



New England Fishery Management Council

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MEMORANDUM

DATE: November 5, 2014
TO: Groundfish Committee
FROM: Groundfish Plan Development Team (PDT)
SUBJECT: **Development of Framework Adjustment 53 (FW 53) to the Multispecies (Groundfish) Fishery Management Plan**

The Groundfish Plan Development Team (PDT) met on October 7, 15, and 28 to discuss Framework Adjustment 53 (FW 53), in particular the draft alternatives and the draft environmental impact analysis.

Based on these discussions, the PDT raised additional suggestions and questions for the Committee to consider in their deliberations at the Committee's November 12-13 meeting.

Throughout this memo, the draft alternatives will be referred to as those dated October 30, 2014.

This memo includes three appendices¹:

- 1) Presentation: Evaluation of VTR landings of Gulf of Maine Atlantic cod
- 2) Presentation: GOM Cod Spawning
- 3) Presentation: Gulf of Maine Cod and Haddock: Review of Recreational Bioeconomic Model and Potential AMs for FY 2015

PDT COMMENTS ON FW53 MEASURES

Section 4.1: Updates to Status Determination Criteria, Formal Rebuilding Programs and Annual Catch Limits

Low GOM Cod ACL

The PDT raised concerns about the ability of the fishery to realize a low catch and target fishery mortality to promote stock rebuilding under the low GOM cod ACL. In addition, based on recent FY 2013 catch data and past experience with this stock, the PDT remains concerned about the ability for the fishery to stay within the very low GOM cod ACL in FY 2015 and the potential incentive a low ACL creates for misreporting or discarding. The PDT is not as concerned with the catch being met on paper but the PDT is concerned with the large incentive for observer

¹ Summaries of these appendices will be incorporated into the draft FW53 document prior to submission.

effects that a low ABC produces. This is of particular concern for GOM cod since most of the stock is still distributed in 514 relatively close to the fishing ports. The PDT recognizes that increasing observer coverage to 100% for the commercial fleet in the GOM would likely be the best way to directly account for all catch in the commercial fishery. Observer coverage at 100% would give the fishery more options with where and how fishing can occur while avoiding GOM cod. Current regulations do not require recreational vessels to carry observers.

In addition, PDT analysis suggests that the majority of commercial cod catch in the GOM comes from 30 minute blocks 124 and 132 and the core area for the GOM cod stock remains in these same areas (Appendix 1). More recently there is some evidence for higher relative cod catch coming from the eastern edge of the GOM closure in blocks 132 and 138 as the fleet moved further offshore to avoid cod with the reductions in the GOM cod ABCs (Appendix 1). However the highest catch rates still show that the heart of the GOM cod population is still within blocks 124 and 132. The PDT discussed possible year-round mortality closures in blocks 124 and 132 to protect the core GOM cod stock.

There are a few signs of high cod tows still occurring in the commercial fishery which is encouraging and shows reasons of optimism. However all raw data sources (i.e., VTR/observer commercial, recreational, survey data) along with the stock assessment itself clearly indicates a very low stock biomass. Protection of the low abundance is now needed to rebuild the stock and a future groundfish fishery where GOM cod is once again an important component of the fishery. The PDT is very concerned about the potential magnitude of unaccounted discarding that will likely occur without the additional protections that are needed with such a low ABC. The lack of additional protection could undermine the hope for rebuilding this stock.

Sub-Component Analysis

ABC/ACL Distribution

Background

Groundfish ABCs and ACLs are distributed to various components of the fishery. First, expected catch by Canadian vessels is deducted from the total ABC, and the amount remaining is the portion of the ABC available to U.S. vessels (U.S. ABC). Expected catch from state waters and the other sub-component is then deducted from the U.S. ABC². These sub-components are not subject to specific catch controls by the Groundfish FMP. As a result, the state waters and other sub-components are not allocations, and these components of the fishery are not subject to accountability measures if the catch limits are exceeded. Because the state waters and other sub-component values are based on expected catch, there is no downward adjustment for management uncertainty that applies to fisheries with specific allocations and accountability measures.

