



## New England Fishery Management Council

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### MEMORANDUM

**DATE:** August 31, 2015  
**TO:** Groundfish Committee (Committee)  
**FROM:** Groundfish Plan Development Team (PDT)  
**SUBJECT:** **Development of alternatives to revise the Groundfish monitoring program**

The Groundfish Plan Development Team (PDT) met on July 21, 2015 and August 18, 2015 and discussed the groundfish monitoring program with a particular focus on the at-sea monitoring (ASM) coverage requirement for groundfish sectors. Several ideas were developed, but the PDT seeks additional direction from the Committee before continuing this work. The following summarizes the PDT discussion.

#### **Recent Council Discussion and Tasking**

In the June 2, 2015 PDT memo to the Groundfish Committee, the PDT suggested ideas to address Council concerns about the groundfish monitoring program and the current ASM requirements for groundfish sectors. Ideas ranged from 'tuning' the ASM program to ideas that may require revisiting the goals and objectives of the overall groundfish monitoring program. At its June meeting, the Council explained during discussion that the scope of the ASM is to make the groundfish monitoring program more efficient and cost effective while achieving the stated goals of the program in Amendment 16 (A16) and Framework Adjustment 48 (FW48).

The Council also passed the following PDT tasking motion:

To task the Groundfish PDT to investigate streamlining the ASM program for the purposes of improving efficiency to include the selection process, cost effectiveness and other issues and to develop alternatives for consideration in the ASM framework action as referenced in PDT memo, document #8, pg. 7-8. (14/0/1)

#### **Management Options Under Development**

The following is the range of ideas offered by the PDT in June. Several have been further developed, as described below, though time constraints prevented developing every idea.

The options are grouped by potential implementation timeline and possible regulatory vehicle. It may be possible to analyze and implement some options in time for the 2016 groundfish fishing year (May 1) within Framework Adjustment 55 (FW 55), while other options may require more extensive development and analysis for implementation beyond May 1, 2016. The number and

complexity of alternatives may impact the timeline for FW 55. Further, General Counsel should be consulted prior to making a final determination about the appropriate process to follow to make any changes to the ASM program.

This organization is not a specific endorsement of any option, or a guarantee that any of the options will result in a reduction in ASM costs. A number of these options could be implemented in combination.

## **Options**

### *1. No Action*

Options that might be possible to implement under NMFS authority in time for May 1, 2016

- 2. Refining coverage rates based on:*
  - a. Rolling averages*
  - b. Area-specific coverage rates*
  - c. Sector-specific rates*
  - d. Gear-specific rates*

Options that require Council action and could potentially be implemented in time for May 1, 2016:

- 3. Removing the ASM requirement for sector trips targeting monkfish, skates, and dogfish*
- 4. Establishing sector specific coverage requirements*
- 5. Establishing sector specific management uncertainty buffers or discard rates*

Options that require Council action and may require more extensive development and analysis:

- 6. Setting a new CV standard (CV>30)*
- 7. Prioritizing coverage of how the CV is applied based on:*
  - a. Allocated stocks vs non-allocated stocks*
  - b. Stock condition - is the stock overfished or subject to overfishing?*
  - c. Percent of ACL harvested*
  - d. Percent of catch comprised of discards*
  - e. Impact of discard estimates on the stock assessment*
  - f. Impact of exemptions on discards of the stock*
- 8. Redesigning and re-stratifying the catch monitoring system to be proportional to landings and/or discards*
- 9. Using a combination of monitoring tools to achieve monitoring goals, objectives, and requirements*

## **1. No Action**

The PDT drafted preliminary text (below) describing the current groundfish monitoring program (the No Action Alternative). In addition, the PDT obtained additional background information from the NEFSC Fisheries Sampling Branch describing the difference between NEFOP, ASM, and the Scallop Industry Funded Program (see Appendix I).

The PDT analysis on the costs and benefits (impacts analysis) of the existing ASM program (No Action) is under development and would be included in the EA for the action.

### **The Current Groundfish Monitoring Program**

The Council has set groundfish monitoring policy through multiple actions. While Amendment 16 did not articulate specific goals and objectives of the sector monitoring program, several sections identify reasons for sector monitoring (NEFMC 2009). Framework 48 specified goals and objectives for the groundfish monitoring program, and eliminated the requirement for dockside monitoring (NEFMC 2013).

The monitoring goals and objectives articulated in FW 48 apply to the entire multispecies commercial fishery, which includes groundfish sectors and vessels operating in the common pool. The commercial groundfish fishery is currently monitored using a variety of tools which include at-sea monitors (NEFOP only for common pool and NEFOP and ASM for sectors), vessel trip reports (VTRs), vessel monitoring system (VMS), and dealer reports. Other monitoring tools like dockside monitoring have been employed in the past to verify landed catch, and Amendment 16 allows for the use of electronic monitoring in place of at-sea observers if the technology is deemed sufficient for a specific trip based on gear type and area fished.

*The goals and objectives of the monitoring program:*

#### **Goal 1: Improve documentation of catch**

Objectives:

Determine total catch and effort, for each sector and common pool, of target or regulated species. Achieve coverage level sufficient to minimize effects of potential monitoring bias to the extent possible while maintaining as much flexibility as possible to enhance fleet viability.

#### **Goal 2: Reduce cost of monitoring**

Objectives:

Streamline data management and eliminate redundancy. Explore options for cost-sharing and deferment of cost to industry. Recognize opportunity costs of insufficient monitoring.

### **Goal 3: Incentivize reducing discards**

#### **Objectives:**

Determine discard rate by smallest possible strata while maintaining cost effectiveness. Collect information by gear type to accurately calculate discard rates.

### **Goal 4: Provide additional data streams for stock assessments**

#### **Objectives:**

Reduce management uncertainty and/or biological uncertainty. Perform biological sampling if it may be used to enhance accuracy of mortality or recruitment calculations.

### **Goal 5: Enhance safety of monitoring program**

### **Goal 6: Perform periodic review of monitoring program effectiveness**

#### **Other Program Elements:**

In addition to the above goals and objectives, the following elements of the monitoring program are pertinent to the options that are being considered:

- The primary goal of observers or at-sea monitors for sector monitoring is to verify area fished, catch, and discards by species and by gear type (see A16 p. 109).
- For observer or at-sea monitoring coverage, minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology (CV30). The required level of coverage will be set by NMFS based on information provided by the Northeast Fishery Science Center and may consider factors other than the SBRM CV standard when determining appropriate coverage levels (see A16 p. 109).
- For allocated groundfish stocks caught by sectors, the coefficient of variation must be met for each stock at the overall stock level (see FW 48).
- Sector operations plans must specify how a sector will monitor its catch to assure the sector catch does not exceed the sector allocation (see A16 p. 108).
- Electronic monitoring may be used in place of actual observers or at-sea monitors if the technology is deemed sufficient for a specific trip based on gear type and area fished (see A16 p. 109).
- Absent NMFS funding for the at-sea monitoring program, sectors are responsible for implementing industry-funded at-sea monitoring programs to monitor their fishing activities (see FW 48).
- The coverage rate for electronic monitoring and at-sea observation must be less than 100% (see A16 p. 109).

***At-Sea Monitoring for Northeast Multispecies Sectors:***

ASM requirements for the sector program are nested within the goals and objectives of the groundfish monitoring program. Based on the Council's current policy for setting ASM coverage for groundfish sectors, NMFS determines the level of ASM coverage necessary to achieve the CV specified by the SBRM at the overall stock level for each stock of regulated species and ocean pout. The specified coverage of ASM for sectors is satisfied through two separate monitoring programs: the Northeast Fisheries Observer Program (NEFOP) and ASM. The NEFOP and ASM programs were designed with different objectives, though coverage by both programs satisfies at-sea monitoring requirements for groundfish sectors. See Appendix I for descriptions of data collected by the NEFOP and ASM programs.

NEFOP objectives (NMFS 2015, p.27):

- Collecting discard data in fisheries that interact with groundfish and other species (tow-by-tow basis),
- Monitoring catch in experimental fisheries and special management programs, such as: Special Access Programs (SAPs), and fishing in the U.S./Canada Management Area and scallop access areas,
- Collecting biological samples (age structures, length, etc.) for fish, invertebrates, and protected species caught in fisheries throughout the Northeast and Mid-Atlantic regions.

ASM objectives (NMFS 2015, p.28):

- Collecting select information on fishing gear to categorize effort,
- Collecting data to accurately calculate discards in the NE multispecies fishery (tow-by-tow basis),
- Sampling fish catch in fisheries throughout the Northeast and Mid-Atlantic regions, and
- Collecting select information on interactions with protected species (photo, tagging).

***Setting of at-sea monitoring coverage levels for Sectors:***

The current language specifying at-sea monitoring levels for sectors is as follows (648.87(b)(1)(v)(B)(1)(i)):

(i) At-sea/electronic monitoring. Unless otherwise specified in this paragraph (b)(1)(v)(B)(1)(i), beginning in fishing year 2013, coverage levels must be sufficient to at least meet the coefficient of variation specified in the Standardized Bycatch Reporting Methodology 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. In making its determination, NMFS shall take into account the goals and objective of groundfish monitoring programs at §648.11(l), the National Standards and requirements of the Magnuson-Stevens Act, including but not limited to the costs to sector vessels and NMFS, and any other relevant factors. For FYs 2013 and beyond, NMFS shall specify a separate coverage rate, lower than the coverage rate for all other sector trips, for sector trips fishing with 10-inch (25.4-cm) mesh or larger gillnets on a monkfish DAS, pursuant to §648.91(c)(1)(iii), and only in the SNE Broad Stock Area, as defined at §648.10(k)(3)(iv).

