



New England Fishery Management Council

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E.F. "Terry" Stockwell, Chairman | Thomas A. Nies, *Executive Director*

MEMORANDUM

DATE: October 16, 2014
TO: Scientific and Statistical Committee (SSC)
FROM: Groundfish Plan Development Team (PDT)
CC: Groundfish Oversight Committee (OSC)
SUBJECT: **Gulf of Maine (GOM) cod incidental catch**

At the request of the SSC, the PDT discussed, completed analyses, and reviewed work regarding **incidental, non-target catch of Gulf of Maine (GOM) cod under the current prevailing operating conditions of the fishery.**

Overview

The PDT met on October 7 and October 15 to work on the SSC's request and is providing the SSC with the following information on GOM cod:

- Catch estimates and patterns
 - Estimation of calendar year (CY) 2014 catches of GOM cod (Appendix 1)
 - Examination of recent patterns in Northeast Fisheries Observer Program (NEFOP) data on GOM cod catches, co-catch of GOM cod with other groundfish species, and target species reported by the captain (Appendix 2 and 3)
 - Spatial patterns of fishery catches of GOM cod (Appendix 4)
- Economic information
 - Preliminary results from the quota change model for groundfish sectors (see presentation for SSC meeting on October 20, 2014)
 - Preliminary results from the bioeconomic model for the recreational fishery (Appendix 5)
- Groundfish sector information
 - Sustainable Harvest Sector (Appendix 6)
 - Maine Coast Community Sector (Appendix 7)
 - Northeast Fishery Sectors (Appendix 8)

Major Points from the Information Examined

Caveats

- All of the analyses presented below focus only on groundfish sectors and the recreational fishery. The common pool fishery, state waters commercial fisheries, and non-groundfish fisheries were not examined due to time constraints. For context, these fisheries (i.e., those not examined in detail) combined have typically made up less than 5 percent of the total GOM cod catch in recent fishing years. All cod catch from non-groundfish fisheries is incidental because these vessels are not allowed to retain groundfish. Both the common pool and state waters commercial fisheries are subject to possession limits for cod; however, the PDT did not examine any possible trends of cod catch in these fisheries.
- The PDT obtained analyses from all but two groundfish sectors related to incidental bycatch of cod. Of note, the combined GOM cod catch (landings and discards) of the two other sectors was less than 1% of the sector catches for GOM cod in FY2012.
- All analyses assume that recent environmental conditions/observations will continue into fishing year (FY) 2015. However, sector managers attending the PDT meeting noted that some industry members have reported seeing more GOM cod in deeper waters in FY 2014 compared to recent years (similar observations by industry have been also seen in the past).

Effort

- Multiple analyses suggest recent declines in directed trips of GOM cod (i.e., from density plots of GOM cod catch, co-catches within the observer data, sector-by-sector analyses, and captain's target species changes).
- It is difficult to predict how the industry may change its behavior in response to a low ACL (e.g., shifting time or area to avoid cod, using gear modifications). Low cod tows located very close to high cod tows could have seasonality included. Tows in excess in 5,000 lbs of cod were within these areas.
- The economic and co-catches analyses suggest disproportionate effects within the commercial fleet from a reduced GOM cod ACL:
 - Effort may move to the north and east or those that do not move would not be able to fish as much,
 - Gillnets may be more negatively impacted than trawl vessels, and
 - Vessels with limited range from ports situated in the western Gulf of Maine may be more negatively impacted.

Catch

- For the first 5 months of FY 2014 (May 1- September 30), groundfish sector landings of GOM cod are 50 mt greater (~25%) than the same time period in FY2013. The ACL remained constant from FY 2013 to FY 2014, and the slight increase in FY 2014 landings

compared to FY 2013 could be due to a variety of factors. For example, the minimum fish size was reduced for GOM cod in July 2013 to help reduce regulatory discards, and this change could partially explain the increase in landings for the first part of FY 2014.

- Preliminary recreational data also show an increase in the first 4 months of FY 2014 (Waves 3 and 4) relative to FY 2013. The number of fish kept declined and number of released fish increased, which could be explained by the increase to the recreational minimum fish size for FY 2014 (i.e., from 19 in to 21 in). Preliminary results from the bioeconomic model of the recreational fishery for GOM cod, under prevailing conditions in FY 2014, indicates that FY 2014 discards could be approximately 150 mt, which would be an increase from FY 2013 recreational discards of approximately 100 mt. This estimate is uncertain because although landing of cod is prohibited for Wave 5 (September-October), some landings are expected to occur. In addition, this estimate assumed that the recreational cod fishery will re-open on April 16, 2015, (possession is prohibited until then); however, any emergency action for FY 2014 could potentially extend the prohibition on possession through the end of FY 2014 (April 30, 2015).
- Sectors provided estimates of non-target incidental GOM cod “bycatch” for FY2013 by removing those trips they classified as directed GOM cod trips from the analyses. Using similar methods and a combination of qualitative and quantitative approaches, the Sustainable Harvest Sector estimated 100mt - 115mt; the Maine Coast Community Sector, MCCA, estimated between 46.5mt - 65.8mt (using information from multiple years), and the Northeast Fishery Sectors estimated 205mt under the conditions and ACLs as of FY 2013.
 - The PDT noted that, if time allowed, this analysis should have been completed for additional fishing years to provide a more complete picture of prevailing operating conditions.
- The control rule specifies that any ABC based on incidental bycatch, should also include a reduction in the bycatch rate. However, the PDT noted that analyses presented by sectors based on FY 2013 data do not include any reduction in bycatch, although the Maine Community Sector did examine how fishing may change in that sector in response to a quota reduction in FY 2015.

Economics

- Based on the preliminary results from the quota change model:
 - For the range of ABCs examined, 50-500 mt, an inability to avoid cod may result in loss of revenues from other species, as GOM cod quotas are caught.
 - For GOM cod ABCs above approximately 500 mt, other stocks (besides GOM cod) may become constraining.

PDT Consensus Statement

The PDT is unable to provide a single, accurate estimate of incidental non-target catches of GOM cod under the current prevailing operating conditions of the fishery. The PDT concluded that the SSC's question regarding incidental non-target catch of GOM cod is difficult to answer, because it is conditional on multiple factors, including:

- The groundfish ACLs in a given fishing year;
- The availability of cod and exploitable stock biomass;
- The variation in definitions of a targeted cod trip (e.g., on a tow-by-tow basis rather than trip-by-trip; across gear types and vessel sizes; by the portfolio of groundfish Annual Catch Entitlement available to sectors over the course of a fishing year);
- The willingness/ability of the fishery to change fishing practices to avoid cod;
- The multispecies nature of the fishery; and
- The ability to define which components of the fishery are actively targeting cod.

Given the factors above, the individual estimates of incidental bycatch provided for the recreational fishery and various sectors do not provide a complete picture, and should not necessarily be used as a proxy for expected incidental GOM cod catch in FY 2015. Because incidental non-target cod catch in the groundfish fishery is largely dependent on the ACL and also on the availability of cod and exploitable stock biomass, the PDT concluded that any incidental bycatch for the components of the fishery analyzed here would likely be lower in FY 2015 compared to FY 2013 or FY 2014. In addition, the individual estimates do not account for all components of the fishery (i.e., other sectors, common pool, state waters, and non-groundfish fisheries).

Incidental cod catch is a logical construct when considering a cod catch in a non-groundfish fishery or perhaps under an unallocated, zero possession regulation, as under these circumstance cod catch is truly incidental to the forces motivating fishing decisions. Estimating incidental non-target cod catch in the context that the SSC suggests (i.e., trips within the groundfish fishery) is challenging specifically because the nominal GOM cod catch will equal the ACL, conditional on extant monitoring. The sector management system provides sectors with the operational flexibility to choose how best to use their ACE portfolio, whatever it may be.

In support of this proposition, the PDT noted that, based on the available analyses and reports from industry members, the sector fishery has adapted in recent years in response to ACL reductions. This adaptation does not imply that everyone has benefited, or even that everyone has suffered the same losses--on the contrary, losses are not evenly distributed.

The PDT also noted that fishery managers and industry (i.e., commercial and recreational fisheries) will need to continue to explore management strategies to achieve the necessary large catch reductions that are required to protect GOM cod, and provide industry with as much flexibility as possible to harvest healthy groundfish stocks. At the September 2014 SSC meeting,

SSC members expressed an interest in discussing management strategies for GOM cod at their October 2014 meeting. Since the Council may not adopt SSC recommendations for management measures, the ABC recommendation needs to be independent of any particular management strategy. The PDT suggests the SSC report clearly differentiate between the recommended ABC and any suggested management strategies.

Appendix 1:

Summary of CY14 GOM Cod Projection

To further the SSC's review, a projection was made of CY14 GOM cod catch.

Commercial landings and discard of GOM cod were estimated using Data Matching and Imputation System (DMIS) data. For the period from January 1, 2014 through August 31, 2014 GOM cod landings and discards DMIS data were summed across all commercial groundfish trips. For the period from September 1, 2014 through December 31, 2014 GOM cod landings and discards were estimated by the following formula:

$$\text{Sept to Dec 2014 value} = (\text{Sept to Dec. 2013 value}) * (\text{May to Aug 2014 value} / \text{May to Aug 2013 value})$$

Recreational GOM cod catch was estimated based on Marine Recreational Information Program (MRIP) data. Preliminary MRIP data through August, 2014 were used to estimate GOM cod landings and dead discards. Catch for September and October 2014 were projected using the Northeast Fisheries Science Center's Bioeconomic model for modeling recreational catches.

State water and other sub-component catches were estimated based on DMIS data. For the period from January 1, 2014 through April 30, 2014 GOM cod landings and discards DMIS data were summed across all state and EEZ (non-groundfish) commercial fishing trips respectively. For the period from May 1, 2014 through December 31, 2014 state and other sub-component GOM cod landings and discards were estimated using the corresponding average of FY12 and FY13 catches for those periods. State water catch was much larger than other sub-component catch. The state average of FY12 catch of 44.6 mt and FY13 catch of 35.8 mt resulted in 40.2 mt of annual catch or 3.35 mt estimated catch per month, which was then used to estimate May through December 2014 catch.

Estimated CY 2014 NE Multispecies GOM Cod Catch (mt)

Stock	ACLs and sub-ACLs; (with accountability measures (AMs))							sub-components: No AMs	
	Total Groundfish	Groundfish*	Commercial Landings	Commercial Discard	Recreational	Herring Fishery	Scallop Fishery	State Water	Other
	A to G	A+B+C	A	B	C	D	E	F	G
GOM Cod									
2014	1,529.5	1,487.4	861.6	15.9	609.8			38.7	3.4
Jan - Jun 2014	642.3	622.1	345.0	7.8	269.3			18.6	1.6
Jul - Dec 2014	887.2	865.3	516.6	8.1	340.6			20.1	1.8

Values in live weight

*Includes estimate of missing dealer reports

Source: NMFS Greater Atlantic Regional Office

October 15, 2014: Data Dates: September/October 2014

These data are the best available to NOAA's National Marine Fisheries Service (NMFS). Data sources for this report include: (1) Vessels via VMS; (2) Vessels via vessel logbook reports; (3) Dealers via Dealer Electronic reporting. Differences with previous reports are due to corrections made to the database

Commercial

Jan - August 2014 commercial data from DMIS (landings 450.6 mt, discards 11.2 mt)

Sept - Dec 2014 value = (Sept-Dec 2013 value)*(May-Aug 2014 value / May-Aug 2013 value)

Landings: 411.0 = 320.3*(226.6/176.6). Discards: 4.7 = 6.6*(5.8/8.0).

Recreational

- CY14 Actual (preliminary) MRIP catch through August. Science Center Bioeconomic Model projection for September and October. Assumed zero for November and December. Includes estimate of dead discard.
Waves 1 and 6: 0.0 mt, wave 2: 1.9, wave 3: 267.4, wave 4: 283.1, wave 5: 57.5

State Water and Other

- Sum of monthly average FY13 actual catch through April 2014 else monthly average of FY12 and FY13 catch. State water: FY12 catch: 44.6 mt, FY13 catch: 35.8 mt, average = 40.2 mt

Appendix 2:

Preliminary description of observed cod catches by gear and calendar year.

Steven Correia
October 14, 2014

Data and methods

Paul Nitschke provided the cod catch data as an excel spreadsheet. Observed tows and hauls (NEFOP and ASM) were retrieved from 2009 to 2014 for large mesh trawl and gillnet fleets in the Gulf of Maine cod stock area. I characterized the cod catch distributions in the groundfish fishery by calendar year using select order statistics. Note that 2014 is partial year of data. Analyses were done on a haul or tow basis since targeting behavior occurs on a tow by tow basis and not necessary on a trip basis. In addition, not all tows are always observed on a trip, tows within a trip are not independent. I explored the catch distributions using the lattice's densityplot graphic functions. I used the default settings in density plot for n, kernel and window.

Results

Cod catches in both gillnets and trawl gear are shown in Figures 1 and 2 and summary of select order statistics are shown in Tables 1 and 2. The distributions are multi-modal in most years. For either gear, a clear decline in location as well as an increase in observed hauls with no cod is evident after 2011. Order statistics for gillnet catches are similar for 2013 and 2014, although the right tail is more truncated in 2014. The distributions are right skewed in all years for both gear types.

The proportion of tows with no cod increased in 2014 to 0.40 for trawl gear and 0.18 for gillnets. The proportion of hauls with no cod are higher for trawl than for gillnets. Whether this reflects differences in opportunity for trawls than gillnets is unknown.

Aside for the shift in location, the general shape of the distributions remains similar for each gear-type among years. The increased proportion of no cod observations may be consistent with testimony from industry concerning avoiding cod. The right skew is also consistent with industry reports of observations of "large cod tows", despite the clear evidence of a decline in location of the cod catch distribution. This suggests that inferring shifts in location made from reports of large catches from incomplete data and or non-random samples remains a dangerous practice.

Conclusions

The decline in location is likely associated with declining ABC and lower biomass. The distribution of cod catches for an ABC of 200 to 514 tons is unknown. I would expect that distributions will remain right skewed and that accidental large takes of cod are likely to occur even if industry actively avoids cod. Auxillary measures such as closing areas with known aggregations of cod may help reduce the probability of large accidental captures.

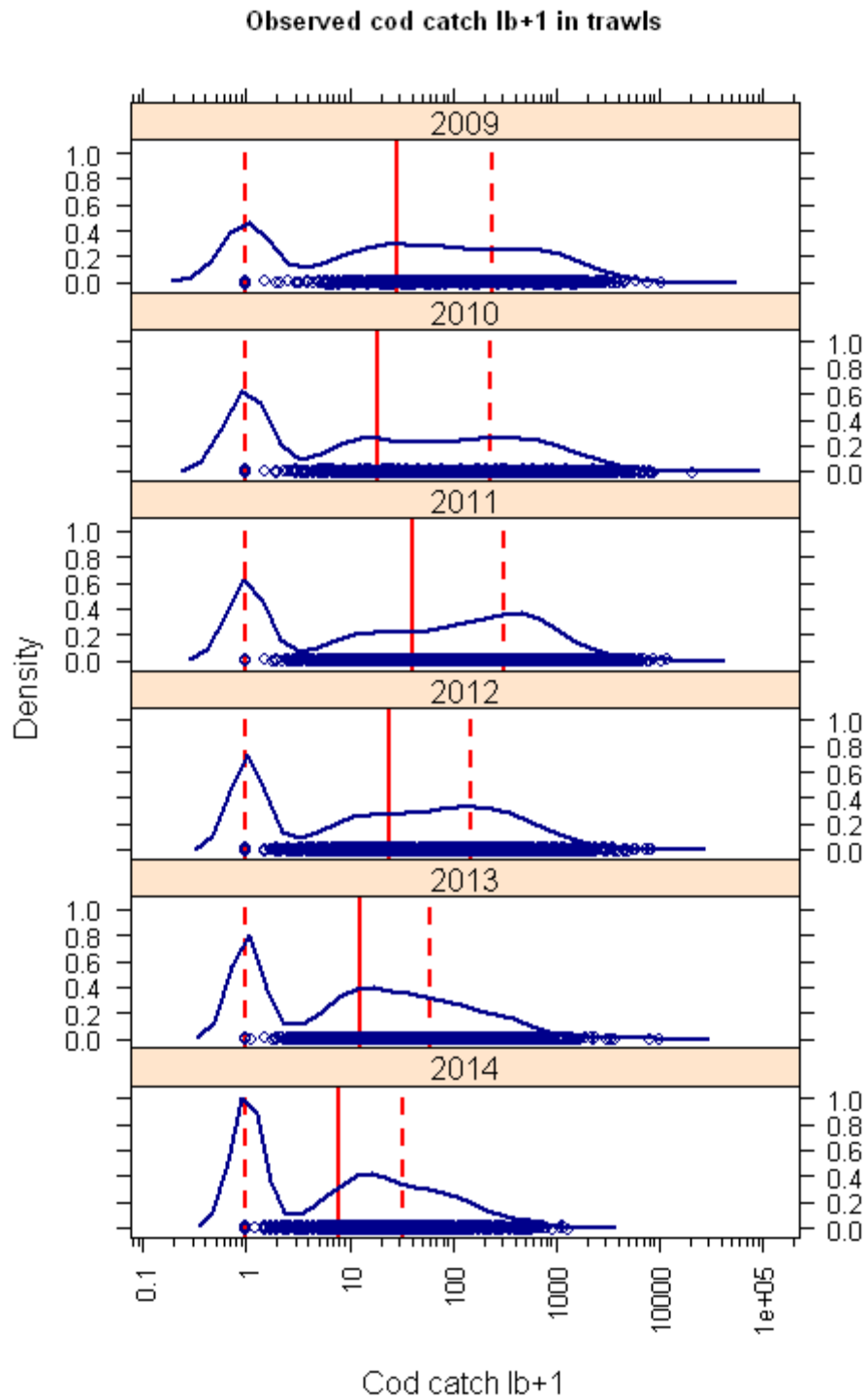


Figure 1. Distribution of observed cod catches by trawl by calendar year. Solid red line is median, dashed lines are 25th and 75th quantile. Note that x-axis is logarithmic and 2014 is a partial year. Observer coverage rates were lower in 2009 than subsequent years.