After the state and other sub-components are deducted, the remaining portion of the U.S. ABC is the amount available to the fishery components that receive an allocation (i.e., subject to

² For GOM cod and haddock, the state waters and other sub-component are deducted from the commercial portion of the U.S. ABC (after allocating to the recreational fishery).

accountability measures). Allocation are made first to non-groundfish fisheries (e.g., scallop, midwater trawl, small-mesh fisheries), and the portion of the U.S. ABC remaining is the commercial groundfish allocation.

Once the U.S. ABC is distributed to the various fishery components, sub-annual catch limits (sub-ACLs) are set by reducing the amount of the ABC distributed to each component to account for management uncertainty (i.e., the likelihood that management measures will result in a level of catch greater than the catch target). For each stock, management uncertainty is estimated using the following criteria: enforceability and precision of management measures, adequacy of catch monitoring, latent effort, and catch of groundfish in non-groundfish fisheries.

The following default management uncertainty buffers are used for groundfish stocks:

- 3% for stocks with no state waters catch;
- 7% for zero possession stocks;
- 7% for recreational allocations; and
- 5% for all other stocks/components of the fishery.

Review of Management Uncertainty Buffer

The PDT last reviewed and recommended changes to the management uncertainty buffer for Framework Adjustment 50 (FW 50). The PDT briefly discussed the changes to the management uncertainty buffers implemented by FW 50, and considerations made for those adjustments. During the development of FW 50, the PDT discussed whether the buffer should be increased due to possible observer bias, but did not recommend any increase because no estimate of bias is available to correctly determine the appropriate changes.

The PDT reiterated that, at this time, it is not possible to quantify observer bias, and that the direction of any bias can change from year to year. The PDT also discussed that no changes to the buffer appear necessary as a result of any changes to the management measures since FW 50. The PDT concluded that no new information is available that would warrant any changes to the default management uncertainty buffers for FW 53, and is recommending no change. However, if the Council selects the prohibition on the possession of GOM cod as its preferred alternative in FW 53, then, consistent with the default buffer used for zero possession stocks, the buffer should be increased from 5% to 7% for GOM cod.

Canadian Catch of Groundfish Stocks

Since fishing year 2010, expected Canadian catch has only been considered for Eastern GB cod and haddock and GB yellowtail, which are jointly managed with Canada. However, based on the results of recent assessments, some Canadian catch of GB winter flounder and halibut does occur. Although these stocks are not jointly managed, Canadian catch should be accounted for when distributing the ABC/ACLs to ensure that biological objectives are met and total catch does not exceed the overall ABC. During the 2014 operational assessment for GB winter flounder, the peer review panel also suggested that Canadian catches should be considered in determining the U.S. ABC.

Georges Bank Winter Flounder

For GB winter flounder, the PDT reviewed Canadian catch information that was included in the 2014 Operational Update. Only the most recent catches are presented here (Table 1). Canadian landings are primarily from the bottom trawl groundfish fishery, and have generally been low relative to the total landings of this stock, which are dominated by the U.S. landings. Discards from the Canadian bottom trawl fishery were not available for the assessment. Although discarding groundfish is prohibited in Canadian groundfish fisheries, some discards likely occur in this fishery. Discards from the Canadian scallop fleet fluctuated around 100 mt from 2010-2012, and decreased to 29 mt in 2013.

Table 1- Canadian catches of Georges Bank winter flounder, metric tons, 2000-2013.