The target at-sea monitoring coverage rate for groundfish sectors (NEFOP + ASM) was 38% in FY 2010 and 2011, 25% in FY 2012, 22% in FY2013, 26% in FY 2014, and 24% in FY 2015 (NMFS 2015) (Table 1). To determine necessary coverage rates for the upcoming FY, NMFS reviews the realized CVs at the stock level from previous FYs and the coverage rate required to achieve a CV30 in that FY. For example, the 24% coverage level in FY 2015 was based on the highest percent of coverage required to achieve a CV30 in FY 2013.

**Table 1 - Target at-sea monitoring coverage for groundfish sectors (FY 2010 - FY 2015)**

	<b>NEFOP Target</b>	<b>ASM Target</b>	<b>Total Coverage Target</b>
<b>2010</b>	8%	30%	38%
<b>2011</b>	8%	30%	38%
<b>2012</b>	8%	17%	25%
<b>2013</b>	8%	14%	22%
<b>2014</b>	8%	18%	26%
<b>2015</b>	4%	20%	24%

### **Options under NMFS Existing Authority**

#### **2. Refining coverage rates**

Amendment 16 left much of the administration of the ASM program (e.g., determining and setting coverage rates) to NMFS. Certain aspects of the ASM program that do not counter the regulatory requirements and statistical standards established by the Council could be changed by NMFS administratively.

*Under NMFS Administrative Authority:*

- Rolling Average
- Area-specific Coverage Rates
- Sector-specific Coverage Rates
- Gear-specific Coverage Rates

In general, these approaches align with Goal 3 of the Groundfish monitoring program of incentivizing minimizing discards, and the objective of determining discard rates by the smallest possible strata while maintaining cost effectiveness.

#### **2a. Rolling averages**

Five years of data are now available for operations under the sector regime. Using a rolling average (e.g., the most recent three years), rather than a single year of data, could minimize fluctuations associated with noise in the data. Given that the stock with highest variability in discards has changed each year, it may make sense to look at the most recent three years of data for each stock to determine the level of variability the ASM program should expect to cover. A

limitation of this idea is that it is not a statistically valid technique if there is an observed trend in the data. For instance, if variability increases every year for a stock, using a 3-year average artificially deflates the expected variability for that stock. In contrast, if the variability of a stock goes up and down from year to year without pattern, a moving average may better approximate the likely variability. If applied, this approach would use data from past fishing years to expand the time series that is currently considered by NMFS when setting ASM coverage.

#### ***2b. Area-specific coverage rates***

The current ASM program requires the same coverage rate in all areas, including areas where the stock(s) with highest variability in discards are not located. This can lead to some stocks receiving higher ASM coverage than is necessary to meet the CV standard. Setting coverage rates based on the stocks present in the BSAs could reduce overall ASM coverage and cost without jeopardizing the CV standard for any one stock.

There are issues of concern around the concept of area- (or stock-) based coverage rate requirements. First, a reduction in overall ASM coverage and cost would only occur if the stock(s) with the highest variability were area-specific, rather than unit stocks. Second, even in that situation, unit stock estimates could be biased, because they would receive higher coverage in some areas than in other areas. Third, the current ASM program bases the required coverage rate on the stock with the highest variability in the most recent fishing year available, not because it is expected that stock will again have the highest variability, but because the data shows the range of variability within the fishery. To date, the driving stock has changed each year. Unless vessels are bound to fish only in the areas declared in, this system may be ineffective at achieving the target coverage rates by area.

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**Table 2- Example approach to prioritization when considering area-specific coverage rates.**

	Realized CV by Fishing Year				
	2010	2011	2012	2013	CV MAX
<b>MAX GB by FY</b>	<b>16.29</b>	<b>27.67</b>	<b>21.48</b>	<b>24.84</b>	<b>27.67</b>
GB cod	5.61	8.39	10.5	14.56	14.56
GB haddock	9.4	10.22	21.48	11.81	21.48
GB winter flounder	16.29	27.67	21.29	23	27.67
GB yellowtail flounder	11.13	10.36	15.97	24.84	24.84
<b>MAX GOM by FY</b>	<b>10.56</b>	<b>9.11</b>	<b>12.26</b>	<b>15.1</b>	<b>15.1</b>
GOM cod	4.74	4.74	9.73	6.07	9.73
GOM haddock	9.94	9.11	12.26	12.98	12.98
GOM winter flounder	10.56	8.81	8.96	15.1	15.1
<b>MAX Multi Stock Area by FY</b>	<b>13.22</b>	<b>9.04</b>	<b>11.01</b>	<b>16.69</b>	<b>16.69</b>
CC/GOM yellowtail flounder	8.66	6.9	7.9	9.32	9.32
GOM/GB windowpane flounder	13.22	9.04	11.01	16.69	16.69
SNE/MA windowpane flounder	9.12	8.22	10.7	7.98	10.7
<b>MAX SNE by FY</b>	<b>13.95</b>	<b>12.85</b>	<b>15.44</b>	<b>31.37</b>	<b>31.37</b>
SNE/MA winter flounder	10.61	12.85	15.44	21.05	21.05
SNE/MA yellowtail flounder	13.95	9.39	12.9	31.37	31.37
<b>MAX Unit by FY</b>	<b>11.51</b>	<b>9.38</b>	<b>13.79</b>	<b>21.16</b>	<b>21.16</b>
Halibut	6.34	6.95	6.66	7.68	7.68
Ocean Pout	9.69	9.38	11.7	11.57	11.7
Plaice	4.96	4.36	5.52	6.51	6.51
Pollock	8.01	6.91	7.71	7.64	8.01
Redfish	11.51	8.98	13.79	21.16	21.16
White hake	9.21	7.76	12.95	11.94	12.95
Witch flounder	5.76	5.11	8.87	7.41	8.87
Wolffish	6.66	7	8.34	9.55	9.55
<b>CV MAX in FY Year</b>	<b>16.29</b>	<b>27.67</b>	<b>21.48</b>	<b>31.37</b>	<b>31.37</b>



ASM rates could be set using conditional (if...then) approach to CVs achieved in specific stock areas. Note that some stock areas will cover multiple BSAs, and some unit stock areas do not cover the entirety of all four BSAs. One issue that would need to be resolved is how to treat BSA 2 – Inshore GB.

Potential Approach (see Table 2):

1. IF CV MAX is equal to MAX Unit, then set ASM = for all stocks
2. IF CV MAX is less than MAX Unit, but equal to MAX Multi, then set ASM coverage for the BSAs that within the MAX Multi stock area, and apply coverage to all stocks within those BSAs. For stocks outside of the BSAs of the MAX Multi, set ASM coverage based on the MAX CV in the given stock area (GOM, GB, or SNE).
3. IF CV MAX is less than MAX Unit and MAX Multi, then set ASM coverage for specific BSA with MAC CV = to MAX stock area 1. If MAX stock area 2 is = to MAX Unit or MAX Multi, follow the above conditions.

#### ***2c /2d. Sector-specific rates/gear-specific rates***

Another approach would be to determine specific ASM coverage rates for particular sectors or gears. Coverage rates could be tied to each sector's composition and fishing practices (e.g., gear types, areas fished). Coverage rates would be linked to the consistency of discard rates relative to the expected amount of discards. For example, sectors taking similar trips with consistent discard rates would need fewer trips observed to achieve a given CV standard compared to a sector with discards that vary greatly among trips. This program would likely reduce ASM coverage requirements and costs for some sectors while increasing coverage rates and costs for others. Currently, coverage levels are based on the CV achieved at the stock level across all sectors.

This could reward the use of conservation gear or sector behavior that reduces discards by reducing the required ASM coverage rates and resultant costs. However, variability is not necessarily a function of the volume of discards. This would also increase the complexity and the administrative burden of determining, implementing, and monitoring ASM coverage rates. Assigning sector-specific rates may cause sector memberships to adjust, so that sectors become more uniform in composition.

**PDT Recommendation:** The Committee could recommend to the Council to provide input to NMFS on how to determine ASM coverage needed to achieve the monitoring standard (CV), including the possibility of having multiple ASM coverage rates. Alternatively, the Committee may wish to consider developing option 2c/2d through a Council Action.

## **Options that require a Council Action**

### **3. Modifying the ASM requirements for Extra Large Mesh Gillnet trips targeting monkfish, skates, and dogfish**

Currently, some level of ASM is required on all “sector trips,” trips that count toward a sector’s Annual Catch Entitlement (ACE). This includes trips by sector vessels that may be targeting monkfish, skates, or dogfish using extra-large mesh (ELM) gillnets, and catching small amounts of regulated groundfish. In FW 48, the Council adopted lower coverage rates for sector trips on a Monkfish DAS in the SNE Broad Stock Area using ELM gillnet gear, with the rationale that the measure would reduce the use of ASM funds on trips that catch little groundfish, helping to focus ASM resources on those trip that catch groundfish. NMFS sets coverage rates for these trips on an annual basis (8% to-date).

The Committee and Council expressed concern about the amount of ASM resources currently being devoted to sector trips that catch relatively little groundfish. Similar to ASM analyses completed in FW 48, the PDT reviewed sector catch information on observed ELM trips in FY 2014. A 5% groundfish catch to total kept catch threshold has been used by NOAA to evaluate exempted fishery requests<sup>1</sup>, and by the PDT to evaluate similar approaches in FW48. Using a comparable approach, the PDT found that there is very little catch of groundfish in BSA 2 - Inshore GB and BSA 4 - SNE using ELM gillnet gear (see Appendix II for details).

An important difference between trips with low groundfish catches in SNE and Inshore GB is that skate represented the majority of kept catch for ELM trips in Inshore GB area. As monkfish does not appear to be a target species on these trips, the Committee may not wish to pursue an alternative in the Inshore GB BSA that mirrors the approach taken in SNE in FW48, because the approach in SNE requires the use of a Monkfish DAS to receive relief from ASM coverage.