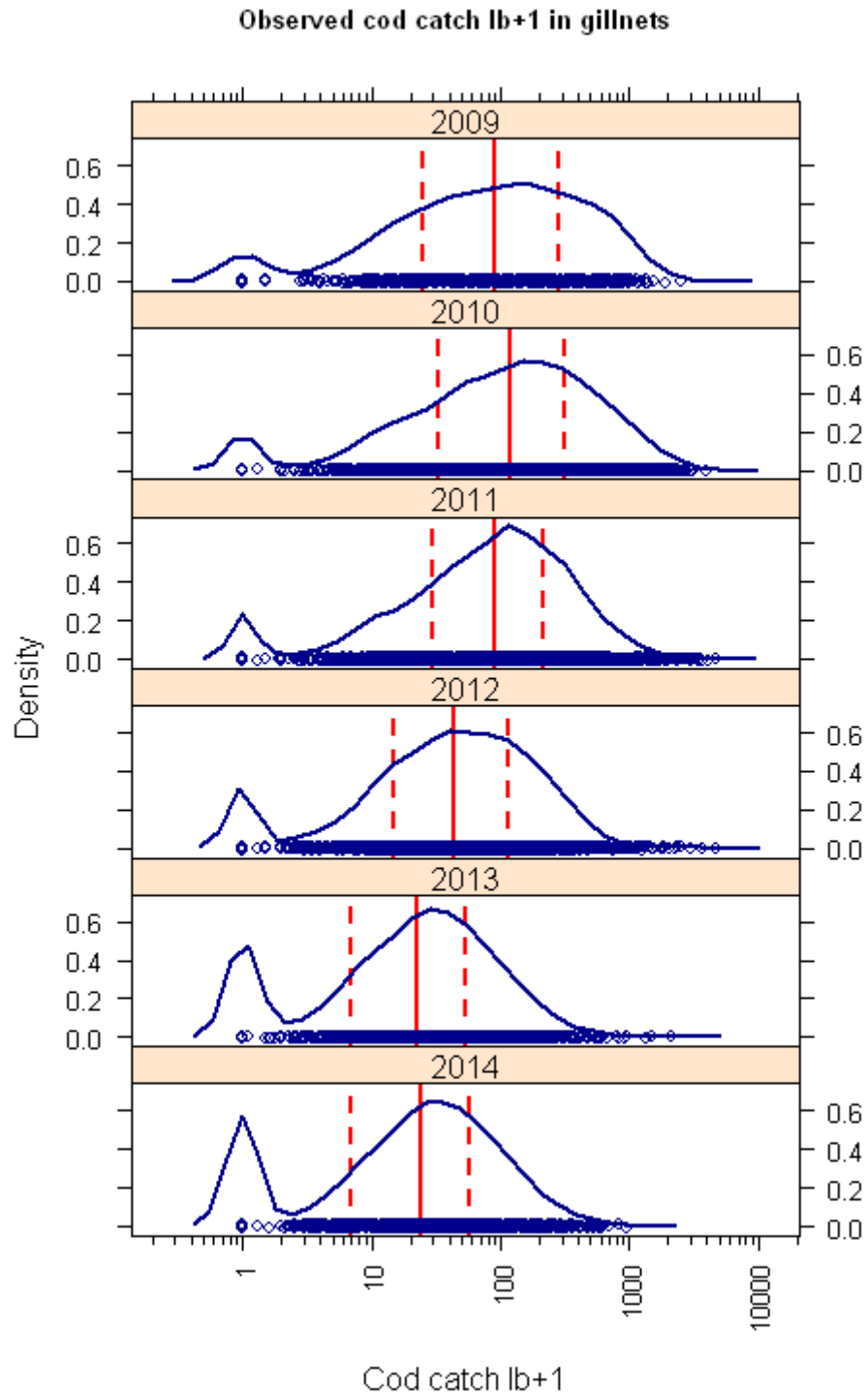


Figure 2. Distribution of observed cod catches by gillnet by calendar year. Solid red line is median, dashed lines are 25th and 75th quantile. Note that x-axis is logarithmic and 2014 is a partial year. Observer coverage rates were lower in 2009 than subsequent years.

Year	Select quantiles										
	min	0.031	0.0625	0.125	0.25	0.50	0.75	0.875	0.938	0.97	max
2009	0	0	0	0	0	28	240	788	1243	1817	10620
2010	0	0	0	0	32	18	234	658	1193	2019	21150
2011	0	0	0	0	29	39	308	644	1053	1607	11730
2012	0	0	0	0	14	23	146	354	611	999	8466
2013	0	0	0	0	6	12	59	153	336	495	9870
2014	0	0	0	0	6	7	32	90	160	295	1289

Table 1. Select order statistics for observed cod catches (lb) by trawls and calendar year. Note that 2014 is a partial year. Observer coverage rates were lower in 2009 than subsequent years.

Year	Select quantiles										
	min	0.031	0.0625	0.125	0.25	0.50	0.75	0.875	0.938	0.97	max
2009	0	0	1	9	24	88	279	530	803	946	2483
2010	0	0	2	11	32	117	313	595	915	1276	4000
2011	0	0	1	10	29	88	211	354	537	817	4716
2012	0	0	0	5	14	42	114	200	298	420	4690
2013	0	0	0	0	6	22	53	97	141	222	2138
2014	0	0	0	0	6	23	56	103	153	234	933

Table 2. Select order statistics of observed cod catches (lb) by gillnets and calendar year. Note that 2014 is a partial year. Observer coverage rates were lower in 2009 than subsequent years.

year	trawls	gillnets
2009	0.28	0.06
2010	0.34	0.06
2011	0.30	0.06
2012	0.31	0.09
2013	0.33	0.16
2014	0.40	0.18

Table 3. Proportion of observed tows without cod catch by gear type and calendar year. Note that 2014 is a partial year. Observer coverage rates were lower in 2009 than subsequent years.

Appendix 3:

Catch composition on observed hauls in the large mesh multispecies fishery and an examination of captain's first target species by haul.

Observed tows and hauls (NEFOP and ASM) were retrieved from 2009 to 2014 for large mesh trawl and gillnet fleets in the Gulf of Maine cod stock area to analyze possible changes in cod targeting behavior in the groundfish fishery. It is important to note that 2014 is partial year of data when interpreting trends. Tows which did not catch groundfish were omitted from this analysis. Analyses was done on a haul or tow basis since targeting behavior occurs on a tow by tow basis and not necessary on a trip basis. In addition, not all tows are always observed on a trip. This analysis was broken up into two sections, observed trends in percent of cod catch to total groundfish caught and trends in the captain's target species by haul.

Percentage of cod to groundfish analysis by haul

Figures 1-3 show the changes in the percent of cod catch to total groundfish caught on a haul or tow from 2009-2014. Large changes in the percent of cod to groundfish on a tow basis have occurred with the decline in the stock and the ACLs. Similar trends can be seen in the raw statistics of cod catch per observed tow (Table 1). There were many tows and hauls which were mostly comprised of cod in 2009 and 2010 when the ACLs and the relative SSB were higher. In addition, the stock was more concentrated in a small area on Stellwagen bank. The concentrated stock on Stellwagen also allowed for better targeting of cod which made it easier for the fishery capture cod. The breakdown of the data by gear suggests stronger trends in gillnets relative to trawl gear. Perhaps this is partly due to gillnet vessels having less targeting options relative to trawl gear. Gillnet gear has more limitations when targeting some flatfish (yellowtail, American plaice, witch flounder) stocks relative to trawl gear. Changes in cod to groundfish percentages is likely due to a combination of factors, declines in stock abundance, changes in stock concentration on Stellwagen bank, and the large reduction in the ACLs in 2013. The targeting behavior on a tow by tow basis will depend on amount of cod ACE available when the tow is made, potential catch of other groundfish stocks in a particular area, lease prices and the ACE of other groundfish stocks that is available for the vessel. For example, a tow could be targeting a groundfish mix which may include some cod depending on the cod ACE owned and lease prices at the time of the tow. Sectors are operating on an individual permit ACE basis even though sector base management was not specified on an individual vessel basis.

Tables 2 and 3 and figure 4 show the percentage of total cod pounds caught from different binning of cod to groundfish tow percentages. We examined bin cutoffs at 10%, 20% and 30%. This analysis also shows the large change over time as the stock and ACLs declined. From 2009

to 2012 most of the cod catch came from tows that had a high percentage of cod. As the ACLs and stock decreased targeting behavior has shifted more to other groundfish stocks.

Examination of captain's first target species

Species composition was also examined by what the captain said he or she was targeting. This analysis was limited to the captain's first target species or if flatfish was the targeted. Tows which said groundfish was the target were not useful for this analysis and were omitted.

Percent composition of target species by hauls and tows are shown in table 4 and figure 5.

Figure 6 also shows that the cod targeted hauls and tows have declined over time. Some of the decrease in target cod hauls was offset with an increase in the targeted Pollock hauls. Table 5 and Figure 7 show the percentage of cod caught by targeted captain species. For example, with trawl gear in 2014, 6% of the tows were tows that the captain indicated as cod target tows and 33% of the cod was taken on those tows. In addition, 31% of the tows were Pollock targeted tows and 25% of the cod was taken on those tows in 2014.

Table 1. Statistics on observer Gulf of Maine cod catch per tow from 2009 to 2014 in the large mesh trawl and gillnet multispecies fishery.

	trawl					
	2009	2010	2011	2012	2013	2014
number tows	1333	2952	4993	5426	3559	2867
average	301	297	280	164	82	41
median	28	18	39	23	12	7
max	10,621	21,150	11,730	8,466	9,870	1,289
90th percentile	984	848	756	447	212	117
10th percentile	0	0	0	0	0	0

	gillnet					
	2009	2010	2011	2012	2013	2014
number tows	869	3943	5947	4953	2476	2542
average	212	257	176	97	47	47
median	88	117	88	42	22	23
max	2,483	4,000	4,716	4,690	2,138	933
90th percentile	634	702	410	232	117	117
10th percentile	7	8	7	2	0	0

Table 2. Percent of cod pounds caught from different cod to groundfish percent tow compositions (10%, 20% and 30% cod percent of total groundfish caught) from observed tows in the large mesh multispecies fishery.

Cod relative to groundfish			Cod relative to groundfish			Cod relative to groundfish		
	<10%	>10%		<20%	>20%		<30%	>30%
2009	4%	96%	2009	6%	94%	2009	8%	92%
2010	3%	97%	2010	5%	95%	2010	9%	91%
2011	3%	97%	2011	7%	93%	2011	11%	89%
2012	5%	95%	2012	10%	90%	2012	15%	85%
2013	16%	84%	2013	27%	73%	2013	36%	64%
2014	21%	79%	2014	39%	61%	2014	51%	49%

Table 3. Percent of cod pounds caught from different cod to groundfish percent tow compositions (10%, 20% and 30% cod percent of total groundfish caught) from observed tows by trawl and gillnet in the large mesh multispecies fishery.

Trawl								
	<10%	>10%		<20%	>20%		<30%	>30%
2009	4%	96%	2009	6%	94%	2009	7%	93%
2010	2%	98%	2010	4%	96%	2010	6%	94%
2011	3%	97%	2011	5%	95%	2011	8%	92%
2012	4%	96%	2012	8%	92%	2012	14%	86%
2013	14%	86%	2013	23%	77%	2013	32%	68%
2014	26%	74%	2014	46%	54%	2014	56%	44%

Gillnet								
	<10%	>10%		<20%	>20%		<30%	>30%
2009	4%	96%	2009	7%	93%	2009	11%	89%
2010	3%	97%	2010	7%	93%	2010	12%	88%
2011	3%	97%	2011	9%	91%	2011	15%	85%
2012	6%	94%	2012	12%	88%	2012	19%	81%
2013	19%	81%	2013	36%	64%	2013	46%	54%
2014	15%	85%	2014	32%	68%	2014	46%	54%

Table 4. Percent of hauls and tows in a year by captain’s targeted species for observed trawl tows and gillnet hauls. Tows or hauls were the captain indicated that the target species was groundfish were omitted from this analysis.

	trawl											
	monkfish	cod	winter fl	witch	yellowtail	dabs	flatfish	haddock	white H	redfish	pollock	other
2009	0.12	38%	3%	6%	3%	3%	3%	2%	7%	2%	19%	2%
2010	0.10	29%	0%	4%	2%	18%	3%	1%	6%	5%	18%	2%
2011	0.09	40%	1%	3%	3%	10%	3%	2%	8%	3%	17%	1%
2012	0.10	35%	1%	5%	4%	8%	6%	2%	5%	7%	17%	1%
2013	0.07	17%	3%	5%	3%	10%	4%	2%	7%	13%	25%	2%
2014	0.09	6%	2%	6%	3%	3%	8%	1%	7%	23%	31%	1%

	Gillnet											
	monkfish	cod	winter fl	witch	yellowtail	dabs	flatfish	haddock	white H	redfish	pollock	other
2009	0.05	62%	2%	0%	4%	0%	1%	1%	2%	0%	18%	6%
2010	0.11	45%	1%	1%	1%	0%	0%	0%	2%	0%	26%	13%
2011	0.07	54%	1%	0%	4%	0%	1%	1%	3%	0%	22%	8%
2012	0.04	47%	0%	0%	13%	0%	4%	2%	2%	0%	18%	10%
2013	0.10	16%	1%	0%	2%	0%	5%	0%	7%	0%	50%	9%
2014	0.10	10%	2%	0%	4%	1%	5%	0%	11%	0%	41%	16%

Table 5. Percent of cod caught on hauls and tows in a year by captain’s targeted species for observed trawl tows and gillnet hauls. Tows or hauls were the captain indicated that the target species was groundfish were omitted from this analysis.

	Trawl											
	monkfish	cod	winter fl	witch	yellowtail	dabs	flatfish	haddock	white H	redfish	pollock	other
2009	0.02	88%	1%	1%	3%	0%	0%	2%	0%	0%	3%	0%
2010	0.01	82%	0%	3%	1%	2%	2%	3%	0%	0%	5%	0%
2011	0.01	84%	0%	1%	2%	2%	1%	1%	1%	0%	6%	1%
2012	0.01	82%	1%	2%	4%	0%	2%	1%	1%	0%	7%	0%
2013	0.01	63%	0%	3%	2%	2%	2%	4%	3%	3%	16%	0%
2014	0.04	33%	1%	4%	6%	1%	15%	1%	4%	6%	25%	1%

	Gillnet											
	monkfish	cod	winter fl	witch	yellowtail	dabs	flatfish	haddock	white H	redfish	pollock	other
2009	0.01	88%	0%	0%	2%	0%	0%	1%	0%	0%	6%	1%
2010	0.01	75%	0%	0%	0%	0%	0%	0%	0%	0%	20%	3%
2011	0.01	79%	0%	0%	1%	0%	0%	1%	1%	0%	14%	3%
2012	0.01	76%	0%	0%	3%	0%	1%	1%	1%	0%	12%	5%
2013	0.02	38%	1%	0%	1%	0%	1%	0%	5%	0%	46%	7%
2014	0.02	24%	1%	0%	1%	0%	2%	0%	8%	0%	52%	10%

