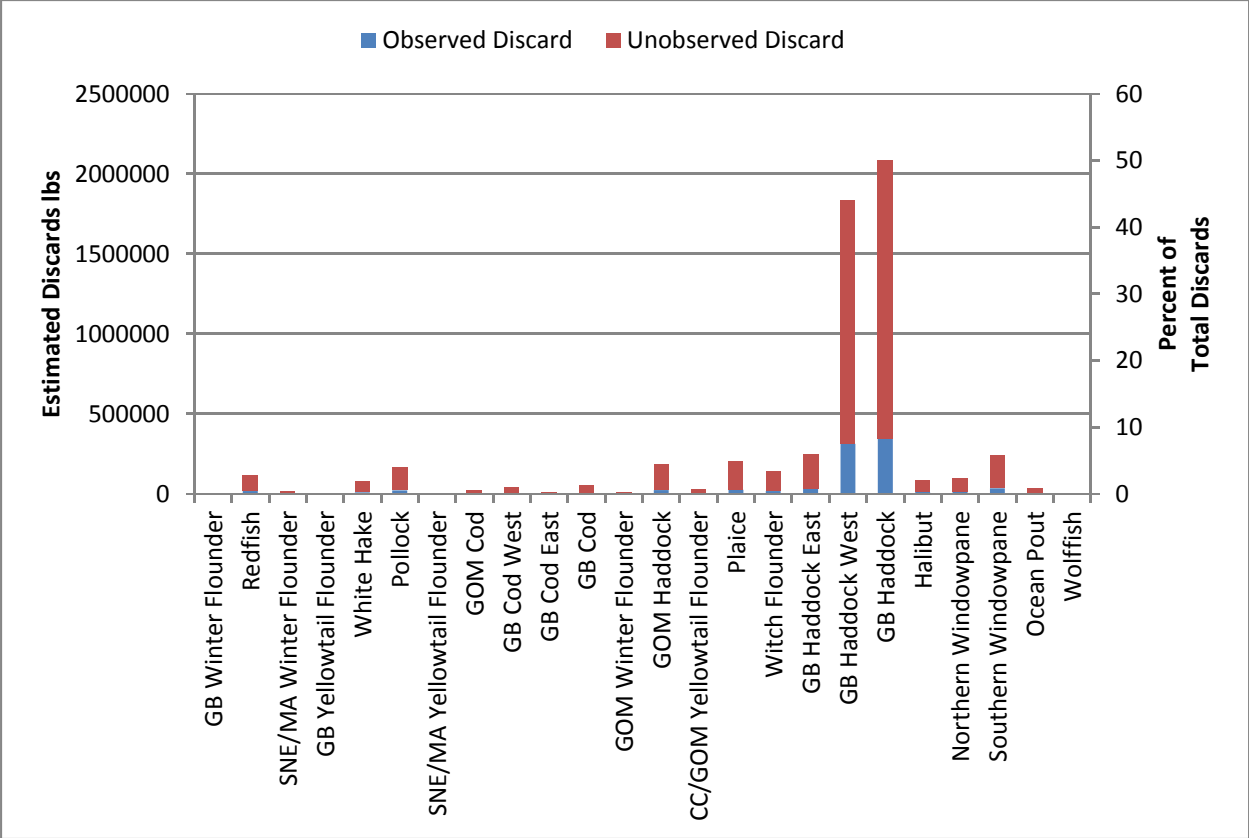


Figure 3: Fishing Year 2016 Discards (Live lbs and Percent of Total Discards)

## RECOMMENDATION

We have interpreted the requirement to accurately monitor sector operations in the context of the FMP requirements, the National Standards and other requirements of the MSA, and determined that the target at-sea monitoring coverage level should be set at the level that is expected to meet the CV30 requirement at the overall stock level for all sectors and gears combined. Our recommendation is also intended to minimize the cost burden to sectors and NOAA Fisheries, while still providing a reliable estimate of overall catch by sectors to monitor annual catch.

Applying these standards and administrative adjustments results in our determination that the combined NEFOP and ASM Program coverage target of 15 percent of trips is expected to meet the CV requirement of at least 30 percent on an overall stock basis, and provides a reliable estimate of overall catch necessary to ensure that sectors do not exceed their ACEs and ACLs, and ultimately the OFL for each stock, while minimizing costs to the extent practicable.