Also, the PDT notes that exemptions already exists for certain trips (e.g., SNE Monkfish and Skate Gillnet Exemption Area allowing 10-inch+ gillnets, SNE dogfish gillnet exempted fishery allowing 6+ inch gillnets, and Mid-Atlantic exemption area allowing fisheries outside of groundfish regulations provided no groundfish are retained).

**PDT Recommendation:** The PDT recommends that the Committee pursue an alternative that would consider allowing a different ASM coverage rate for sector trips using 10”+ ELM sink gillnets in BSA 2 - Inshore GB. Further, the PDT suggests that creating an ELM exemption, currently in place in SNE, would create parity between ELM trips in SNE and Inshore GB that catch very little groundfish.

### **4. Establishing sector specific coverage requirements**

See option 2c/2d in above section.

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<sup>1</sup> The standard for RA authority is that regulated species bycatch cannot exceed 5% of total catch.

## **5. Establishing sector specific management uncertainty buffers or discard rates**

### ***Catch buffers (or management uncertainty buffers)***

A catch buffer could be applied in lieu of at-sea monitors to cover uncertainty in discard estimates of unobserved catch. In this approach, the catch buffer could be subtracted out of a sector's ACE at the beginning of the fishing year. This buffer would be in addition to the management uncertainty buffer that is applied to the entire commercial fishery when calculating stock-specific catch limits ( $ABC - \text{stock specific management uncertainty} = ACL$ ).

The PDT did not develop this section in detail due to time constraints.

## **6. Setting a new CV standard (> CV30)**

ASM is necessary to achieve the CV specified by the Standard Bycatch Reporting Methodology (SBRM), a CV of 30 for each stock. Changing the CV standard for the groundfish monitoring program may result in higher or lower coverage levels at the fleet level, depending on the direction that the CV is adjusted (higher or lower), and the homogeneity of discards on observed trips. Increasing the CV standard (>30) may result in lower coverage. The CV is a measure of the precision of the discard estimate resulting from ASM, and does not indicate the accuracy, magnitude, or importance of the discard estimate.

The PDT did not develop this idea in detail due to time constraints. However, future analyses could include reviewing: a higher CV for all stocks, different CV's for each stock, or setting criteria to determine whether which stocks should be held to a particular CV standard (see option 7 below).

**PDT Recommendation:** Although no analyses are complete at this time, the PDT recommends that this option be investigated further.

## **7. Prioritizing coverage of how the CV is applied based on stock status, stock area fished, or proportion of discards**

### ***Alternative Ways to Prioritize ASM Coverage for Sectors***

Under the current ASM program, NMFS sets a single coverage rate for all sectors in all areas based on the observed discard estimate variability from the most recent complete fishing year. Under this option, the Council would develop performance criteria to prioritize ASM coverage with the purpose of improving the efficiency of the ASM program.

Prioritizing ASM coverage in the sector program beyond the potential changes under NMFS authority may require changing existing regulations that require that the CV30 be achieved at the stock level for all regulated species and ocean pout.

One approach within the bounds of the current CV standard that the Committee may wish to consider is to make the CV30 a target, rather than a requirement, along with a prioritization scheme for assigning and implementing ASM coverage for sectors. This change would provide

NMFS additional latitude to consider a range of priorities when deciding whether every stock has an equal need for discards estimate precision.

To prioritize coverage of how the CV standard is applied, (e.g., based on stock status, or stock area fished, or proportion of discards), performance criteria would need to be developed. Under this approach, prioritization means that, depending on the performance criteria, certain stocks would be removed as drivers for determining the necessary ASM coverage for a given year. For example, the stock status performance criteria suggests prioritizing stocks in poor condition. If stock status were chosen as performance criteria, then stocks in poor condition would drive ASM coverage rates.

The current ASM program treats all stocks equally, such that the required coverage rate can be driven by the variability in the catch of a stock that is fully rebuilt, is not experiencing overfishing, is underutilized, and for which discards are only a tiny fraction of total catch. Given limited resources, it might be better to create priorities for ASM coverage. Below are nine possible ways to prioritize ASM coverage, all of which would need a Council action to remove the current requirement that discard estimates of each regulated species and ocean pout meet a CV of 30 at the stock level across all sectors.

The PDT discussed several factors to consider when determining whether or not it is necessary for a stock to meet the CV30 standard.

- Allocated stocks vs non-allocated stocks
- Stock condition – is the stock overfished or subject to overfishing
- Percent of ACL harvested
- Percent of catch comprised of discards
- Impact of discard estimates on the stock assessment
- Impact of exemptions on discards of a stock

*Allocated v. Non-allocated*

Only regulated species may be allocated to sectors. ASM coverage could be prioritized by applying the CV30 only to allocated stocks. However, sector catch of non-allocated stocks is entirely discards, so exempting these stocks from meeting the ASM CV standard might have disproportionately high impacts on the catch estimates of these stocks (Table 3). The Council's preferred alternative in FW48 specified that ASM coverage be set based on the coverage needed to achieve a CV30 at the stock level for all allocated stocks.

**Table 3- Summary of CVs for non-allocated stocks.**

Stock Area	Stock	FY 2010		FY2011		FY2012		FY2013	
		Realized CV	CV 30 Percent Coverage Required	Realized CV	CV 30 Percent Coverage Required	Realized CV	CV Percent Coverage Required	Realized CV	CV Percent Coverage Required
SNE/GB	SNE/MA window-pane flounder	9.12	4.75	8.22	3.23	10.7	2.99	7.98	1.74
GOM/GB	GOM/GB window-pane flounder	13.22	8.08	9.04	3.05	11.01	3.21	16.69	6.45
Unit	Ocean Pout	9.69	4.58	9.38	3.36	11.7	3.55	11.57	2.8
Unit	Halibut	6.34	2.01	6.95	1.93	6.66	1.22	7.68	1.43
Unit	Wolffish	6.66	2.18	7	1.9	8.34	1.93	9.55	2.24

### *Stock Condition*

Some groundfish stocks are healthy, fully rebuilt, and not subject to overfishing. Other stocks are overfished and/or experiencing overfishing. One way to prioritize ASM coverage would be to focus on stocks that are subject to a rebuilding program, or that are in need of a reduction in fishing mortality (Table 4). This would focus ASM resources on the stocks of greatest concern. This could lead to a higher CV for discard estimates of healthy stocks, but those stocks are generally least likely to be at risk to exceed their ACLs or to suffer biological harm from exceeding an ACL.

**Table 4 - Groundfish Stocks with Overfished Status, based on the last stock assessment. Columns in gray are non-allocated stocks.**

Stock	Year	Realized CV	CV 30 Percent Coverage Required	Stock specific average (2010-2013) of needed coverage	Overfished (1=yes 0=no)	Overfishing (1=yes 0=no)	Rebuild By	Stock assessment model
CC/GOM yellowtail flounder	2013	9.32	2.43	2.625	1	1	2023	VPA
GB cod	2013	14.56	5.19	3.2425	1	1	2026	ASAP
GB yellowtail flounder	2013	24.84	12.42	6.3775	1	1	2032	empirical
GOM cod	2013	6.07	1.11	1.6075	1	1	2024	ASAP
GOM/GB windowpane flounder	2013	16.69	6.45	5.1975	1	1	2017	AIM
Halibut	2013	7.68	1.43	1.6475	1	0	2055	RYM
Ocean Pout	2013	11.57	2.8	3.5725	1	0	2014	Index
SNE/MA winter flounder	2013	21.05	11.77	8.4875	1	0	2023	ASAP
Witch flounder	2013	7.41	1.35	1.515	1	1	2017	VPA
Wolffish	2013	9.55	2.24	2.0625	1	0	???	SCALE

*Percent of ACL harvested*

Prioritization could focus ASM coverage on stocks with catch that approaches the ACL, rather than focusing coverage on precisely estimating discards of a stock where only 30% of the ACL is harvested. Table 5 illustrates total GF catch/ACL ratios (all fleets, fisheries) since FY2010. Stocks with catch/ACL ratios less than 0.5 during all years since FY 2010 include redfish, GB haddock, Pollock, ocean pout, and wolffish.

**Table 5 - Total GF catch/ACL ratios (all fleets, fisheries), FY 2010 – FY 2013. Highlighted stocks are those with catch/ACL ratios less than 0.5 during all years.**

Total Catch/ACL	FY2013	FY2012	FY2011	FY2010
Acadian redfish - Gulf of Maine / Georges Bank	0.38	0.42	0.26	0.3
American plaice - Gulf of Maine / Georges Bank	0.97	0.39	0.42	0.53
Atlantic cod - Georges Bank	0.85	0.27	0.68	0.84
Atlantic cod - Gulf of Maine	0.97	0.58	0.69	0.71
Atlantic halibut - Northwestern Atlantic Coast	0.82	0.91	0.69	0.53
Atlantic wolffish - Gulf of Maine / Georges Bank	0.29	0.42	0.43	0.29
Haddock - Georges Bank	0.12	0.01	0.01	0.2
Haddock - Gulf of Maine	1.48	0.47	0.58	0.66
Ocean pout - Northwestern Atlantic Coast	0.27	0.22	0.36	0.4
Pollock - Gulf of Maine / Georges Bank	0.47	0.46	0.46	0.4
Windowpane - Gulf of Maine / Georges Bank	1.95	1.28	1.19	1.01
Windowpane - Southern New England / Mid-Atlantic	1.05	1.37	2.24	2.38
Winter flounder - Georges Bank	0.48	0.53	0.85	0.78
Winter flounder - Gulf of Maine	0.24	0.28	0.52	0.84
Winter flounder - Southern New England / Mid-Atlantic	0.64	0.52	0.35	0.61
Witch flounder - Northwestern Atlantic Coast	0.99	0.67	0.85	0.93
Yellowtail flounder - Cape Cod / Gulf of Maine	0.87	0.84	0.79	0.82
Yellowtail flounder - Georges Bank	0.45	0.7	0.79	0.79
Yellowtail flounder - Southern New England / Mid-Atlantic	0.70	0.59	0.77	0.67
White hake - Gulf of Maine / Georges Bank	0.52	0.67	0.89	0.87
Total Catch/ACL = The total quantity of fish that are OFL/ABC/ACL or ABC/ACL Applicable relative to the ACL for the stock. If the ratio is greater than 1, the ACL was exceeded.				