Trawl and Gillnet combined

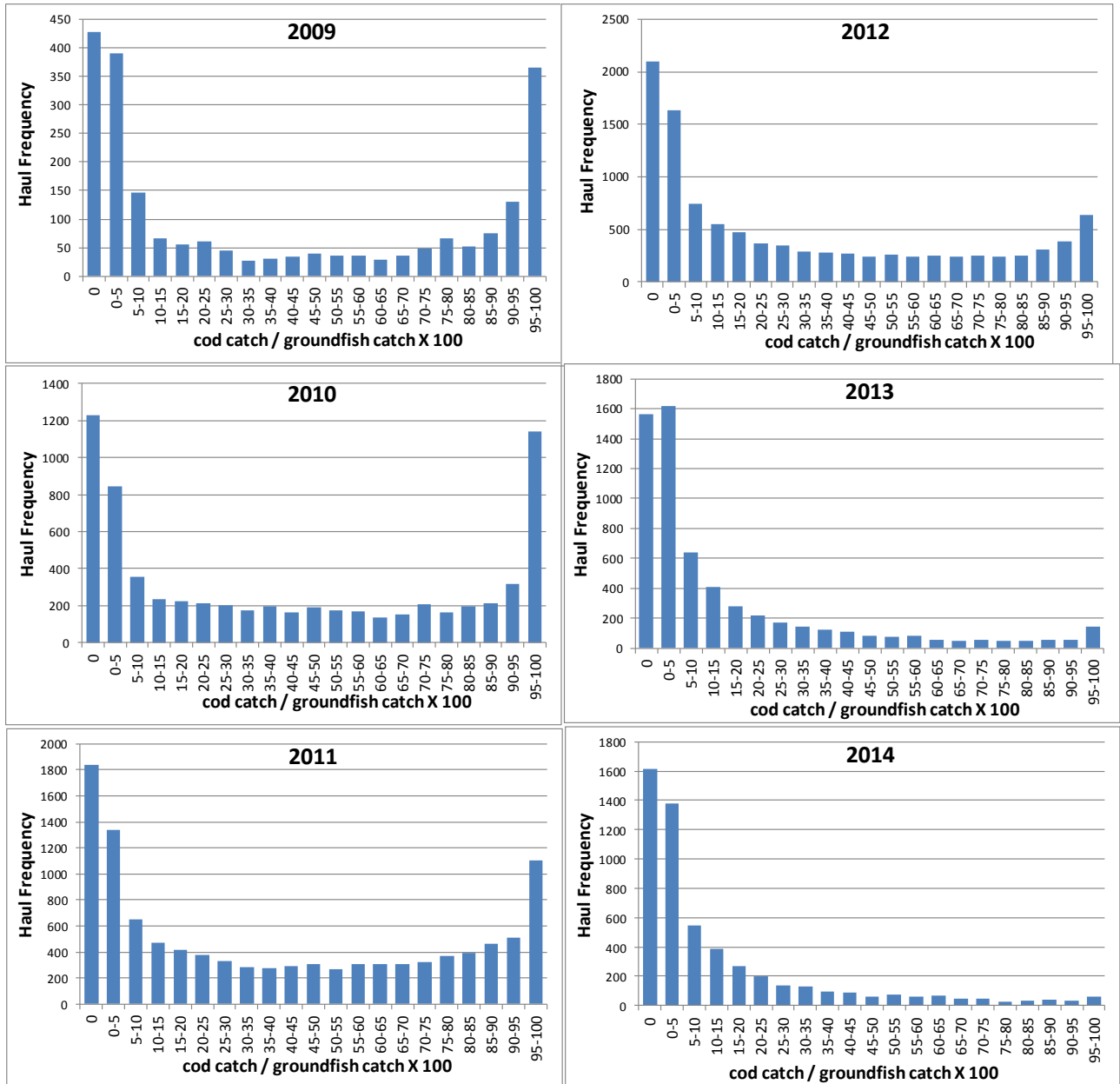


Figure 1. Frequency of observer hauls or tows from observed large mesh trawl and gillnet gear from 2009-2014 by percent of cod to total groundfish caught on a haul or tow.

Trawl

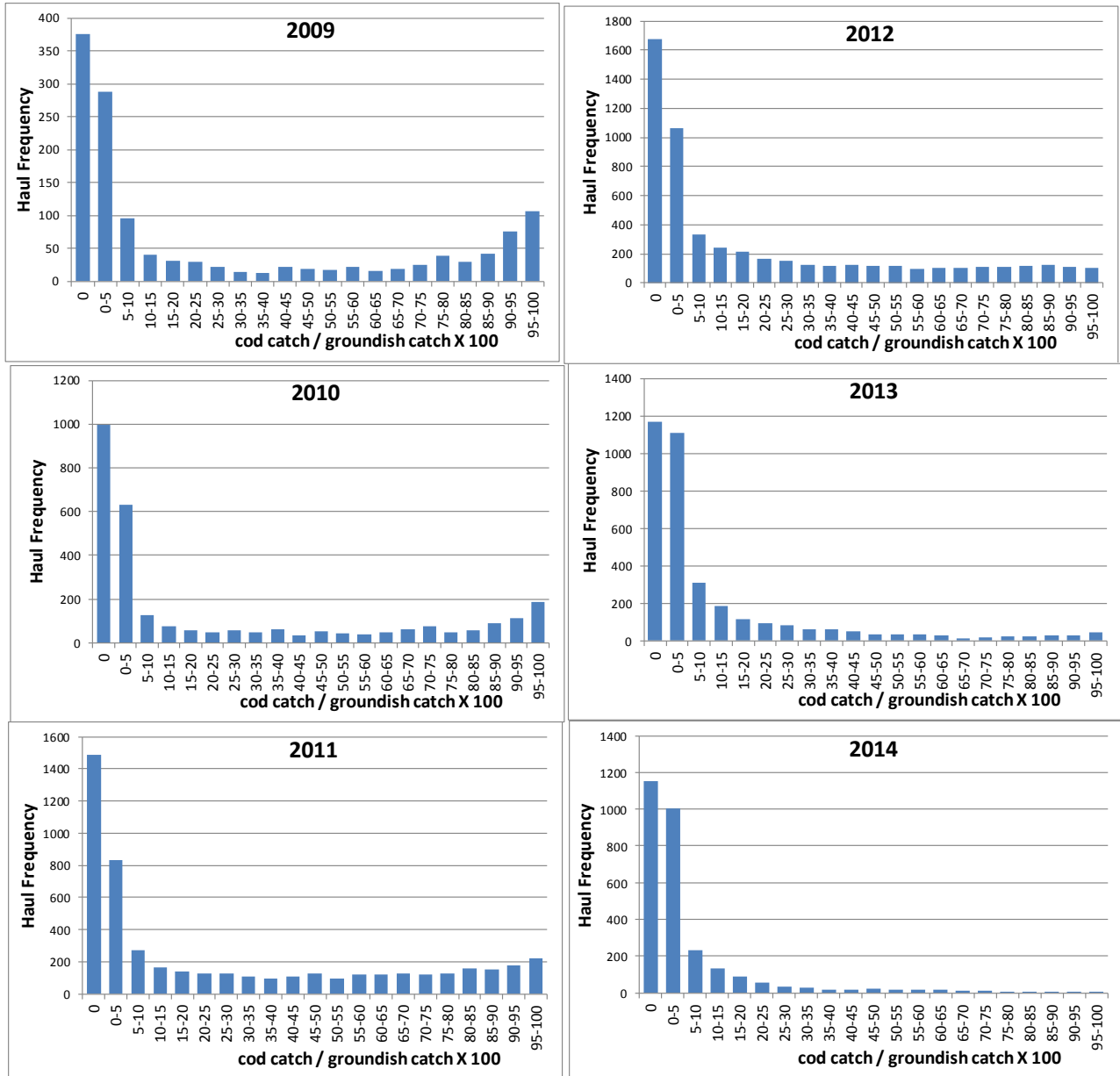


Figure 2. Frequency of observer tows from observed large mesh trawl gear from 2009-2014 by percent of cod to total groundfish caught on a tow.

Gillnet

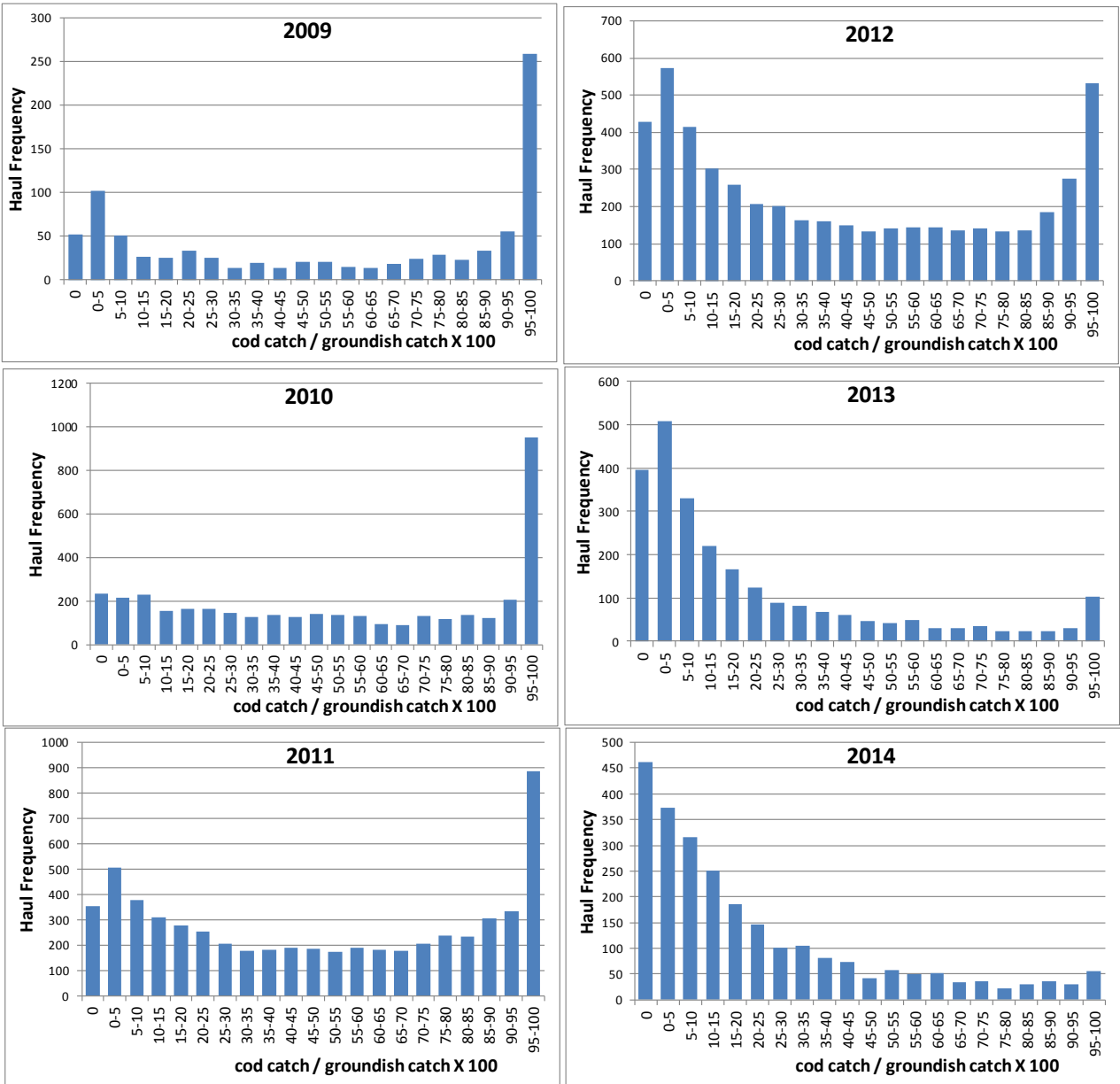


Figure 3. Frequency of observer hauls from observed large mesh gillnet gear from 2009-2014 by percent of cod to total groundfish caught on a haul.

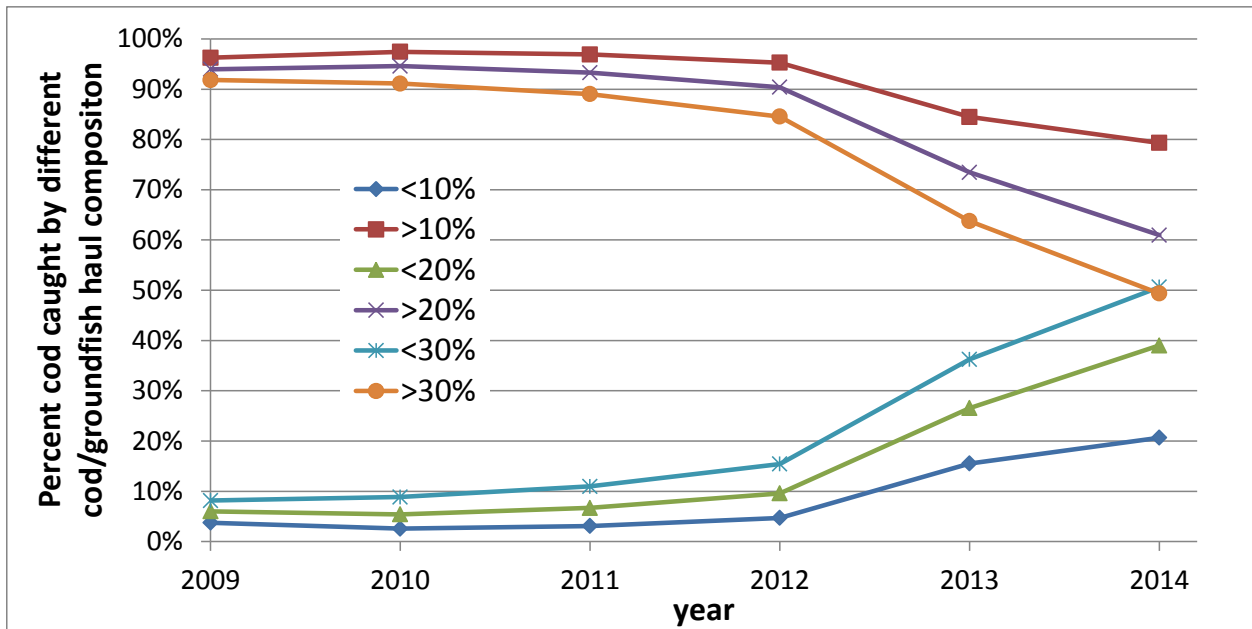


Figure 4. Percent of cod pounds caught from different cod to groundfish percent haul compositions (10%, 20% and 30% cod percent of total groundfish caught) from observed hauls in the large mesh multispecies fishery. Plot of table 2.



Figure 5. Percent of hauls and tows in a year by captain’s targeted species one for observed trawl tows and gillnet hauls. Tows or hauls were the captain indicated that the target species was groundfish were omitted from this analysis. Plot of table 4.

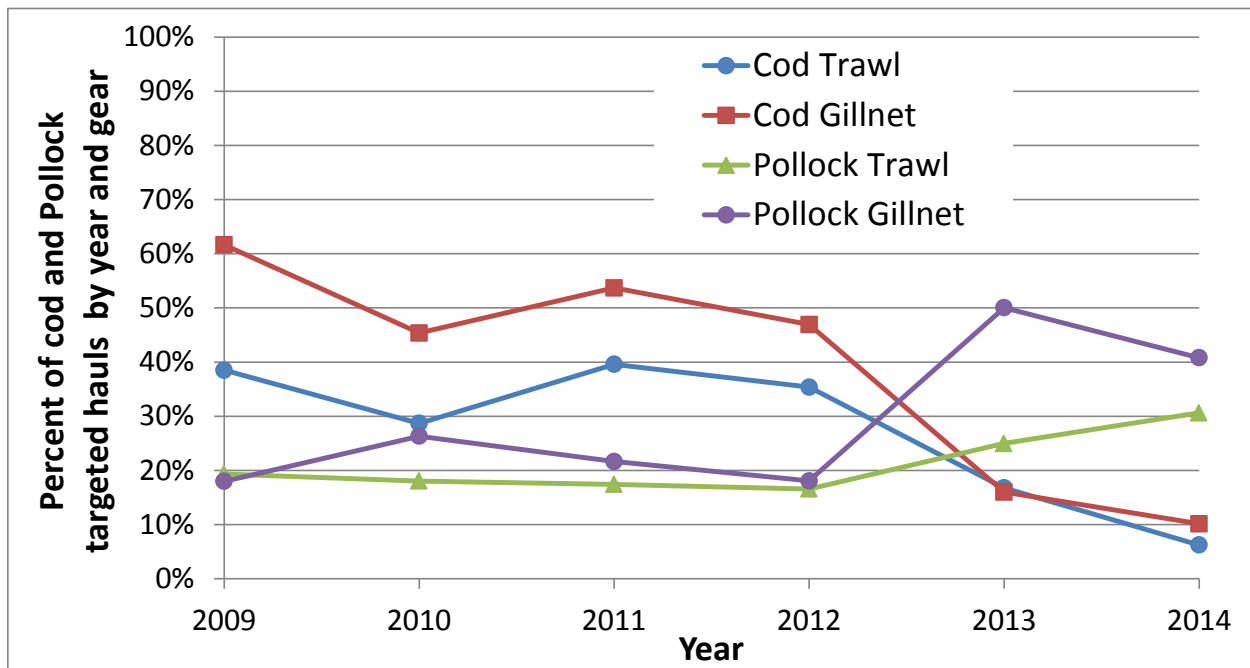


Figure 6. Percent of hauls and tows in a year by captain's indicated target limited to cod and Pollock for observed trawl tows and gillnet hauls. Tows or hauls were the captain indicated that the target species was groundfish were omitted from this analysis.