#### *Percent of catch comprised of discards*

Prioritization could focus ASM coverage on stocks where a high proportion of catch is comprised of discards, rather than focusing coverage on precisely estimating discards for a stock where discards are only a small portion of the catch.

#### *Quality of stock assessment*

Prioritization could focus ASM coverage on stocks that have the greatest need for improved information within their stock assessments. Doing so may not only improve selected assessments, but also potentially increase the value of information received for ASM funds spent. The timing of stock assessments may need to be considered to incorporate the information into the management process.

#### *Exemption-impacted stocks*

Another idea to consider is whether stocks that have discards impacted by specific exemptions should be included when setting the overall ASM coverage rate, as they currently are. For example, sectors are granted an exemption to use a smaller mesh cod end when targeting redfish in certain areas. Those trips may have different discard profiles than trips not using the exemption.

### **8. Redesigning and re-stratifying the catch monitoring system to be proportional to landings and discards**

The PDT did not develop this section in detail due to time constraints.

### **9. Using a combination of monitoring tools to achieve monitoring goals, objectives, and requirements**

In practice, effective monitoring can be achieved using multiple combinations of self-reporting and independent monitoring tools. Several tools have been used to meet the goals, objectives, and requirements of the groundfish monitoring program.

#### **Self-reporting tools**

- Vessel reports
  - Vessel trip reports (VTRs) & electronic vessel trip reports (eVTRs)
  - Vessel monitoring system (VMS) catch reports
  - VMS trip declarations
- Dealer logbooks

#### **Independent monitoring tools**

- VMS - passive location monitoring
- Third-party monitoring
  - Northeast Fishery Observer Program (NEFOP) monitors
  - ASM
  - Dockside monitoring (requirement removed through FW48)
  - Electronic monitoring (Pre-implementation phase)



While several electronic monitoring pilot projects have been conducted in New England, EM technology is not currently a component of groundfish monitoring program. At its June 2015 meeting, the NEFMC passed the following motion in regard to electronic monitoring:

That the Council recommends to NMFS GARFO that, in the short-term, electronic monitoring in the groundfish fishery be used for the purpose of verifying VTR reported discards of groundfish ACE managed species. (16/0/1)

As noted in the above motion, discard estimation through an EM programs relies upon an entirely different set of assumptions than those used in the current ASM program. The current ASM program, with coverage levels set to achieve a CV30 at the stock level, extrapolates discard data collected on observed trips across unobserved trips, irrespective of discards reported on VTRs. The EM model uses cameras to verify the accuracy of self-reported discard information on VTRs. Discards are then calculated at the trip level based on self-reported information which is audited using EM video footage.

Further, full retention may be an additional approach for further consideration.

**References:**

NMFS, 2015. Summary of Analyses Conducted to Determine At-Sea-Monitoring Requirements for Multispecies Sectors FY2015. <http://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/nemultispecies.html>

## **Appendix I**

### **Fisheries Sampling Branch Data Collection**

*Focusing on similarities/differences between NEFOP and ASM groundfish data*

The National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center (NEFSC) Fisheries Sampling Branch (FSB) collects, maintains, and distributes data for scientific and management purposes in the Northwest Atlantic. FSB manages three separate but related observer programs: the Northeast Fisheries Observer Program (NEFOP), the At Sea Monitoring (ASM) Program, and the Industry Funded Scallop (IFS) Program. Although each program is tailored to meet specific monitoring objectives, all programs operate within and are governed by the same laws, and are subject to the same standards in regards to data quality and confidentiality, safety, and harassment.

NEFOP and IFS priorities focus on the following objectives:

- Collecting accurate discard data in fisheries that interact with groundfish and other species (tow-by-tow basis),
- Monitoring catch in experimental fisheries and special management programs such as Species Access Programs (SAPs) and fishing in the U.S./Canada Management Area,
- Monitoring catches in scallop access areas,
- Sampling fish and crustacean catches in fisheries throughout the Northeast and Mid-Atlantic regions, and
- Collecting detailed biological samples (age structures, lengths, etc.) for fish, invertebrates, and protected species.

ASM priorities focus on the following objectives:

- Collecting select information on fishing gear to categorize effort,
- Collecting accurate discard data in the NE multispecies fishery (tow-by-two basis),
- Sampling fish catch in fisheries throughout the Northeast and Mid-Atlantic regions, and
- Collecting select information on interactions with protected species (photo, tagging).

The main difference between the ASM and NEFOP monitoring programs is that ASM collects a subset of the data collected by NEFOP observers, which reduces the training time, gear requirements, and internal support resources necessary to administer the ASM program. NEFOP focuses on biological sampling of catch including protected species. Biological sampling involves collecting data on age, length, sex, animal condition, and gear interactions to provide end users with data to determine the health of a fish stock, project biomass, and to use in scientific studies of life history that examine the distribution of stock, matriarchal lines, and contaminate and food habit studies. ASMs collect data to verify area fished and catch (landings and discards), by species and gear type, for the purpose of monitoring sector ACE utilization (see FY 2015 Multispecies Sector ASM Requirements Summary).

The NE multispecies groundfish fishery is covered by both NEFOP and ASM sampling and all groundfish trips follow the same protocols:

- Observer uploads preliminary data within 48 hours of landing
  - Both programs upload all ASM data fields electronically

- Species verification samples/photos are checked in within 48 hours of receipt (photo upload or physical sample arrival)
  - Both programs have the same species verification requirements
- Preliminary data is reviewed by the FSB and loaded to SIMM within 5 days of landing
- Observer submits paper logs within 5 days of landing
  - Both programs currently use paper logs for verification of electronic submissions
- Paper log data is compared to electronic data and any additional changes are made and reloaded to SIMM within 30 days of landing
- Biological samples are checked in within a week and then sent to processing within 90 days
  - NEFOP biological samples include whole fish/invertebrate samples, whole protected species or samples, otoliths, scales, monkfish vertebrate, and specialized research tags.

After review, the NEFOP data fields are entered into a separate data entry system, audited, and then loaded to the observer database for use by NEFSC end-users, a process that typically takes about 90 days from trip landing.

Table # and # summarize the data collected and reported on groundfish trips. For a complete list of all data fields collected on NEFOP and ASM logs, refer to the Northeast Fisheries Observer Program Manual.

Data Set	ASM Collection	Additional NEFOP Collection	SIMM Reporting
<b>Vessel and Trip Information</b>	Trip identifier, program code, sector/fleet, vessel information, ports and dates sailed and landed, trip costs, gear type used, target species	Home port, trip duration, crew size, fishing time lost, gear onboard and soaking, captain experience	All ASM fields
<b>Trawl Gear Information</b>	Gear code, gear number, net descriptors, codend and liner mesh sizes, excluder/separator and escape outlet presence	Doors, kites, construction material, fishing circle, length measurements, strengthener, chafing gear, ground gear, sweep gear, floats, gear mounted electronics details, excluder/ separator and escape outlet details	Gear code, gear number, mesh size category
<b>Gillnet Gear Information</b>	Gear code, gear number, number of nets, net length, net height, tie downs, marine mammal deterrents, mesh size	Hanging ratio, twine size, floats and floatline, anchors and leadline, spaces, droplines, net color, surface system, buoyline, groundline, weak links	Gear code, gear number, mesh size category
<b>Longline Gear Information</b>	Gear code, gear number, number of hooks, hook brand, hook model, hook size	Sections, mainline, leaders, anchors, gangions, surface system, buoyline, groundline, weak links, swivels, radar reflectors	Gear code, gear number
<b>Haul Information</b>	Haul number, gear code, gear number, haul observed,	On effort, marine mammal watch, catch exist, wind speed and direction,	Haul number, gear code, haul observed,

	weather, wave height, gear condition, target species, soak duration; Dates, times, and locations: haul begin and end	water temperature, depth, set method, set/tow speed, number of turns, wire out, bait; Dates, times, and locations: fixed gear set, mobile gear fishing begin and gear onboard	target species, statistical area, soak duration
<b>Catch Information</b>	Species name, market, weight, disposition (kept or discard) and reason, catch estimation method	Same as ASM	Species, market, stock area, weight, disposition (kept or discard), calculated live weight
<b>Biological Sampling</b>	Lengths: Species name, disposition and reason, sample weight, animal length, number at length	Lengths: sex, age sample type and number Age structures: scales, otoliths, vertebrae, and/or heads (species dependent)	None
<b>Protected Species Interactions</b>	Takes: Animal number, haul number, tag number (applied or existing), species name, entanglement situation, animal condition	Takes: Net number/position, time taken, pinger condition code, sex, sampling measurements, body temperature (mammals) Sightings: Event type, position, haul number, location, weather, wave height, species name, number of animals, how sighted, animal condition, animal behavior	Harbor porpoise takes: Porpoise number, tag number, entanglement situation, animal condition, location

VESSEL & TRIP			
Field Name	NEFOP	ELECTRONIC	SIMM
Trip Identifiers	X	X	
Tripid, Program code, Sector Id	X	X	X
Fleet Id	X		X
Area	X	X	X
Homeport/Trip Dur/Crew	X		
Gear Used/Onboard/Number soaking	X		
Time Lost	X		
Hauls obs/Unobs, Primspland	X		
Trip Costs	X	X	
Vessel Info- Name, Permit, Hullnum, VTR	X	X	X
Gear and Target Species	X	X	X
Port/Date Sail and Land, Dealer Info	X	X	X