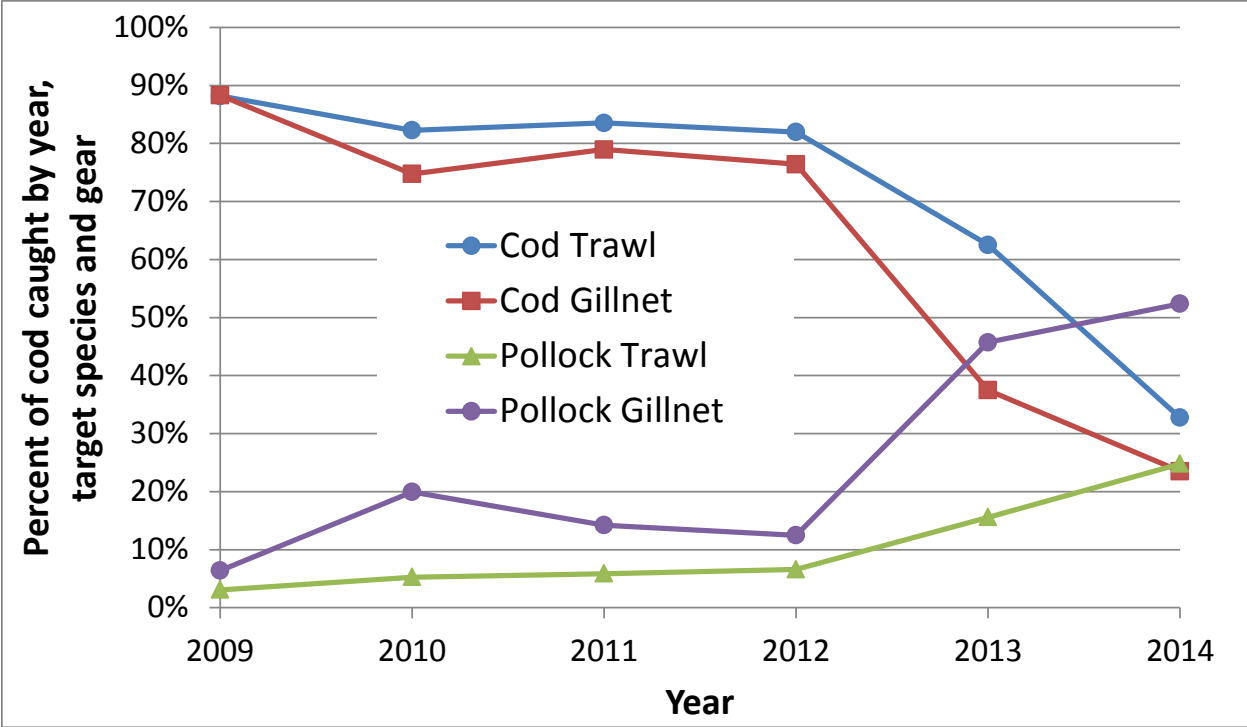


Figure 7. Percent of cod caught on hauls and tows in a year by captain’s indicated target limited to cod and Pollock for observed trawl tows and gillnet hauls. Tows or hauls were the captain indicated that the target species was groundfish were omitted from this analysis.

Appendix 4:

Spatial patterns of fishery catch of GOM cod

These figures represent GOM cod catch rates in CY 2013- CY 2014 by location by various catch rates.

Figure 1- Observed commercial fishing tows in which catches rates were greater than 1,000 lbs/hour. Data source: CY2013- CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas

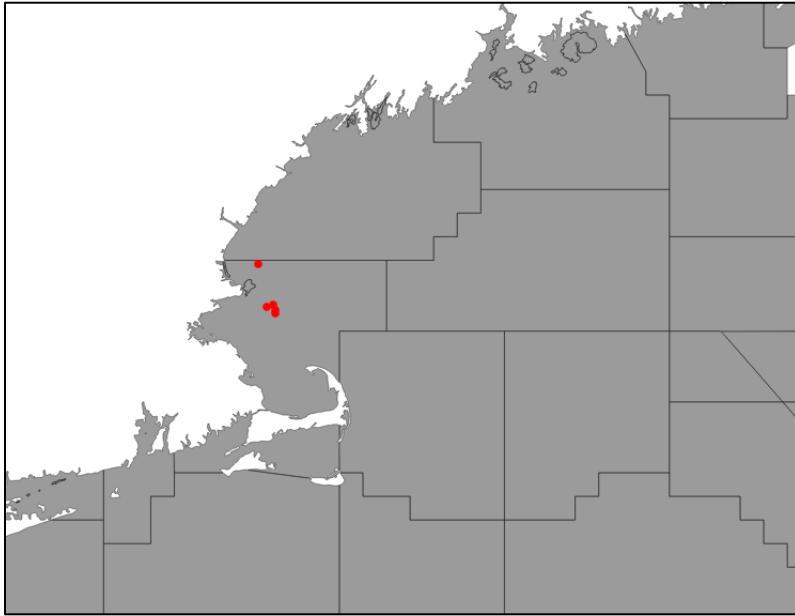


Figure 2- Observed commercial fishing tows in which catches rates were greater than 500 lbs/hour. Data source: CY2013- CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.

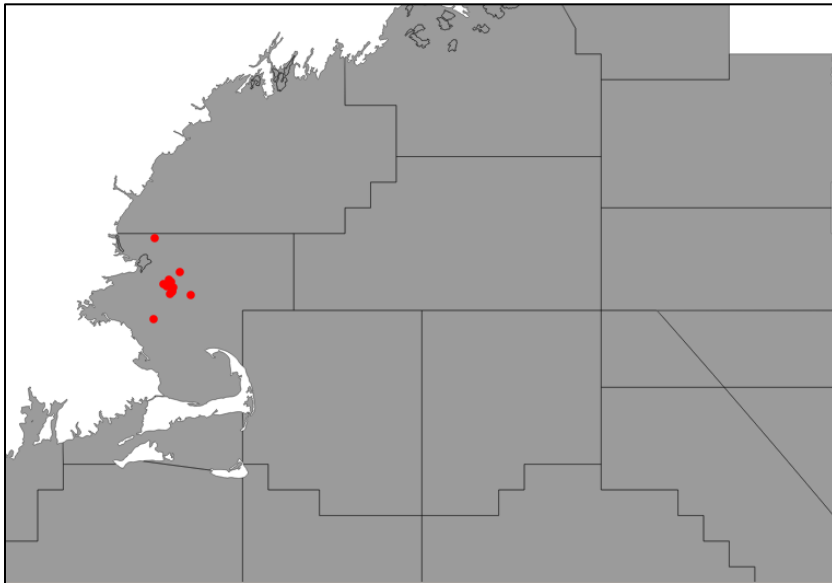


Figure 3- Observed commercial fishing tows in which catches rates were greater than 200 lbs/hour. Data source: CY2013-CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.

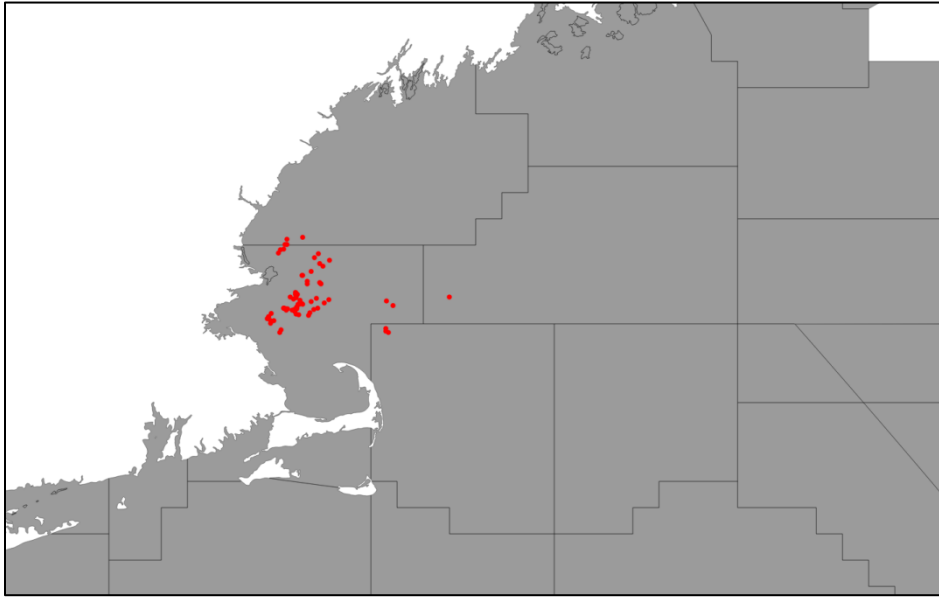


Figure 4- Observed commercial fishing tows in which catches rates were greater than 100 lbs/hour. Data source: CY2013-CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.

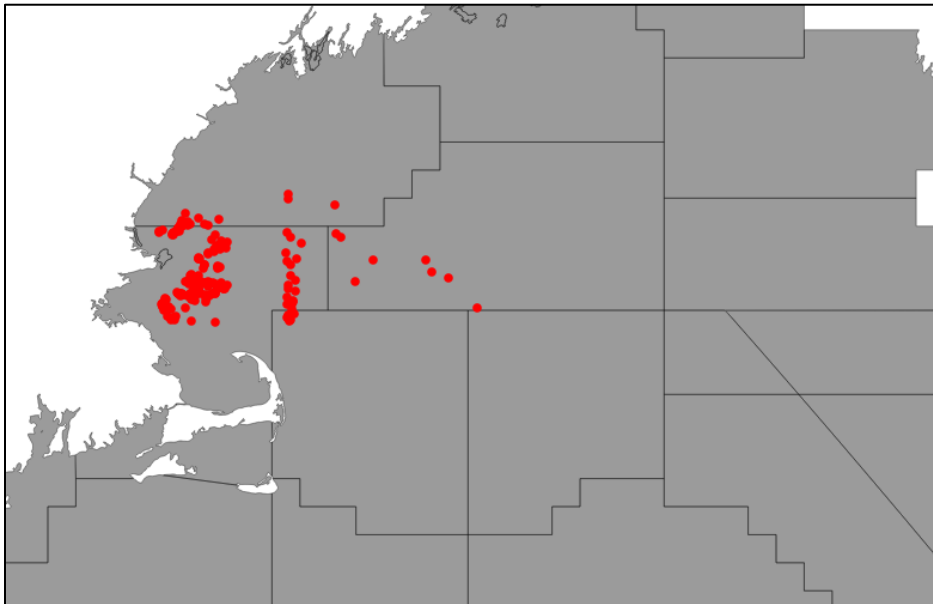


Figure 5- Observed commercial fishing tows in which catches rates were greater than 50 lbs/hour, data through September 19, 2014. Data source: CY2013-CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.

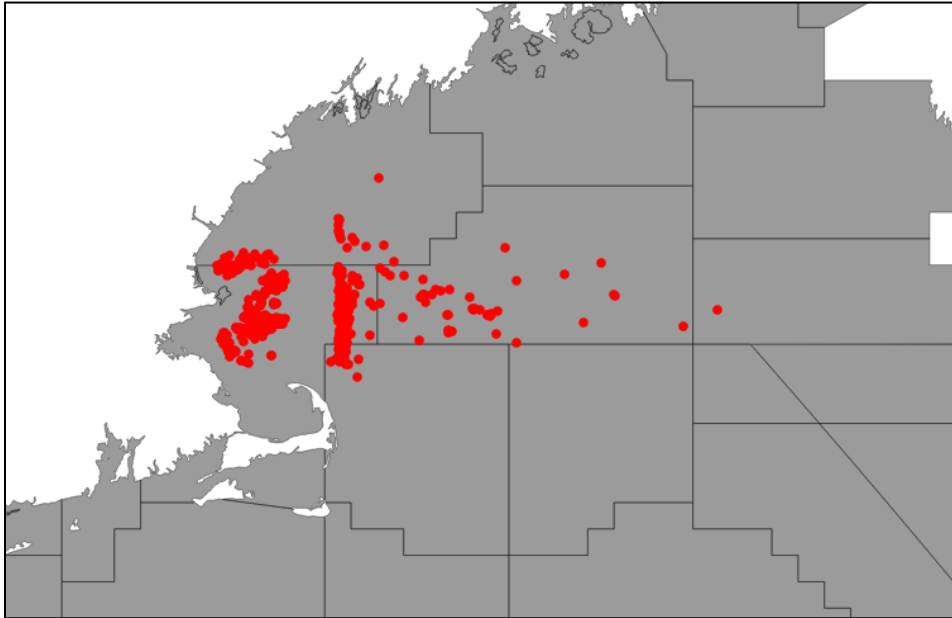


Figure 6- Observed commercial fishing tows in which catches rates were greater than 25 lbs/hour. Data source: CY2013-CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.

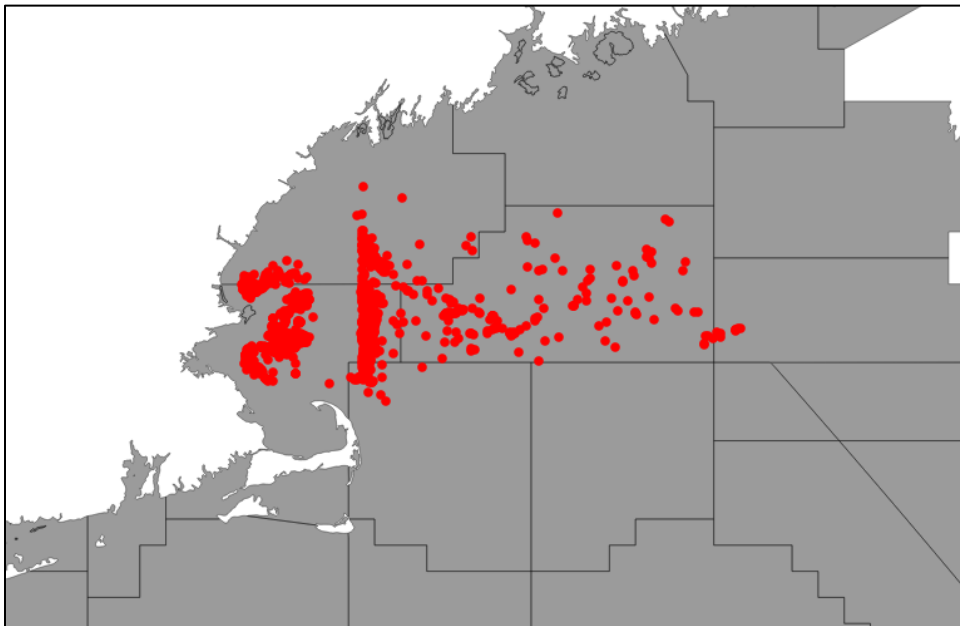


Figure 7- Observed commercial fishing tows in which catches rates were greater than 10 lbs/hour. Data source: CY2013-CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.

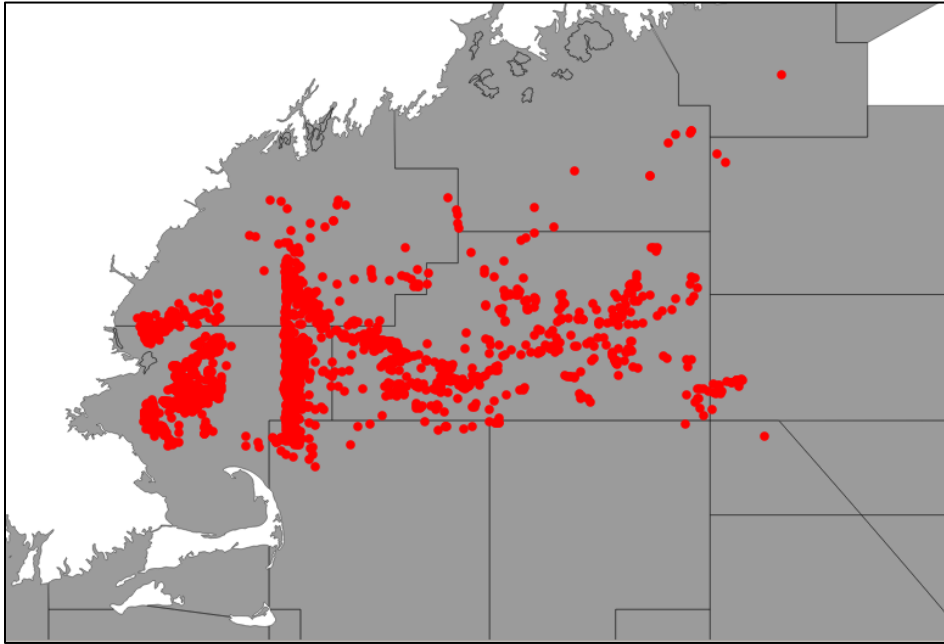
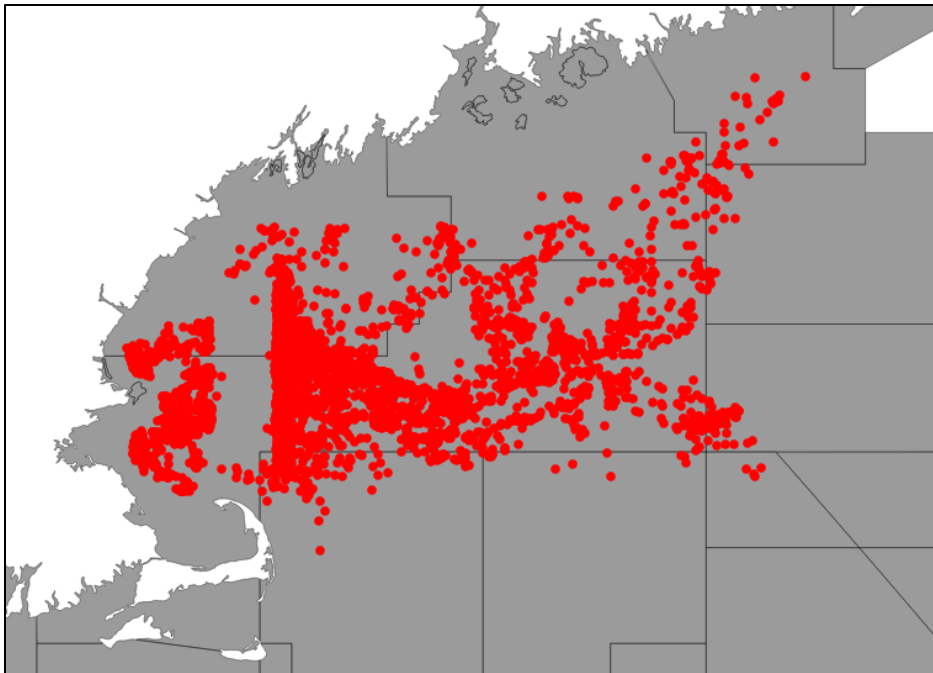


Figure 8- Observed commercial fishing tows in which catches rates were greater than 0 lbs/hour (i.e. presence of cod). Data source: CY2013-CY2014 (with data through September 16, 2014) from observer and at-sea monitoring, cod reported caught (landings and discards) in GOM statistical areas.



Appendix 5:

Preliminary Results from the Bioeconomic Model for the Recreational Fishery

Predicted FY2014 Gulf of Maine Cod

year	wave	tot_cat (num)	landing (num)	release (num)	landing (mt)	release mortality (mt)	total mortality (mt)
2015	1	0	0	0	0	0	0
2015	2	2,250	413	1,836	0.60	0.40	1
2014	3	363,800	98,718	265,081	199	68	267
2014	4	293,067	83,038	210,029	241	42	283
2014	5	137,987	9,972	128,015	12	46	57
2014	6	0	0	0	0	0	0
		797,103	192,142	604,961	453	156	609

Predicted FY2014 Gulf of Maine Haddock

year	wave	tot_cat (num)	landing (num)	release (num)	landing (mt)	release mortality (mt)	total mortality (mt)
2015	1	0	0	0	0	0	0
2015	2	5,096	31	5,065	0.04	3	3
2014	3	441,065	75,666	365,399	133	156	289
2014	4	322,961	51,899	271,062	85	110	194
2014	5	163,001	594	162,407	0.66	90	91
2014	6	0	0	0	0	0	0
		932,123	128,190	803,933	218	359	578

NOTES:

Recreational catch estimates for Gulf of Maine cod and haddock in FY2014.

The catch estimates are based on preliminary MRIP data (wave's 3 and 4) and predictions from the bioeconomic model (wave's 2 and 5).

- 1) Zero possession of cod was assumed for wave 2 (March-April, 2015). The cod fishery is currently scheduled to open again on April 16, 2015 but could remain closed if that was under the emergency action.
- 2) Although anglers are not allowed to keep cod or haddock caught in federal waters during wave 5 (Sept-Oct), landings are predicted to occur. Estimated landings in wave 5 are from state waters (open in all three GOM states during Sept-Oct) and predicted noncompliance.
- 3) Anglers are also not allowed to keep haddock caught in federal waters during wave 2 (Mar-Apr), but the model predicts a trivial amount will be landed. Estimated landings in wave 2 are from state waters (assumes state-level landings will continue from April 16 - April 30 in 2015) and noncompliance.
- 4) Landings and release mortality estimates by weight were determined from MRIP length-frequency distributions and length-weight equations.
- 5) Biological projections for cod are based on the m=0.2 model.

Gulf of Maine Cod Catch Data for the Sustainable Harvest Sector, FY2013

Introduction

The PDT asked if industry can provide estimates of incidental, non-target bycatch of GOM cod under the prevailing operating conditions of the fishery. Sustainable Harvest Sector (SHS) provides a reasonable facsimile of a full-time groundfish fleet which spends much of its time fishing in the GOM, but not targeting GOM cod.

SHS contains about 40 active vessels and 120 permits with a cumulative GOM cod PSC of about 20%. However, most of the vessels have not traditionally been reliant on GOM cod for the majority of their catch. Well before implementation of sectors, they have tended to fish east of 70°15', further up the Maine coast and the easternmost reaches of the GOM (or, outside the GOM entirely). Their GOM catch has historically been largely stocks such as plaice, witch, and white hake, with some bycatch of GOM cod mixed in.

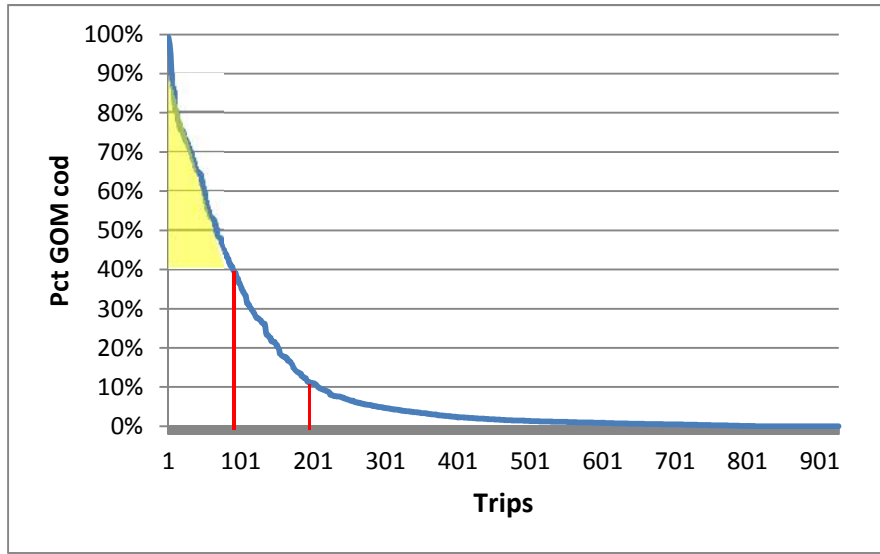
Because of FY2013's significant reduction in GOM cod ACE, more SHS vessels and trips had to focus on avoiding GOM cod catch that year, when they may not have been so constrained in prior years. Thus the FY2103 SHS dataset may provide a reasonable picture of how much cod GOM fishermen would encounter in a groundfishery not permitted to target GOM cod.

SHS Cod Catch

Through a combination of data analysis and personal knowledge of boat owners and captains, we can identify not just the boats which direct on GOM cod, but also to some extent the trips which did so in FY2013 (all data which follows reflects FY2013, derived from a combination of NMFS and sector data).

Figure 1 (next page) shows the percentage of GOM cod caught on each trip that spent some or all of its time fishing in the GOM. The formula used is: [Live lb. of GOM cod landed] ÷ [K_{all} of catch in the GOM].

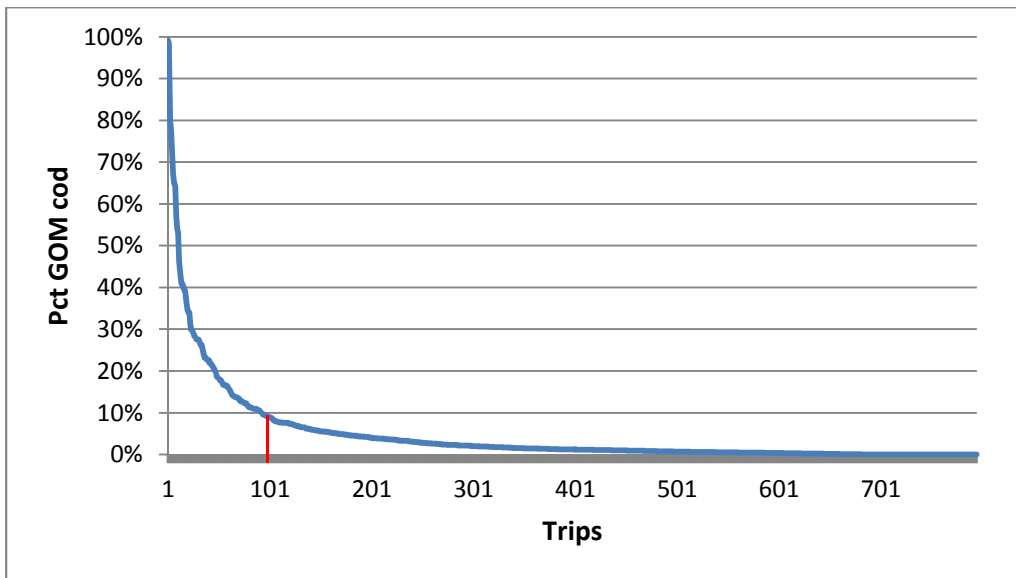
Figure 1: SHS GOM cod catch as % of all GOM catch



In other words, there were about 100 trips which were comprised of 40% or more GOM cod, then the next 100 trips' cod composition ranged from about 40% down to 10%, and so on.

However, of the top 100 trips which were comprised of 40% or more GOM cod (highlighted in yellow above), 80 were from one vessel. This is the SHS's sole vessel (we'll call it Vessel X) which regularly targets GOM cod, so removing it from Figure 1 gives a clearer picture of non-directed GOM cod bycatch percentages in the SHS:

Figure 2: SHS GOM cod catch as % of all GOM catch, less Vessel X



Moving forward, we'll exclude the Vessel X trips from the discussion.

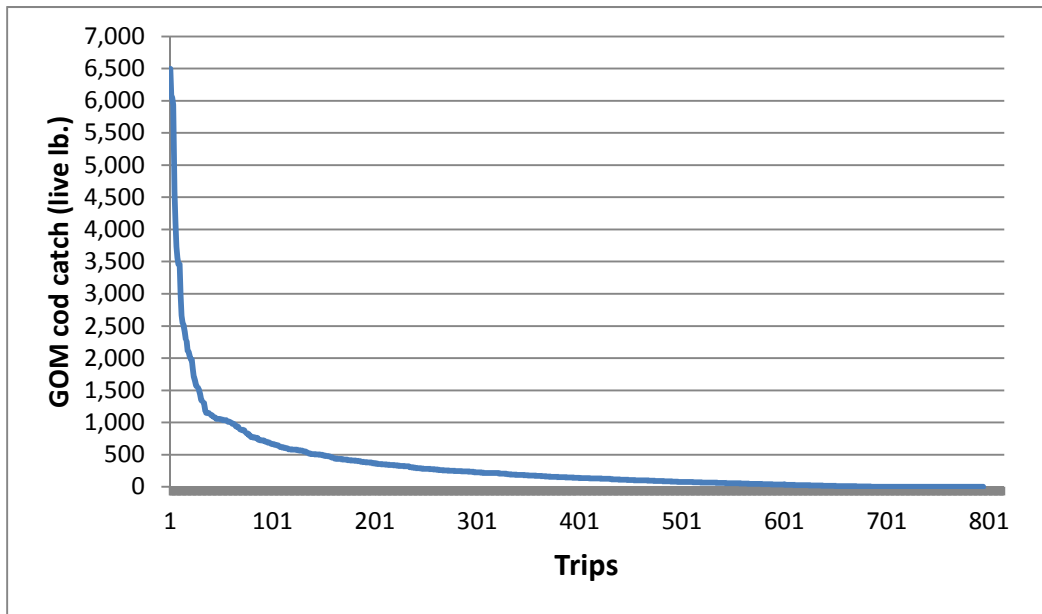
Of the roughly 800 remaining trips which fished in the GOM, about 700 landed less than 10% GOM cod. (little time on these trips was spent fishing west of 70°15’):

Table 1: SHS GOM cod catch as % of all GOM catch, less Vessel X

% GOM cod	# of trips
50%-100%	11
25-50	24
15-25	28
10-15	32
Under 10%	The rest

Turning from percentages to pounds landed, Figure 3 shows the pounds (converted to live weight) of GOM cod landed per trip:

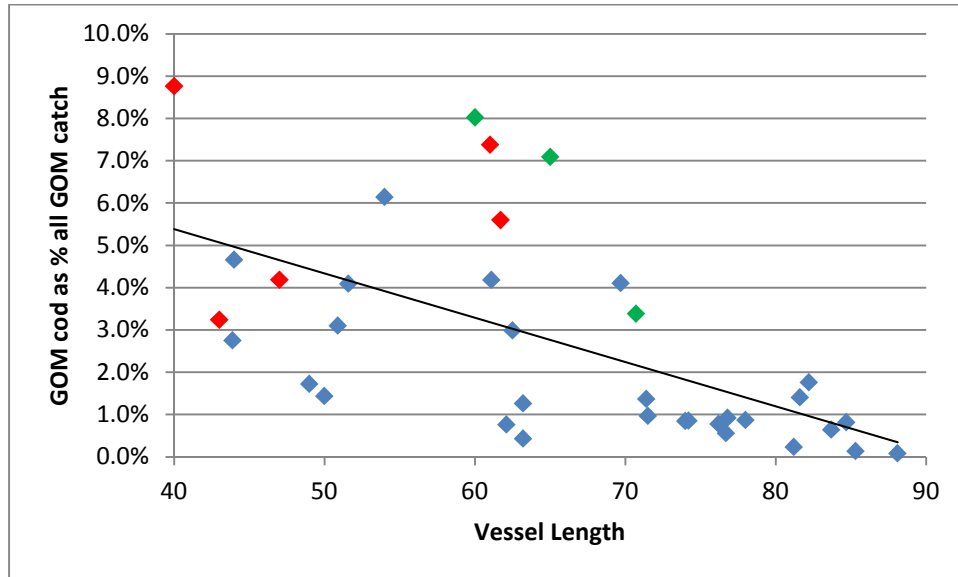
Figure 3: SHS GOM cod catch per trip, GOM trips, less Vessel X



The top 10 trips landed from 3,500-6,500 pounds of GOM cod. Of those, the sector manager has personal recollection of 5 trips that intentionally targeted GOM cod, meaning that he discussed GOM cod allocation status with the vessel owner and they mutually agreed it was feasible and worthwhile to target the stock on at least a portion of these trips. Thus arguably, those trips were able to stay away from GOM cod if required. The other 5 trips in the top 10 may have been targeting the stock, or may have caught the stock incidentally.

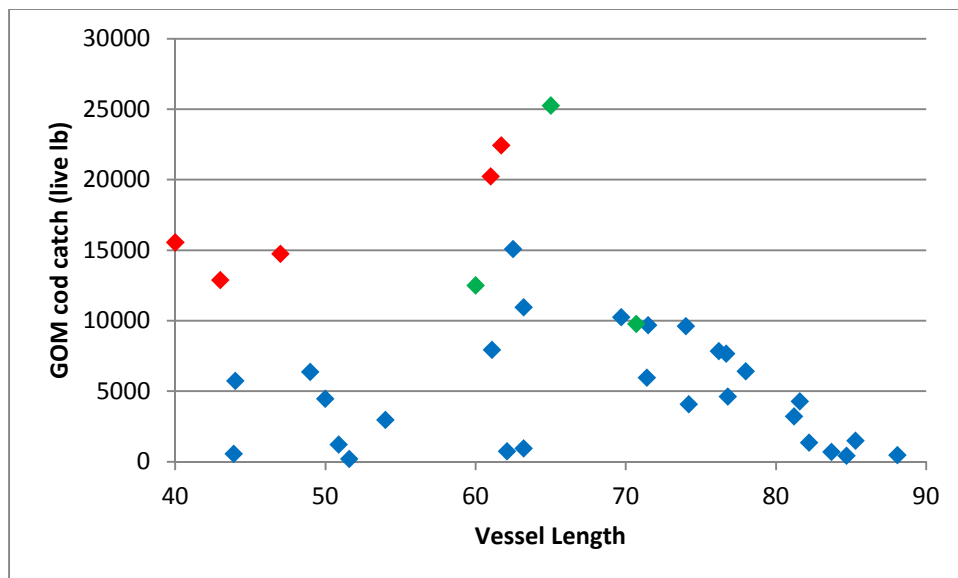
As expected, GOM cod generally comprises a greater percentage of catch for smaller vessels than large. In Figures 4 and 5 below, red points reflect gillnet catch and the rest is trawl (one red point is catch from both gear types on one vessel). Green points are vessels where one or more of the vessel's trips were known by the sector manager to be targeting GOM cod (the five trips mentioned previously).

Figure 4: SHS annual GOM cod **percentage** landed by vessel length, GOM trips, less Vessel X



Similarly, in FY2013 the largest boats generally caught smaller volumes of GOM cod as well:

Figure 5: SHS annual GOM cod **pounds** landed by vessel length, less Vessel X



Spatial Cod Catch Data

The SHS does not collate spatial catch data finer than the granular level of Broad Stock Area. However, observer data for this sector generally supports the common understanding that cod catches decrease moving from west to east.

[One tow of 9,800 pounds from statistical area 513 has been excluded from the figures which follow. This was unintentional catch.]