Highlighted fields are collected by ASM

HAUL LOG			
Field Name	NEFOP	ELECTRONIC	SIMM
Gear code, Target Spp, Obsrflag, Haul Num	X	X	X
Weather	X	X	
Wind, Depth Haul Begin	X		
Wave Height	X	X	
Begin/End Time/Coordinates	X	X	X*
Specific Haul Info ex. Pumping, Soak Dur	X		X**
MM Watch (GG)	X		
Depth Bottom/Leadline (GG)	X		
Number of Nets Hauled (GG)	X	X	
Number of Nets Set/Lost (GG)	X		
Number of MM Deterents Hauled (GG)	X	X	
Number of Deterents Lost/Passive (GG)	X		
Mainline Length (LL)	X		
Set Method and Speed (LL)	X		
Hook Depth Range (LL)	X		
Bait (LL)	X		
Catch Spp, Wgt, Market, Fish Disp, Est Meth	X	X	X***

Highlighted fields are collected by ASM

\*Area only, \*\*Soak dur, \*\*\*spp, market, stock area, catch disp, calc live wgt

TRAWL GEAR			
Field Name	NEFOP	ELECTRONIC	SIMM
General Gear- Name/Type	X	X	
Codend/Liner, Mesh Size	X	X	
Mesh Category			X
Gear Code, Gear Number	X	X	X
Construction Material	X		
Doors and Kites	X		
Fishing Circle, Strengtheners	X		
Ground Gear	X		
Length Measurements	X		
Sweep/Floats	X		
Gear Mounted Electronics	X		
General Excluder/Escape	X	X	
Specific Excluder/Escape	X		

Highlighted fields are collected by ASM

GILLNET GEAR			
Field Name	NEFOP	ELECTRONIC	SIMM
General Gear- Number Nets, Mesh Size	X	X	X
Mesh Category			X
Gear Code, Gear Number	X	X	X
Net Info Basic- Length/Height	X	X	
Net Specifics- Hanging Ratio, Twine	X		
Tie Downs	X	X	
Droplines, Anchors, Floats	X		
MM Deterrents Basic- Number	X	X	
Deterrents Specific- Passive, Brand	X		
Color, Surface System, Buoyline	X		
Groundline, Weak Links	X		

Highlighted fields are collected by ASM

LENGTH FREQUENCY			
Field Name	NEFOP	ELECTRONIC	SIMM
Species Name, Fish Disposition	X	X	
Sex, Age Samples, Number of Samples	X		
Sample Weight	X	X	
Volume Meats (Scallop)	X		

Highlighted fields are collected by ASM

LONGLINE GEAR			
Field Name	NEFOP	ELECTRONIC	SIMM
General Gear- Number Hooks	X	X	
Gear Code, Gear Number	X	X	X
Hook Brand, Model, Size	X	X	
Number of Sections and Length	X		
Mainline, Leaders, Anchors	X		
Gangions, Buoyline, Groundline	X		
Surface System, Weak Links	X		
Floats, Light sticks, Color	X		
Swivels, Dropline, Material	X		

Highlighted fields are collected by ASM

INDIVIDUAL ANIMAL LOG			
Field Name	NEFOP	ELECTRONIC	SIMM
Species, Weight, Market, Est Meth	X	X	
Sequence Number	X	X	
Gear Number	X		
Initial Status Code	X		
End Status Code, Fish Disposition	X	X	
Processing Code	X		
Tag Number, Length	X	X	
Sex, Biological samples, Photos	X		

Highlighted fields are collected by ASM

INCIDENTAL TAKE			
Field Name	NEFOP	ELECTRONIC	SIMM
Animal Identifier (PSID), Haul Number	X	X	X*
Time, Active Deterrent Device	X		
Species, Tag Number, Entanglement	X	X	X*
Animal Condition, Photo	X	X	X*
Animal Onboard	X		
Sample Taken, Length	X		
Latitude and Longitude			X*

Highlighted fields are collected by ASM

\* Harbor porpoise only

## **Appendix II**

### **Analysis of Extra Large Mesh (ELM) Gillnet Trips**

Similar to ASM analyses completed in FW 48, the PDT reviewed sector catch information on observed trips in FY 2014. A 5% groundfish catch to total kept catch threshold has been used by NOAA to evaluate exempted fishery requests, and by the GF PDT to evaluate alternatives similar to approaches pursued through FW 48.

Observer data from ELM ( $\geq 8''$ ) sector gillnet trips in FY 2014 were analyzed. A latitude/longitude position from an individual haul on each trip was used to display a spatial trip position in ArcGIS. Table 1 contains the number of observed trips by specific mesh sizes for ELM gillnet trips grouped into four ranges (to address any confidentiality concerns).

**Table 1 –ELM mesh sizes used on observed sector trips, FY 2014**

<b>Mesh Size Range</b>	<b>Number of Observed Trips</b>
<b>8 to 10</b>	16
<b>10.1 to &lt; 11</b>	78
<b>11 to &lt; 12</b>	21
<b>12 to 13</b>	499
<b>Total</b>	614

ELM gillnet effort was observed in 12 statistical reporting areas across the GOM, Inshore GB, and SNE/MA Broad Stock Reporting Areas (BSAs), with the most frequent trips observed in Inshore GB (Table 2).

**Table 2 - Number of ELM gillnet observed trips by area, FY 2014**

<b>AREA</b>	<b>Number of Observed Trips</b>
<b>BSA 1 – GOM</b>	154
<b>BSA 2 - Inshore GB</b>	318
<b>BSA 4 – SNE/MA</b>	142
<b>Total</b>	614

Total observed groundfish catch of 12,645 lbs represented 0.42% of overall observed catch on ELM gillnet sector trips in FY 2014.

Total discards observed on ELM gillnet trips in FY 2014 were 441,907.2 lbs. Discards of regulated groundfish species accounted for 1% of total discards (4,429 lbs). Of these groundfish discards, Atlantic halibut accounted for over half of total groundfish discards, followed by Atlantic cod and pollock. Discards of large winter and barndoor skates accounted for approximately half of total observed discards.

Total observed kept catch reported on these ELM gillnet trips was 3,071,568 lbs, of which 8,216 lbs (0.3%) were regulated groundfish. Observed kept catch of skates accounted for approximately 80% of total kept catch, while kept catch of monkfish constituted 16.4% of total catch.

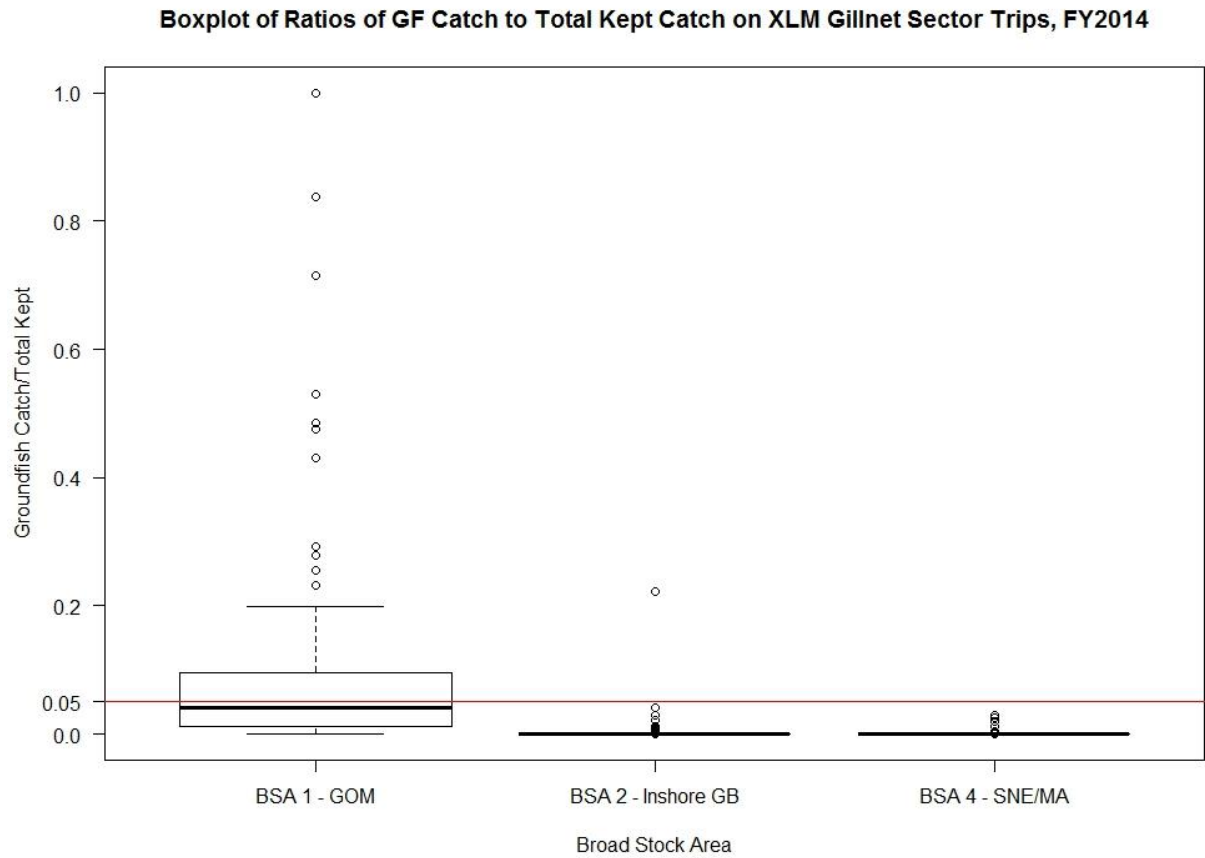


Regulated groundfish catch constituted a very small percentage of both discards and landings on sector trips using ELM gillnets in FY 2014, though groundfish catch was not uniformly distributed across statistical areas (Figure 1 and Figure 2). The ratio (percentage) of observed groundfish catch exceeded 5% of total kept catch on multiple trips in the GOM BSA. The 3<sup>rd</sup> quartile value of .095 (Table 3) indicates that 25% of the observed ELM gillnet trips in the GOM BSA had catches of regulated groundfish which exceeded 9.5% of the total catch. In the Inshore GB BSA, only one observed trip recorded groundfish catch greater than 5% of the total kept catch using ELM gillnet gear. This maximum value in the Inshore GB BSA is shown as an outlier in Figure 1. The observed groundfish catch was less than 5% of total catch on all observed trips in the SNE/MA BSA.