Table 2: FY2013 SHS trawl per-tow observed catch of GOM cod

Stat Area	Observed Tows	Null Tows (no cod catch)	Null Pct	Total observed cod catch	Average Per Tow
514	450	170	38%	46,750	104
513	424	140	33%	22,840	54
515	843	437	52%	15,380	18
512	171	85	50%	2,185	13
465	66	23	35%	585	9
511	59	37	63%	405	7
464	46	28	61%	225	5

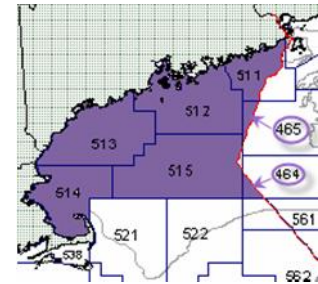
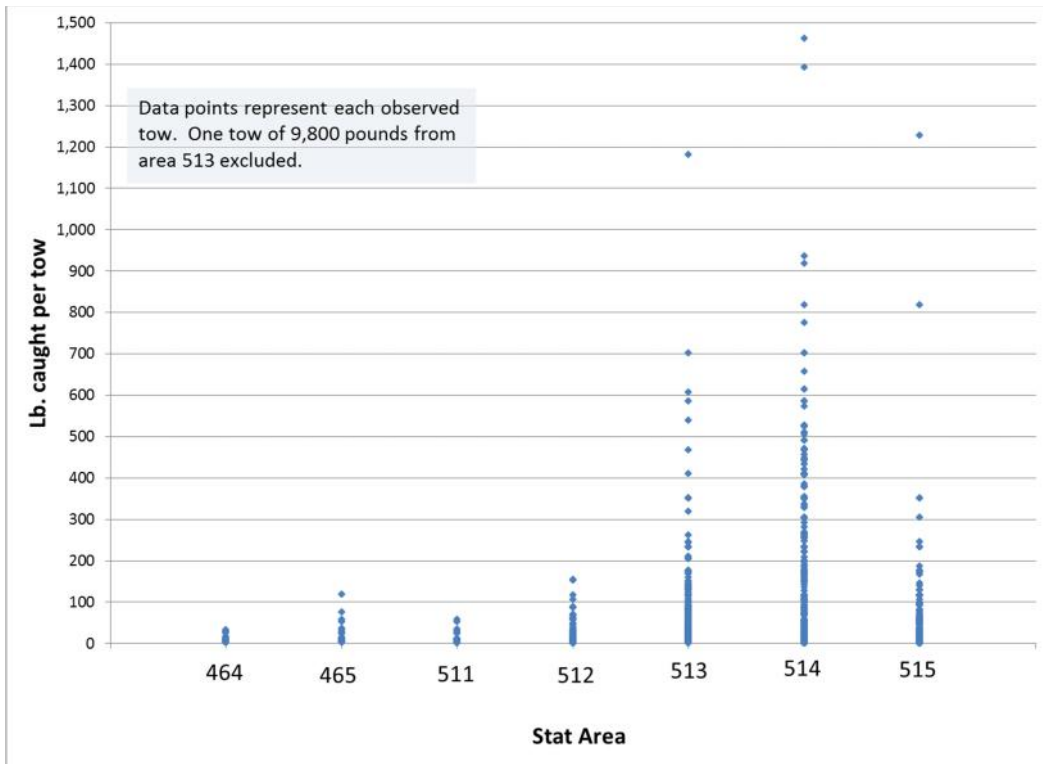


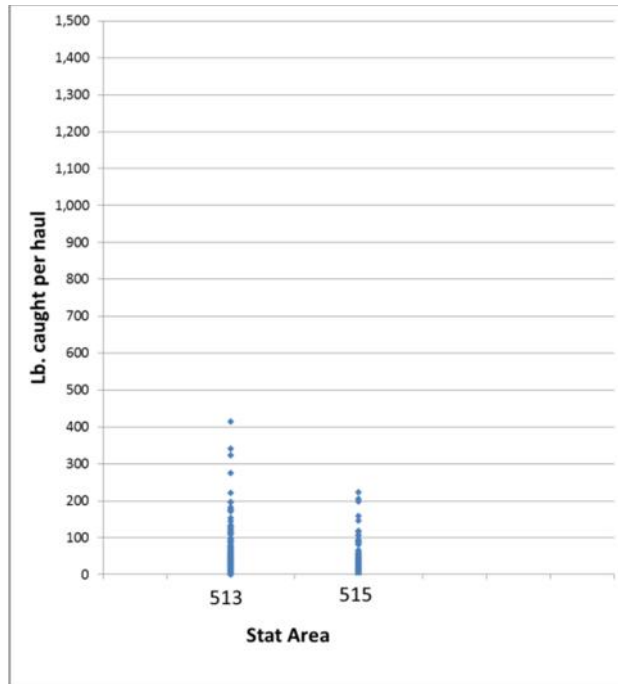
Figure 5: FY2013 SHS trawl per-tow observed catch of GOM cod (excludes nulls)



Observed gillnet data is more sparse for this sector; only four vessels were observed, fishing in just two statistical areas.

Figure 6: FY2013 SHS gillnet per-haul observed catch of GOM cod (excludes nulls)

	Observed	Null Hauls		Total observed	Average
Stat Area	hauls	(no cod catch)	Null Pct	cod catch	Per Haul
513	226	31	38%	10,600	104
515	150	23	33%	5,700	54



Lastly, 12 observed tows were made in statistical areas 464 and 515 with haddock separator gear. Total cod catch was 7 pounds in 3 tows (all 3 in area 515), the remaining 9 were null tows.

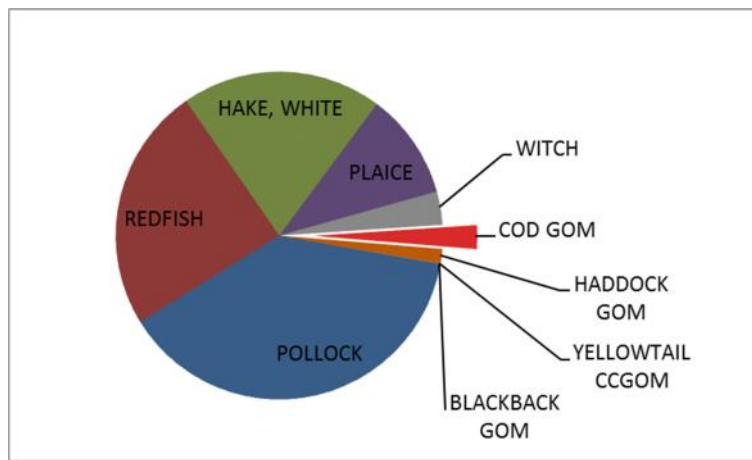
Summary

The SSC and PDT asked what level of GOM cod catch might be expected in a non-directed fishery. We know that in FY2013:

- Under a quota scenario that discouraged directed fishing, and...
- Removing some known directed catch from the analysis, with...
- A given set of environmental conditions and...
- On a given number of trips by...
- A group of fishermen traditionally not reliant on GOM cod catch and fishing east of 70°15' ...

...that the total catch of GOM cod was 225,000-250,000 pounds, or in the range of 100-115 tons. Most trips caught 500 pounds or less (see Figure 3); undoubtedly sometimes catch was inadvertently more. Minus the directed trips identified earlier, the SHS's overall ratio of groundfish catch to cod catch in the GOM was about 50:1.

Figure 8: FY2013 SHS GOM catch composition percentage, less directed cod trips



Appendix 7:



Jamie Marie Cournane, PhD
Groundfish Plan Coordinator
New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950

October 10, 2014

Dear Jamie,

In response to the request from the Science and Statistical Committee and Plan Development Team for information from sectors on Gulf of Maine cod bycatch, the Maine Coast Community sector conducted an analysis on GOM cod catch during the last three fishing seasons, including the on-going 2014 fishing season. The Maine Coast Community Sector is comprised of thirty-three fishing businesses, and there are typically between fifteen and twenty active vessels going on groundfish trips. However, with the continued reduction in allocation of key groundfish species, the number of active vessels has declined over the past three years (Table 1.)

Table 1. Number of active vessels making more than two groundfish trips in the Maine Coast Community Sector by fishing year and gear type.

Fishing Year	Number of Gillnet Vessels	Number of Trawl Vessels
2012	8	8
2013	7	6
2014	6	3

Maine Coast Sector vessels fish inside the Gulf of Maine, and are greatly impacted by the recent cuts and proposed additional cuts in Gulf of Maine cod quota. The majority of sector trips occur within the statistical areas 515 and 513. High lease prices for GOM cod early in the fishing season, and very low allocation within the sector – the sector holds only 4.6% of the total GOM cod PSC – have caused fishermen to target other groundfish species therefore effectively rendering the GOM cod fishery a non-directed fishery over the past three years. This is of important note because none of our membership has targeted cod during the last three years.

The sector has four basic categories of fishing effort, each with a different interaction with cod. The four categories were analyzed separately to create a more thorough analysis on how the sector utilizes its cod quota. The four categories are 1) gillnet vessels that target dogfish, 2) gillnet day boats, 3) gillnet vessels that take three to four day trips, and 4) trawl vessels. The fishing efforts from these four categories decreased dramatically between FY 2012 and FY 2013 with the last dramatic cut in GOM cod, American plaice and witch flounder allocation (Table 2.)

Table 2. Fishing activity by gear type within the Maine Coast Community Sector.

Fishing Year	Number of Trips (Gillnet)	Number of Trips (Trawl)
2012	447	165
2013	238	53
2014	261	29

Though our sector has relatively low percentage of allocation of key stocks when compared to the entire industry, the vessels have landed a relatively large proportion of the total catch for the region. When analyzing the catch over the past three years, it is apparent that the vessels have not been targeting cod, but rather have been trying to avoid it based on catch ratios (Table 3). The cod to redfish catch ratio is included in the analysis to demonstrate how few redfish are caught by our sector members and therefore is not truly an economic substitute for cod, pollock, or flat fish. Despite trying to avoid cod, the gillnet vessels are still having some cod catch in most trips. To estimate the GOM cod allocation needs for next fishing season in a non-directed cod fishery, the mean, median and range of cod catch were analyzed from the past three seasons (Table 4).

Table 3. Catch ratios for Maine Coast Community Sector active vessels for catch over the past three fishing seasons. The ratios mean that for every one pound of cod caught (live weight) the corresponding pounds of the other stock (live weight) were caught. For instance, a gillnet boat targeting dogfish caught 4.8 pounds of pollock for every pound of cod landed, and a trawl boat landed 52 pounds of plaice per pound of cod landed.

Fishing Category	Cod:Pollock	Cod:White Hake	Cod: Redfish
Gillnet Dayboat targeting Dogfish	1:4.8	1:4.24	1:0.07
Gillnet Dayboat	1:6.9	1:1.71	1:0.08
Gillnet Multi-day Boat	1:10.2	1:4.0	1:0.36
	Cod:Plaice	Cod: Witch Flounder	Cod:Redfish
Trawl Dayboat	1:52	1:10.8	1:0.28

Table 4. Average catch of GOM cod by sector vessels during the last three fishing seasons, including FY 2014 to date.

Fishing Category	Total Catch over last 3 fishing years (live lbs)	Mean Catch per Trip	Mean Standard Error	Median	Quartile 1	Quartile 3
Gillnet Dayboat targeting Dogfish	27,118	108.5	5.9	81.9	38.9	149.8
Gillnet Dayboat	151,688	279.8	10.1	219.5	121.1	364.8
Gillnet Multi-day Boat	63,731	398.3	30.2	271.0	130.4	578.4
Trawl Dayboat	50,213	204.1	28.9	127.1	36.6	240.0

In order to estimate the amount of GOM cod the sector would need in FY 2015 to operate under a bycatch only, non-directed inshore GOM groundfish fishery several assumptions were made when applying the average catch per trip by fishing category. Our sector members have already felt the economic and legal pressures of being severely constrained by the GOM cod allocation, especially when the expansion and presence of GOM cod throughout the inshore area this summer is taken into account. Therefore, the first assumption is that the average number of trips over the past three years is a representative bottom threshold for the number of trips a fishing vessel can take and still maintain a viable business. This assumption is supported by the sector having to lease in enough cod allocation to double the initial ACE allocated. The second assumption is that mean cod catch per trip from the past three years accurately captures a suitable cod catch ratio per trip next fishing season. This assumption may result in an underestimation of the required cod allocation for two reasons, firstly because the mean cod catch is based on live weight converted from dealer reports, and only observed and assumed discards, and secondly because the fishermen are seeing more cod in the water this season compared to the last few seasons and if this trend continues the mean cod catch per trip may change. Following these assumptions, the sector will need between 46.5 and 52.5 metric tons of GOM cod next year to support the same number of fishermen with similar cod catch ratios (Table 5).

Table 5. Projected cod allocation needs for fishing year 2015 based on average cod catch per trip from the past three fishing seasons and the same number of fishermen taking a similar number of trips.

Gear Type	Mean Cod per Trip (+/- SE) lbs	Number of Trips Estimated based on 2014 sub-ACL	Mean Cod Needed (lbs)
Gillnet Dayboat targeting Dogfish	108.5 (5.9)	100	10800
Gillnet Dayboat	279.8 (10.1)	180	50220
Gillnet Multi-day Boat	398.3 (30.2)	100	39800
Trawl Dayboat	204.1 (28.9)	41	8364
Combined TOTAL			109,184

However, using catch ratios and average catch from FY 2014 alone and applying similar expected trips for FY 2015, the need for cod increases to 52.3 to 65.8 mt (Table 6). The sector has not been limited by allocation for the target species pollock or plaice in the past three fishing seasons, but have been constrained by cod, which would suggest that for the sector to maximize ACE utilization of target species like pollock and plaice additional GOM cod allocation would be needed.

Table 6. Projected cod allocation needs for fishing year 2015 based on average cod catch per trip from just the current fishing year (2014) and the same number of fishermen taking a similar number of trips.

Gear Type	Mean Cod per Trip (+/- SE) lbs	Number of Trips Estimated based on 2014 sub-ACL	Mean Cod Needed (lbs)
Gillnet Dayboat targeting Dogfish	104 (10.0)	100	10400
Gillnet Dayboat	285 (21.5)	180	51300
Gillnet Multi-day Boat	676 (98.8)	100	67600
Trawl Dayboat	115 (43.9)	41	862
Combined TOTAL			130162

The Maine Coast Community Sector acknowledges the necessary management response to the latest news from the science center from the GOM cod stock assessment update. We understand that the corresponding management decision is very difficult since any reduction in GOM cod allocation will reduce the number of trips our sector members can take next year. Thank you for the opportunity to present these numbers and explain the need for GOM cod by our sector. We are happy to provide additional information or respond to specific questions as the process to set specifications continues.

Sincerely,

Lucy Van Hook
MCCS Sector Data Analyst

Appendix 8:

October 13, 2014 (updated final version)

Groundfish Plan Development Team
New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950

Dear Groundfish Plan Develop Team members,

The Northeast Sector Service Network (NESSN) offers the following preliminary information in response to the SSC's request for industry input for estimates of incidental, non-target catch of GOM cod under the prevailing operating conditions of the fishery.

NESSN has been working with the Northeast Fishery (NEFS) Sectors to gather data in response to the SSC's request. Although this work is ongoing, NESSN wanted to provide the groundfish PDT members with preliminary information in time for the PDT discussion scheduled for October 7, 2015. These analysis were compiled using various data sets available on NMFS Sector Information Management Module (SIMM), the final Fishing Year 2013 (May 1, 2013-April 30,2014) Detail Reports as submitted to NMFS and the Sector Managers extensive knowledge about the fishing activity of their Members.

It is important to recognize that GOM cod incidental catch estimates are based entirely upon the most recent conditions related to the catchability and catch rates of GOM cod throughout the fishing areas where NEF Sector members operate.

Furthermore, the NEF Sectors have also indicated that the low ACL's in 2013 and 2014 have directly served as a spatial management tool among and within statistical block areas. In other words, the ACL reductions have modified fishing activity whereby the more discreet areas where directed fishing on GOM cod would typically be conducted are fished much less frequently due to the operational realities of low allocations and high lease costs. The sectors believe that this shift in fishing patterns within statistical block areas and on a much finer spatial and temporal scale than 30 minute squares should be verifiable through VMS track data. Due to the diverse substrates and depth contours that exist throughout the Gulf of Maine, each statistical block contains a broad range of fishing opportunities with regards to species targeting or avoidance strategies. This can be seen in [Appendix 1](#), which documents the total annual catch of Gulf of Maine stocks including unit stocks for each Sector that predominantly conduct their fishery in the Gulf of Maine for Fishing Year 2010,2011,2012,2013. Additionally, a similar table that documents the combined annual catch for NEF Sectors who conduct the majority if not all of their fishing activity outside of the Gulf of Maine is provided for reference.

The Gulf of Maine Broad Stock Area (GOM BSA) is comprised of statistical area 514,513,515,512,511,465,464. Sector vessels fishing on a "sector trip" in the GOM BSA may be targeting any of the following allocated stocks:

- Gulf of Maine Cod
- Gulf of Maine Winter Flounder
- Gulf of Maine Haddock
- White Hake
- American Plaice
- Pollock
- Redfish
- Witch Flounder
- Cape Cod/Gulf of Maine Yellowtail (includes stat area 521)

Additionally, it is important to highlight that many vessels also participate in the monkfish, skate, and dogfish fisheries in the Gulf of Maine. Typically, these trips are deemed “sector trips” for ACE accounting purposes when the vessel utilizes a Groundfish Day at Sea. These “sector trips” must adhere to the retention requirements under the groundfish sector system, and any and all catch of allocated stocks (assumed or observed) are deducted from the Sectors Annual Allocation.