The maps in Figures 3-8 illustrate the spatial distribution of observed ELM gillnet effort on sector trips. Figure 3 uses graduated colors to illustrate groundfish catch/total kept catch ratios across all three BSAs. In an effort to illustrate targeting behavior at the trip level on observed ELM gillnet trips, the PDT examined species kept ratios to total kept ratios based on species with a large proportion of overall catch (skates and monkfish). Figure 4 shows observed trip level data for kept skate as a proportion of total kept, while Figure 5 depicts monkfish kept as a proportion of total kept. Figure 6 illustrates combined kept skate and monkfish kept catch/total kept. Figure 7 depicts the ratio of GF Catch to Total Kept (same as Figure 3) with overlay of SNE Monkfish and Skate Gillnet Exemption Area (hatched), and BSA 4 – SNE with gray fill.

Finally, a boxplot (Figure 8) of the groundfish catch to total kept ratios for observed sector trips using ELM in the Inshore GB area for FY2011-FY2014 illustrates that the vast majority of ELM trips in this area catch very little groundfish.

**Figure 1.**



**Table 3 - Summary Statistics of GF Catch/Kept Catch on ELM Gillnet Sector Trips, FY2014**

	BSA 1 – GOM	BSA 2 – Inshore GB	BSA 4 – SNE/MA
<b>Min</b>	0.00000	0.00000	0.00000
<b>1<sup>st</sup>. Quartile</b>	0.01264	0.00000	0.00000
<b>Median</b>	0.04030	0.00000	0.00000
<b>Mean</b>	0.08388	0.001601	0.00090
<b>3<sup>rd</sup>. Quartile</b>	0.09563	0.000000	0.00023
<b>Max</b>	1.00000	0.222834	0.02998
<b>Trips</b>	154	318	142

Figure 2 – Log scale.

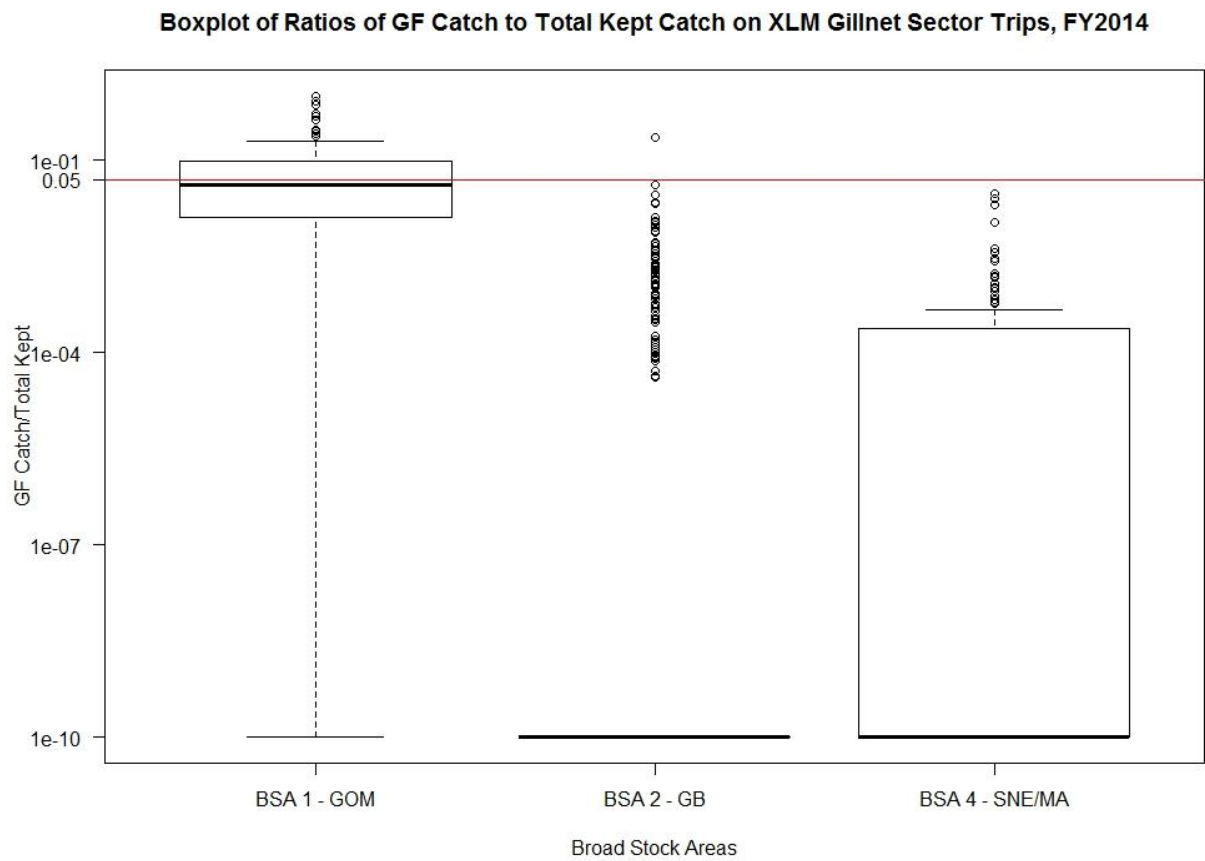


Figure 3 - GF Kept/Total Kept on observed ELM gillnet sector trips in FY2014.

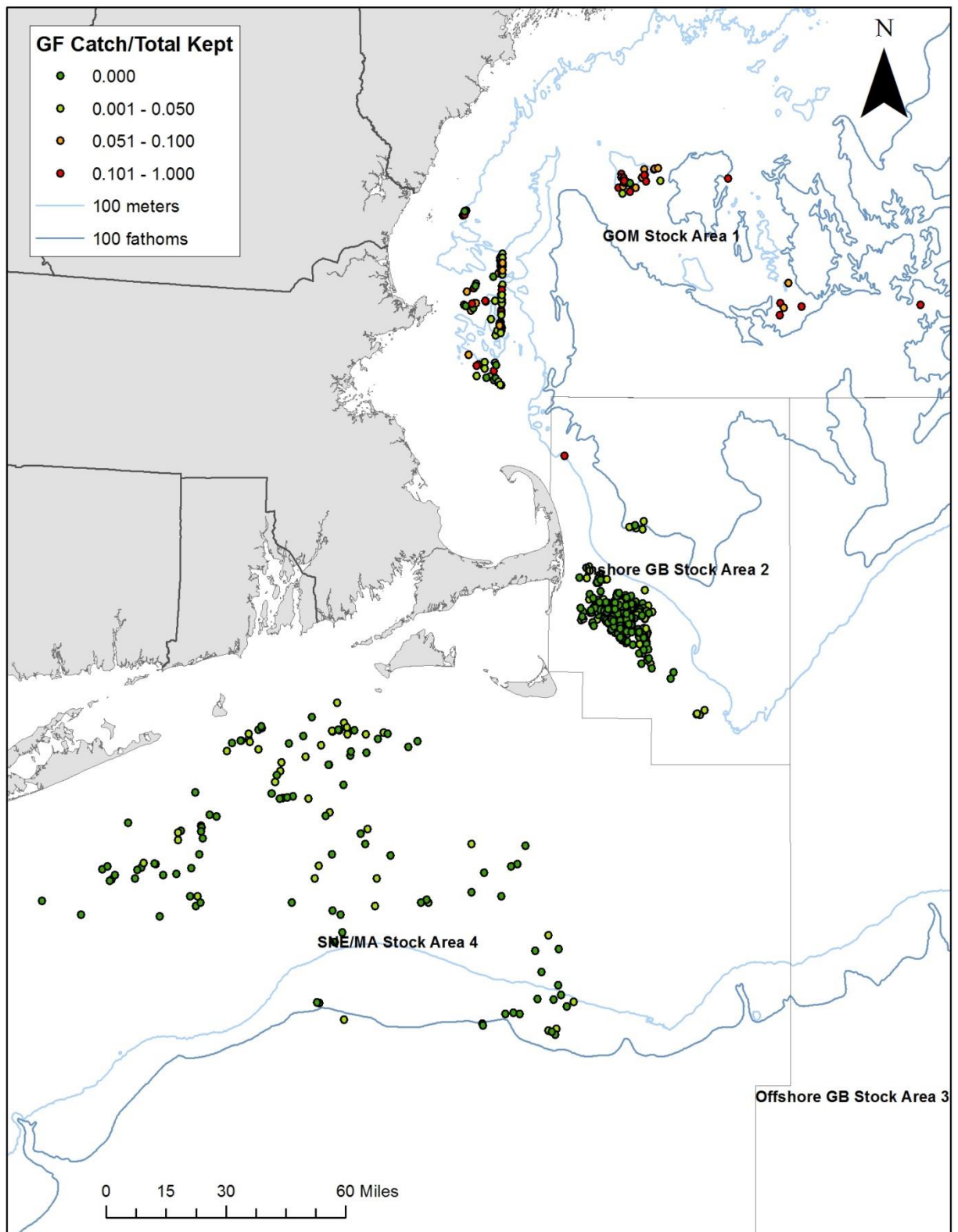


Figure 4 - Skate Kept/Total Kept on observed ELM gillnet sector trips in FY2014.