The majority of fishing activity in the Gulf of Maine occurs by vessels enrolled in NEFS 2, 3,6,10 and 11¹. NEFS 5,7,8,9, and 13 have limited activity in the Gulf of Maine and preliminary responses from those sectors have indicated that they do not anticipate any greater activity in the Gulf of Maine in FY 2015 than in previous years. Northeast Fishery Sector 1 and 4 are lease only sectors with no fishing activity. Combined for Fishing Year 2014, the Northeast Fisheries Sectors combined represent 67.72% of the Gulf of Maine Cod Groundfish Sub-ACL, i.e. 1,237,278 live pounds. Of this combined 67.72%, 54.45% is based on permits enrolled in NEFS 2, 3,6,10 and 11 i.e. 996,333 live pounds.

	MRI's Enrolled FY 2014	Declared Active Vessels FY 2014
2-NEFS	81	36
3-NEFS	78	23
6-NEFS	22	5
10-NEFS	43	17
11-NEFS**	56	34
TOTAL	280	115

Compiled using Final FY 2014 Roster and Sector Contracts which designate Active/Non-Active Status

^{1**} Up until Fishing Year 2014 Northeast Fishery Sector XI and XII were separate stand along sectors comprised primarily of members fishing out of New Hampshire. For Fishing Year 2014, these two sectors' merged into Northeast Fishery Sector XI. The fishing activity as captured in the FY 2013 Detail Reports for both Sectors was analyzed for the information being presented, but for simplicity the activity that occurred in FY 2013 for these two sectors is simply being referred to NEFS 11 in this preliminary report.

of "Sector Trips" Taken per Fishing Year

	2010	2011	2012	2013
2-NEFS	1605	2199	1944	1038
3-NEFS	2,540	2,959	2,294	1,258
6-NEFS	131	126	119	98
10-NEFS	762	1220	1213	613
11-NEFS**	1467	1970	1912	1315
TOTAL	6505	8474	7482	4322

Of Vessels Annually who took at least one "Sector Trip"

	2010	2011	2012	2013
2-NEFS	42	38	38	31
3-NEFS	38	35	30	25
6-NEFS	6	5	4	5
10-NEFS	20	22	21	11
11-NEFS**	27	27	25	20
TOTAL	136	127	118	92

Compiled using NMFS generated Year End Tables, which are utilized by Sectors when completing their Annual Reports

Each Sector has a distinct geographic and/or gear feature that precludes using the same filters and thresholds across or even within all Sectors. Generally, there are three broad categories of vessel size, gear type and historical fishing patterns contained between and within the sectors that direct all, or a majority of their fishing activity in the Gulf of Maine.

- The gillnet component is mostly comprised of the day gillnet class. NEFS 3 and 11 are primarily in this class while NEFS 10 has several members that are gillnet vessels.
- Day boat or "inshore" trawlers are generally, but not always the smaller of the dragger vessels. This class is defined primarily by their historical fishing patterns rather than by vessel size. The majority of NEFS 2 and 10 members are in this class while NEFS 11/12 in NH has several members in this class also.
- Mid-range and full range trawlers are vessels that have historically fished a substantial portion of their fishing history in the Gulf of Maine including west of 70:15 but their fishing patterns are mostly multi-day trips from 3 to 9 days with the majority of their time spent east of the WGOM closed area north and south of 42:20 on the same trips. NEFS 6 is comprised entirely of this class of vessels while NEFS 2 has a substantial component of membership in this class.

With the above considerations the Sectors who have the majority of fishing activity in the Gulf of Maine approached their analysis in one or a combination the following three ways:

- (1) Sectors that have membership that fish both inshore (day vessels) and offshore (trip vessels) in the Gulf of Maine separated FY 2013 fishing activity between the two trip characteristics.
 - a. For Offshore Vessel Trips: Trips that averaged 6.5 days at sea and landed 4,000 live pounds or greater of Gulf of Maine Cod were identified as “Directed Gulf of Maine Cod Trips”
 - b. For Day Trip Vessels: Trips that had 700 live pounds or more of landings of Gulf of Maine Cod were identified as “Directed Gulf of Maine Cod Trips”
 - c. All other trips were identified as “Non-Directed Gulf of Maine Cod Trips”
 - d. The total landings/discards in live weight were summed together for the Non-Directed Gulf of Maine Cod Trips to calculated the total amount of Gulf of Maine Cod that would be needed in order to continue persecuting other stocks and fisheries in the Gulf of Maine

	Est. "Incidental" Catch of GOM Cod based FY 2013 Activity after Directed GOM Cod Trips were removed
2-NEFS	163,608

- (2) Sectors that have membership that also participate heavily in fisheries such as dogfish, monkfish and/or skates:
 - a. For all trips with a k-all (dogfish, monkfish, skates included) less than 2,000 pounds and Gulf of Maine Cod landings greater than or equal to 50% of the k-all were considered a “Directed Gulf of Maine Cod Trips”
 - b. For all trips with a k-all (dogfish, monkfish, skates included) greater than 2,000 pounds and Gulf of Maine Cod landings greater than or equal to 15% or 33% of the k-all were considered a “Directed Gulf of Maine Cod Trips”
 - c. The total landings/discards in live weight were summed together for the Non-Directed Gulf of Maine Cod Trips to calculated the total amount of Gulf of Maine Cod that would be needed in order to continue persecuting other stocks and fisheries in the Gulf of Maine

	Est. "Incidental" Catch of GOM Cod based FY 2013 Activity after Directed GOM Cod Trips were removed
3-NEFS	92,681
10-NEFS	36,405
11-NEFS**	96,000
TOTAL	225,086

- (3) Sectors that have membership comprised of trip vessels that fish both inshore and offshore in the Gulf of Maine separated their “Directed Gulf of Maine Cod Trips” from “Non-Directed Gulf of Maine Cod Trips” based on the portion of Gulf of Maine Cod caught compared to total trip catch. Specifically, trips with a total catch of Gulf of Maine Cod comprising 65% of their total catch and higher were considered “Directed Gulf of Maine Cod Trips”
- a. The total landings/discards in live weight were summed together for the Non-Directed Gulf of Maine Cod Trips to calculate the total amount of Gulf of Maine Cod that would be needed in order to continue persecuting other stocks and fisheries in the Gulf of Maine.

	Est. "Incidental" Catch of GOM Cod based FY 2013 Activity after Directed GOM Cod Trips were removed
6-NEFS	47,137

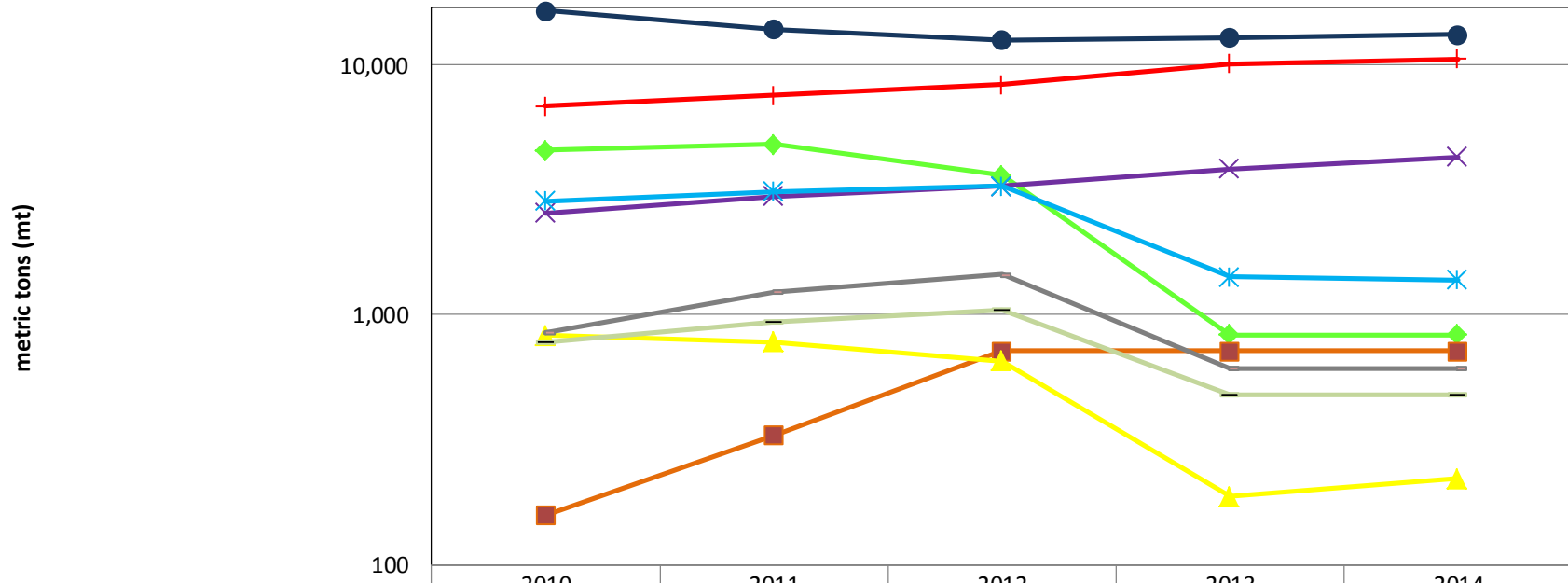
Annually, since the expanded sector management system began in Fishing Year 2010 Northeast Fishery Sectors 5,7,8,9 and 13 have had limited or no fishing activity in the Gulf of Maine. Based on conversations with the managers of these Sectors, it is anticipated that any limited fishing activity in the Gulf of Maine will continue to be at most consistent with previous fishing years. In light of this anticipated limited activity a proxy incidental catch was calculated using an average from FY 2010, 2011, 2012, and 2013.

	Est. "Incidental" Catch of GOM Cod based FY 2013 Activity after Directed GOM Cod Trips were removed
NEFS 5,7,8,9,and 13	15,146

Based on these analysis, and assuming that current conditions and catch rates of GOM Cod throughout the BSA remain the same the Northeast Fisheries Sectors estimate that combined they would need 453,961 (live pounds) i.e. 205 mt of GOM Cod to continue fishing for other stocks and other fisheries in the Gulf of Maine in FY 2015.

Appendix 1:

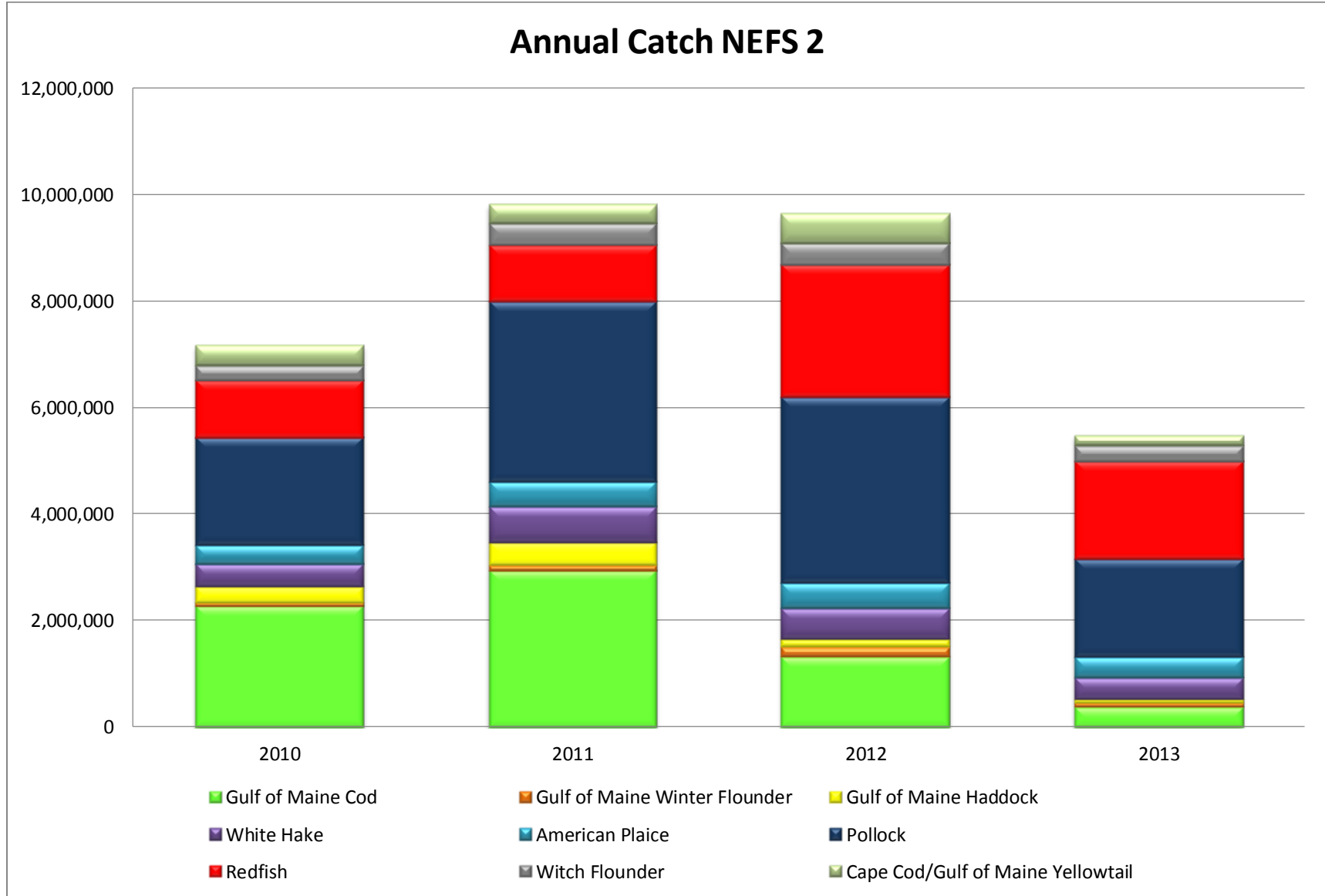
Commercial Sub-ACLs per Fishing Year GOM & Unit Stocks



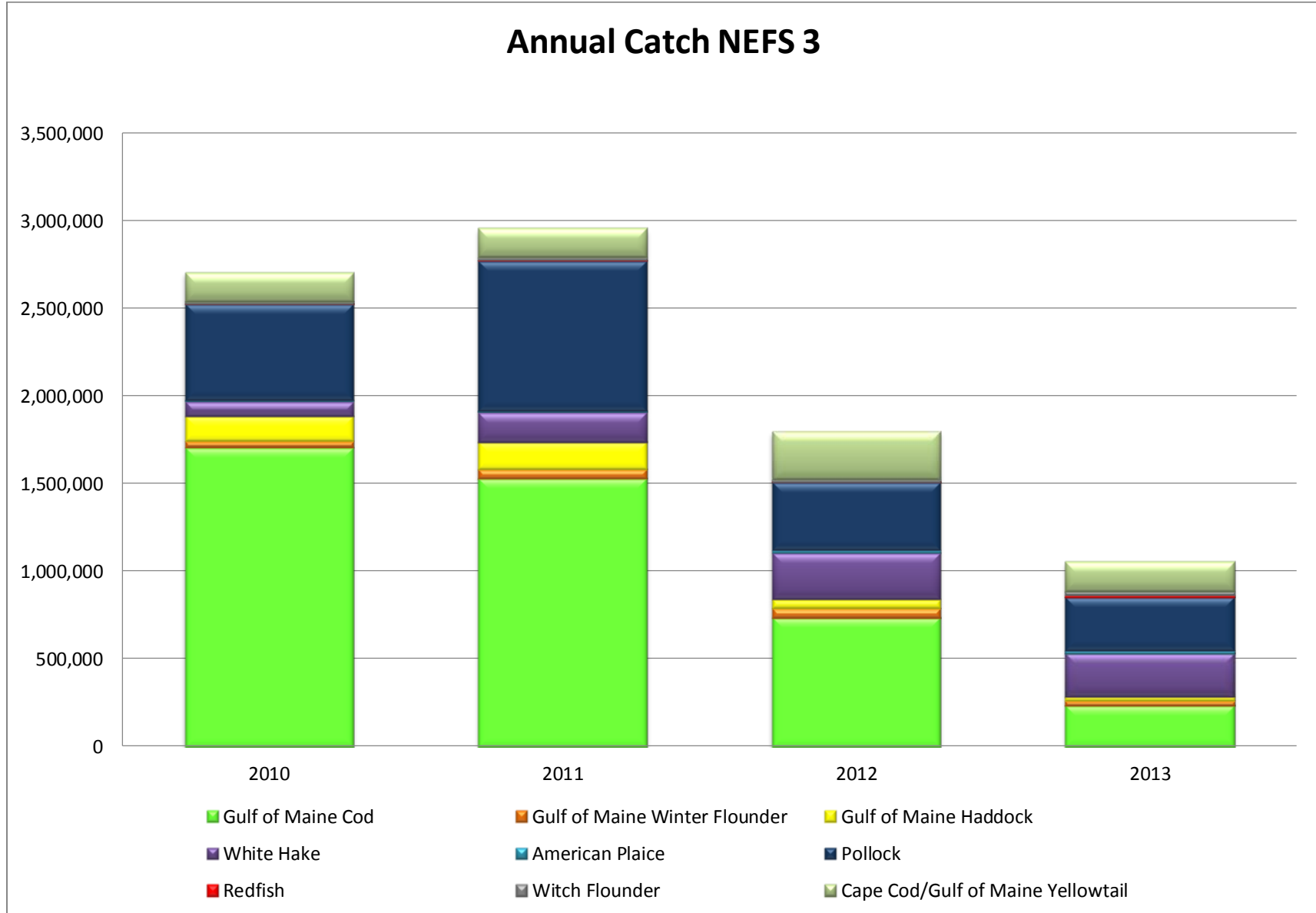
	2010	2011	2012	2013	2014
◆ Gulf of Maine Cod	4,567	4,825	3,619	830	830
■ Gulf of Maine Winter Flounder	158	329	715	714.7	714.7
▲ Gulf of Maine Haddock	825	778	653	187	220
✕ White Hake	2,556	2,974	3,283	3,849	4,278
✧ American Plaice	2,848	3,108	3,278	1,420	1,382
● Pollock	16,553	13,952	12,612	12,893	13,224
✚ Redfish	6,846	7,541	8,325	10,132	10,565
— Witch Flounder	852	1,236	1,448	610	610
— Cape Cod/Gulf of Maine Yellowtail	779	940	1,046	479	479

Data compiled using Commercial Sub-ACL's as documented on NMFS Sector Information Management Module (SIMM)

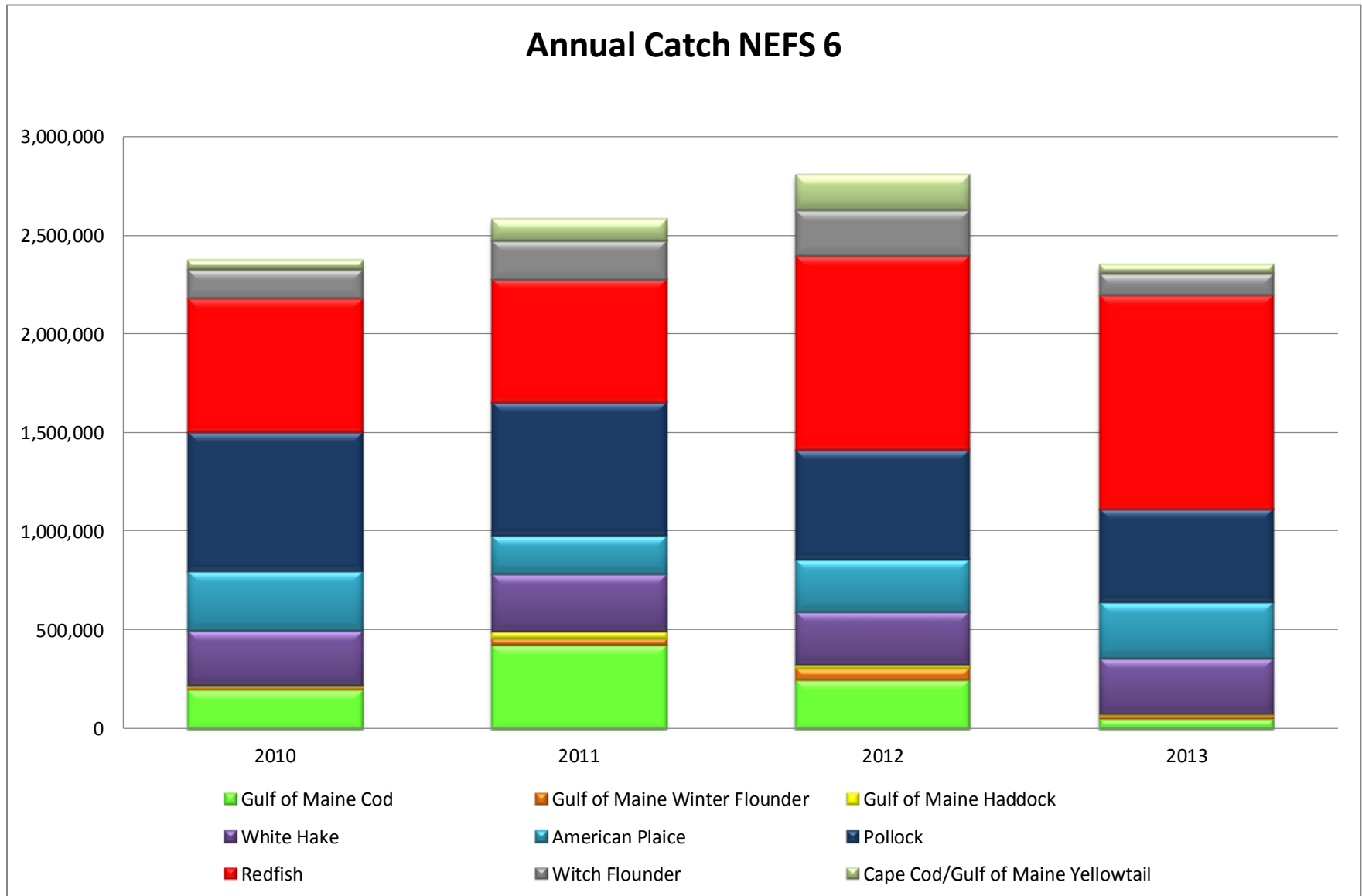
Appendix 1:



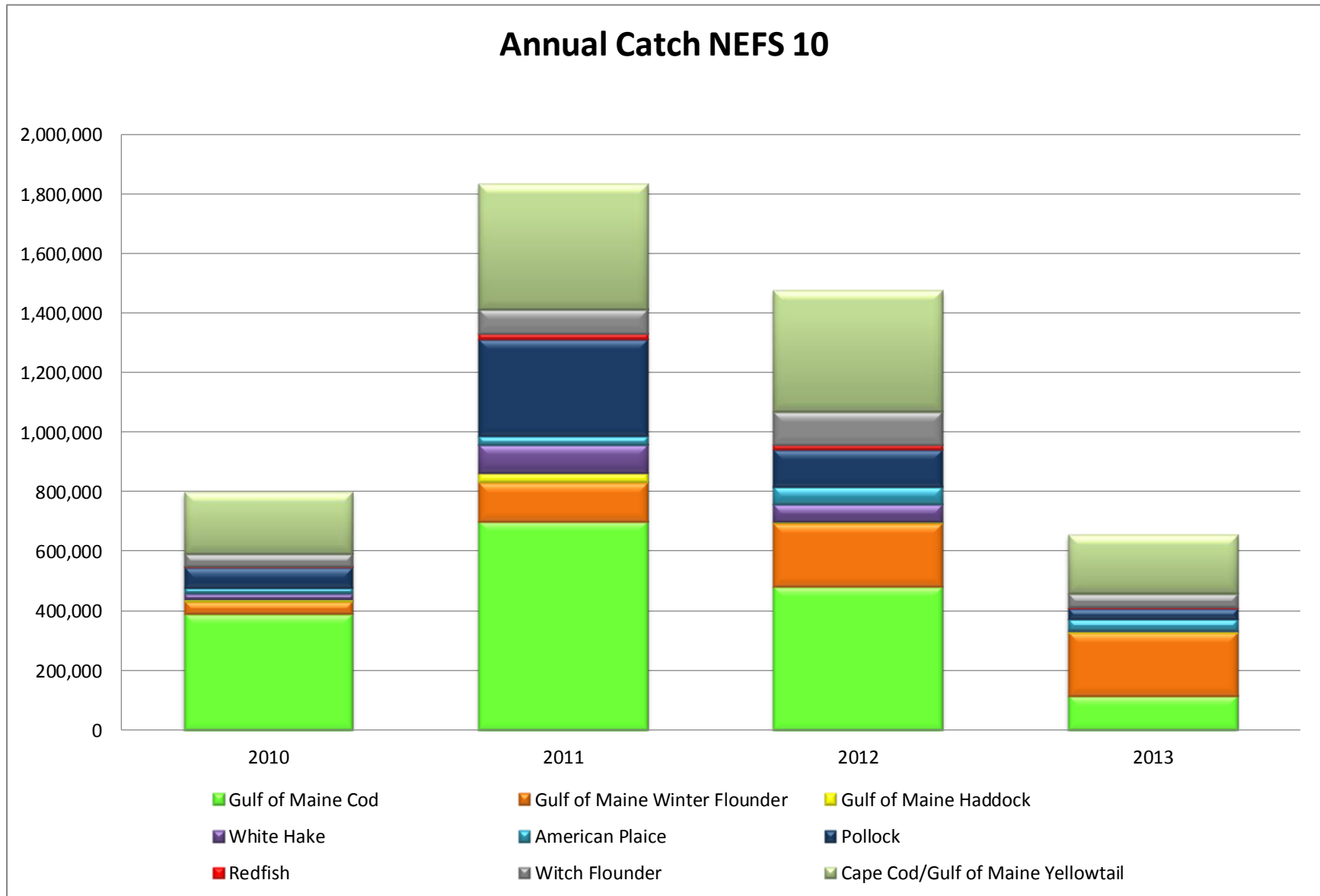
Appendix 1:



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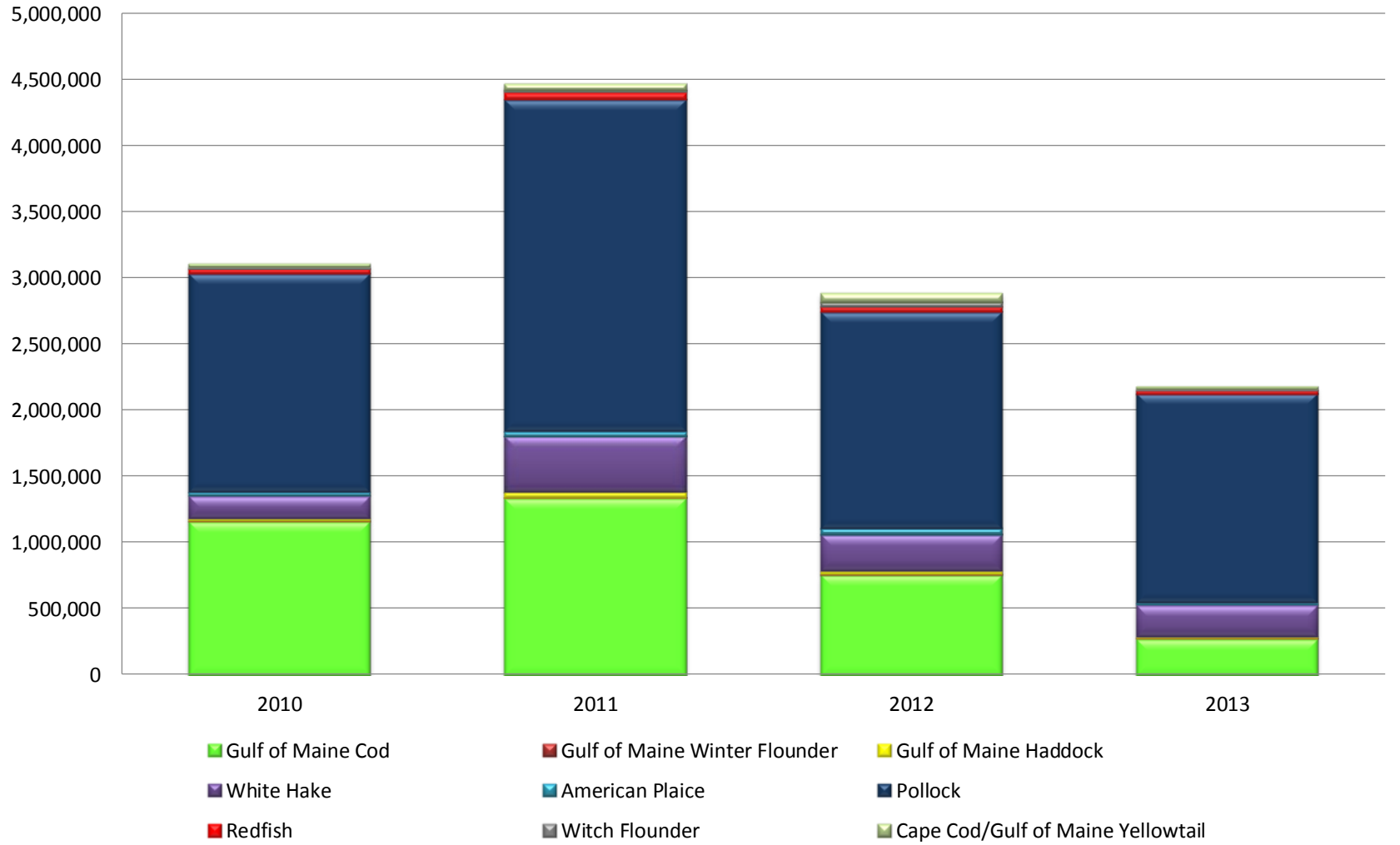


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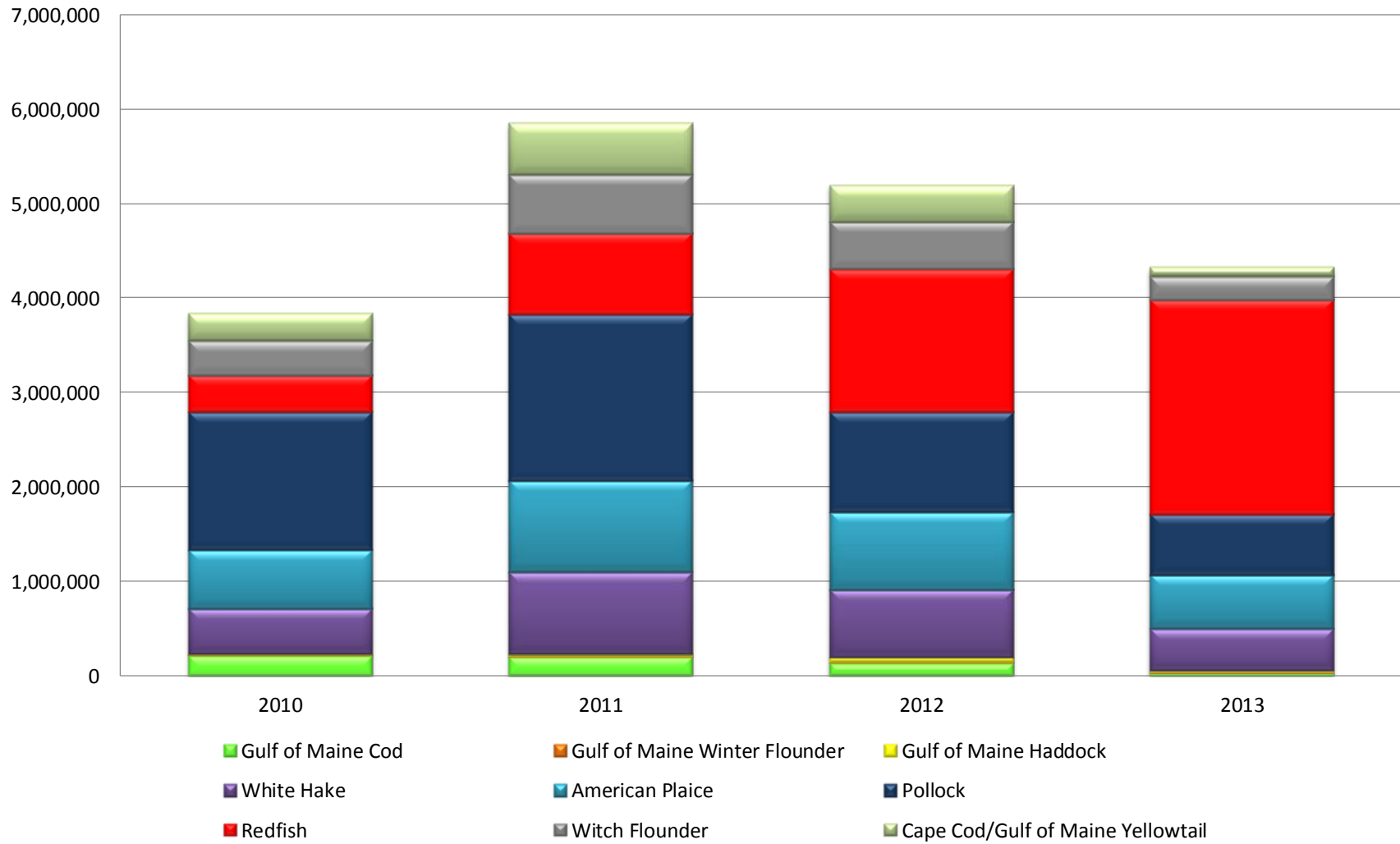
Appendix 1:

Annual Catch NEFS 11 & 12



Appendix 1:

Annual Catch NEFS 5,7,8,9 & 13 Combined



Appendix 1:

Graphs showing Catch of GOM and Unit Stocks on a Fishing Year basis per Sector compiled using NMFS generated Year End Accounting Tables specifically:

- *FY 2010 End of the Year Accounting of NE Multispecies Catch (lbs.) Run Date June 29,2011*
- *FY 2011 End of the Year Accounting of NE Multispecies Catch (lbs.) Run Date June 16,2012*
- *FY 2012 End of the Year Accounting of NE Multispecies Catch (lbs.) Run Date June 14 2013*
- *FY 2013 End of the Year Accounting of NE Multispecies Catch (lbs.) Run Date September 29, 2014*