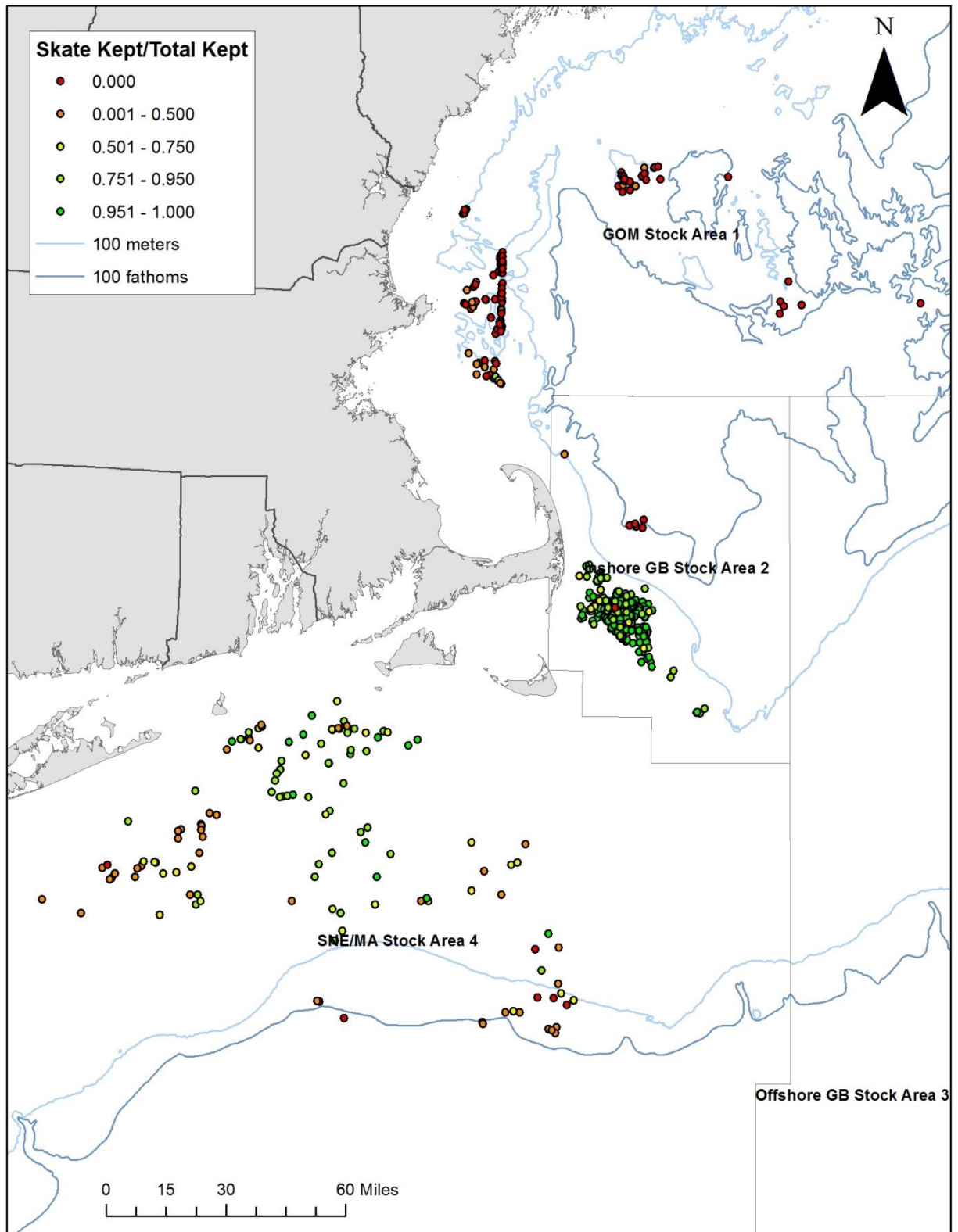


Figure 5 - Monkfish Kept/Total Kept on observed ELM Gillnet Sector Trips in FY2014.

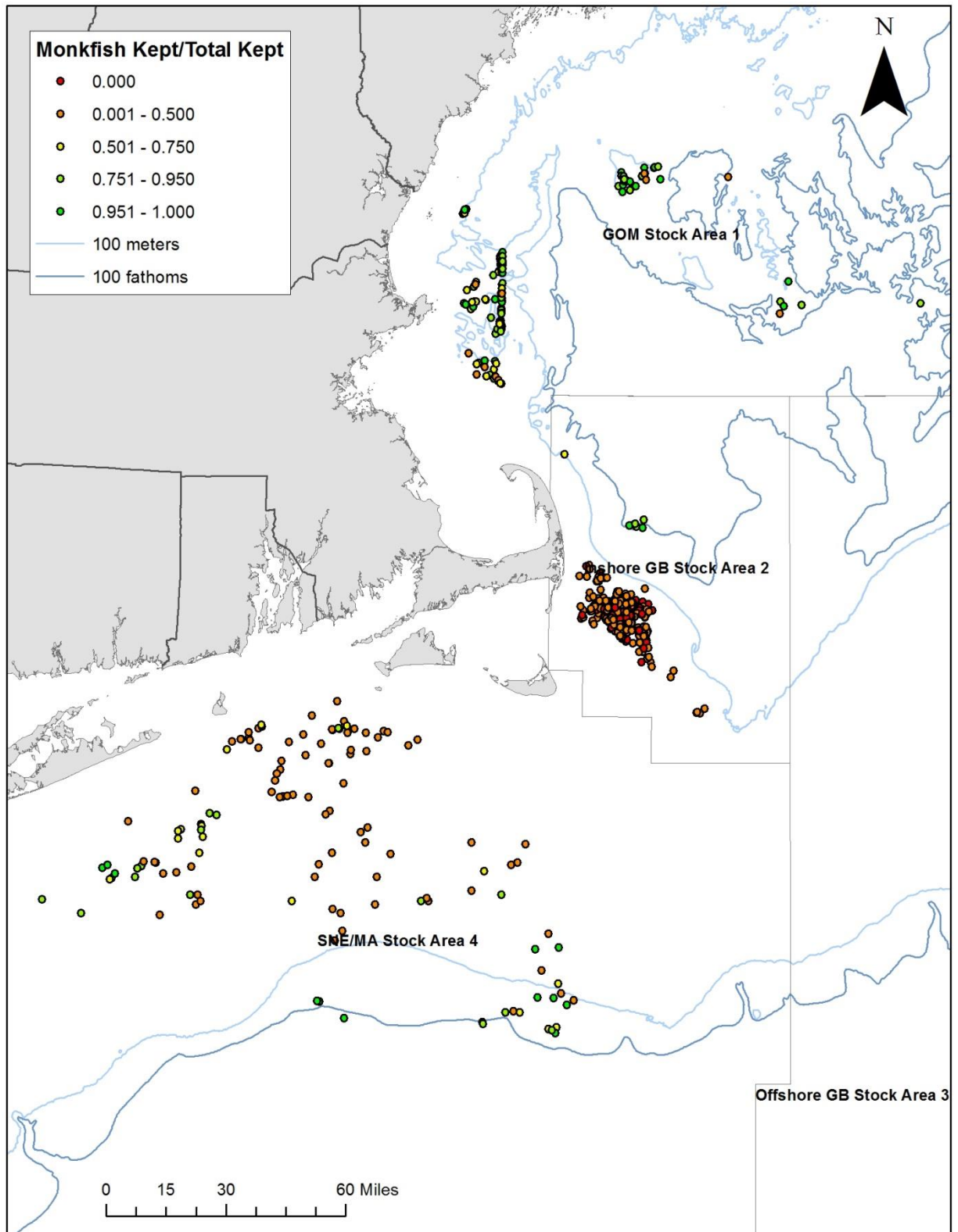
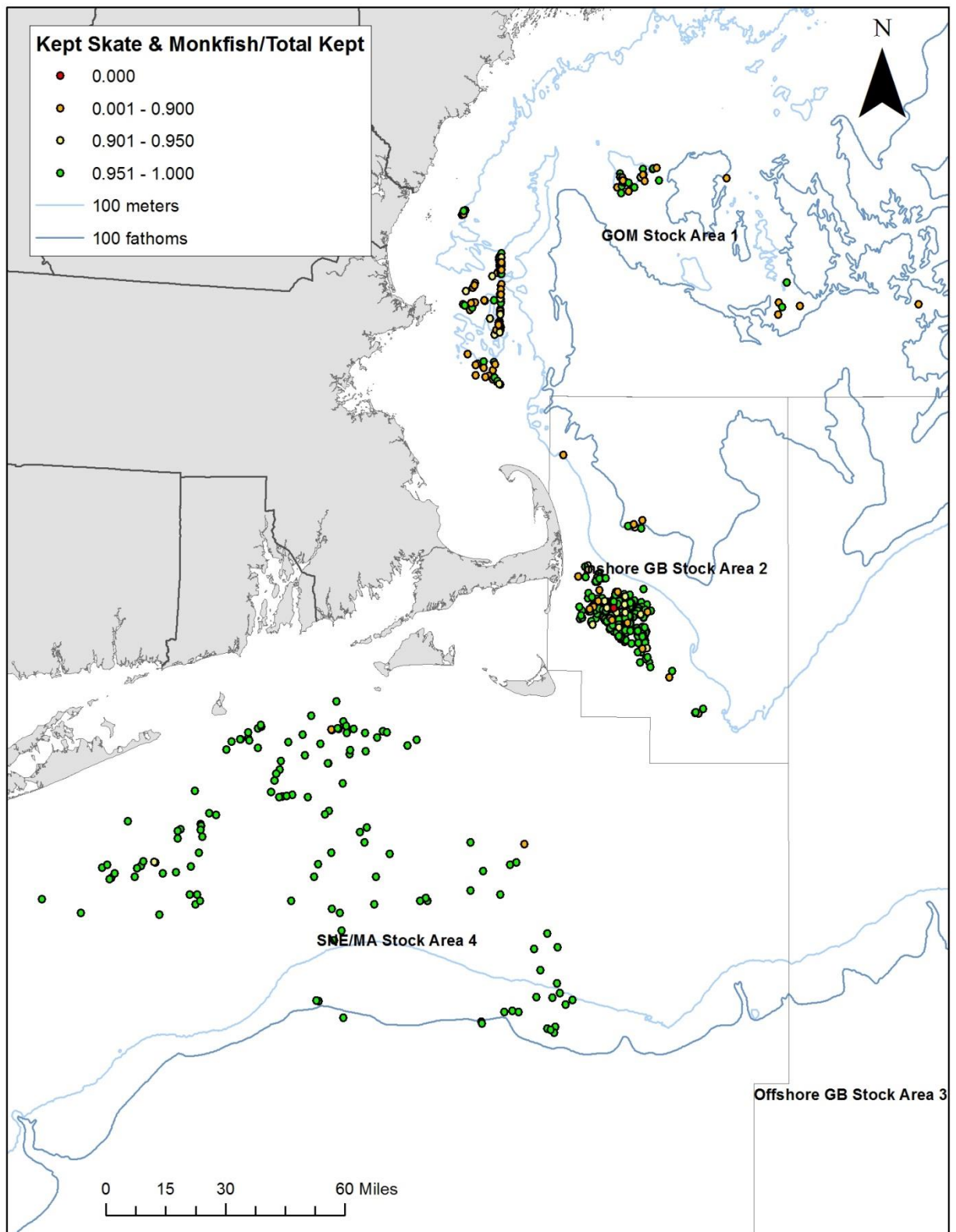
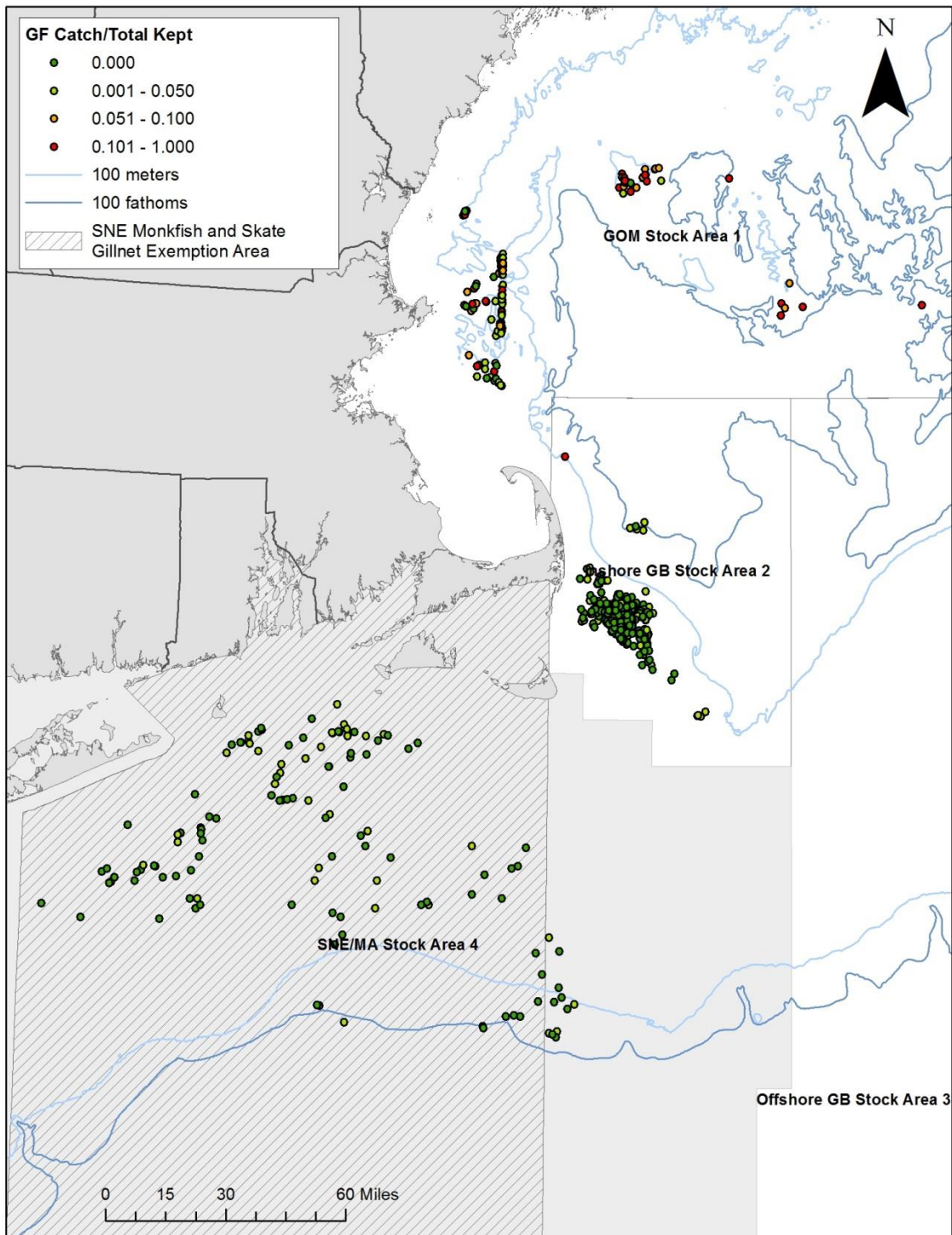




Figure 6 - Kept Skate and Monkfish/Total Kept on observed ELM gillnet sector trips in FY2014.

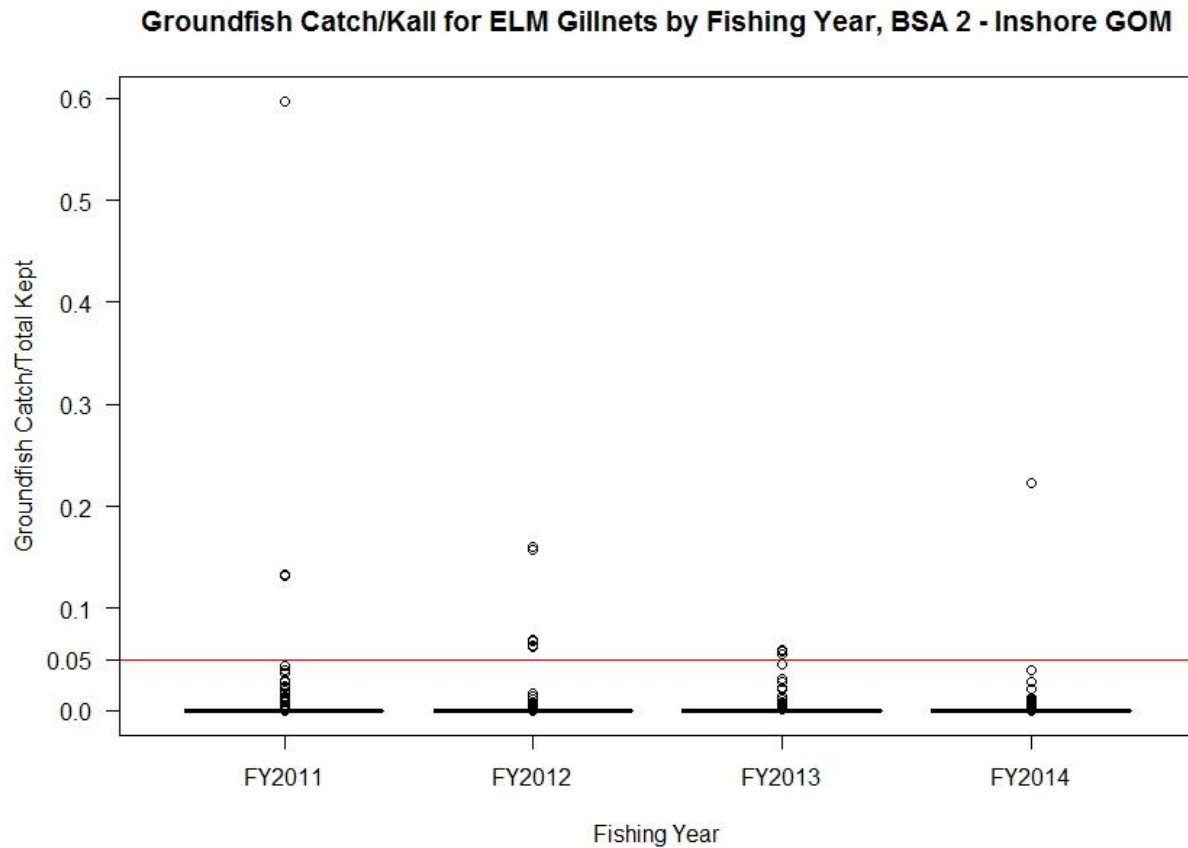


**Figure 7 – Ratio of GF Catch to Total Kept, with overlay of SNE Monkfish and Skate Gillnet Exemption Area, and BSA 4 – SNE with gray fill.**





**Figure 8 - Boxplot of Groundfish Catch to Total Kept ratios for trips using ELM on observed sector gillnet trips in BSA 2 - Inshore GB, FY2011-2014.**



Summary Statistics of Groundfish Catch/Kall ratios for ELM Sector Gillnet Trips by FY:

FY2011 (n=290)	FY2012 (n=168)	FY2013 (n=176)	FY2014 (n= 318)
Min. :0.000000	Min. :0.0000	Min. :0.00000	Min. :0.000000
1st Qu.:0.000000	1st Qu.:0.0000	1st Qu.:0.00000	1st Qu.:0.000000
Median :0.000000	Median :0.0000	Median :0.00000	Median :0.000000
Mean :0.004651	Mean :0.0041	Mean :0.00240	Mean :0.001601
3rd Qu.:0.000127	3rd Qu.:0.0000	3rd Qu.:0.00021	3rd Qu.:0.000000
Max. :0.596853	Max. :0.1610	Max. :0.05891	Max. :0.222834