Year	Canadian Landings	Canadian Discards	Total Canadian Catch	Total Canadian Catch as Percent of Total Catch
2000	161	198	359	18%
2001	529	199	728	30%
2002	244	193	437	17%
2003	310	179	489	15%
2004	191	105	296	10%
2005	73	145	218	9%
2006	55	135	190	17%
2007	12	44	56	5%
2008	20	69	89	8%
2009	12	252	264	13%
2010	45	109	154	10%
2011	52	88	140	7%
2012	83	79	162	7%
2013	12	29	41	2%
2011-2013 Average	49	65	114	6%

Halibut

For halibut, the PDT reviewed recent Canadian catches from the most recent assessment (2012 Operational Assessment), as well as additional years of catch information that are available from the NAFO 21A Extraction Tool (Table 2). Canadian landings have typically been well below 30 mt with the exception of a few years. The 2012 Operational Assessment for halibut only included Canadian landings from NAFO Division 5ZC (Statistical Areas 551 and 552); however, the PDT noted that the assessment likely should have also included landings from NAFO Division 5Y (Statistical Area 511). Because the assessment did not include Division 5Y, the PDT did not include these catches in determining the expected Canadian catch that should be applied to the total ABC. In addition, duplicate catch data was included in the NAFO 21A Extraction Tool for 2012, and the PDT removed the duplicate data entry for this analysis.

Table 2- Canadian landings of halibut, metric tons, 2000-2012

Year	5Y	5ZC	Total Landings
2000		6	6
2001		11	11
2002		10	10
2003		14	14
2004		12	12
2005		9	9
2006		10	10
2007		32	32
2008		29	29
2009	7	15	22
2010	7	11	18
2011	6	19	25
2012	2	28	30
2010-2012 Average	5	19	24

PDT Recommendation for Accounting for Canadian Catch

For GB winter flounder and halibut, the PDT recommends using the average catch of the most recent three years available as the expected Canadian catch. This expected Canadian catch should be reduced from the total ABC for the respective stock before distributing the remaining portion of the ABC to U.S. vessels.

Stock	Expected Canadian Catch
GB winter flounder	114 mt
Atlantic halibut	19 mt

Review of State Waters and Other sub-Components

The PDT completed a comprehensive review of the sub-components for FW 50, and a number of adjustments were adopted beginning for the 2013 fishing year. The sub-components have not been reviewed since this action, which implemented substantial ACL reductions for many groundfish stocks. Two additional years of catch information (FY 2012 and 2013) are now available as well.

The PDT reviewed final fishing year 2013 catch information and sub-component performance to determine if adjustments made in FW 50 were effective. In general, there were only a few instances where fishing year 2013 sub-component catches exceeded the sub-component value. The PDT also highlighted a number of stocks where sub-component catch was either relatively high compared to the sub-component value (75% or greater), or relatively low compared to the

other sub-component value (25% or less). Table 3 summarizes the major highlights from the fishing year 2013 final catch report. The PDT also reviewed proposed FY 2015 specifications to determine if any adjustments to the sub-components are necessary in anticipation of any expected ACL changes.

Table 3- Summary of FY 2013 sub-Component Catches (as percent of sub-component caught).

	Stock	State sub-Component	Other sub-Component
<i>Sub-component 'overages'</i>	SNE/MA Yellowtail Flounder	206.5%	106.3%
	CC/GOM Yellowtail Flounder	130.2%	271.3%
	Witch Flounder	115.5%	–
	SNE/MA Winter Flounder	–	108.1%
	Pollock	104.9%	103.7%
	Wolffish	185.0%	
	<i>Sub-Components with High Utilization ($\geq 75\%$)</i>	Plaice	–
Northern Windowpane Flounder		–	95%
<i>Sub-Components with Low Utilization ($\leq 25\%$)</i>	GOM Cod		6%
	GB Haddock	2%	5%
	GOM Haddock		25%
	GB Yellowtail Flounder		<1%
	Redfish	17%	2%
White Hake	6%	10%	

PDT Recommendations for Changes to sub-Components

The PDT developed recommended changes to the state waters and other sub-components based on recent catch information (FY 2010-FY 2013), expected ACL changes and management measures for 2015, stock abundance and availability, and other information. The PDT’s recommendations for FW 53 are summarized in Table 4, and are described in more detail below. The PDT noted that final FY 2014 catch information will be available in time for setting specifications for FY 2016, and that the state waters and other sub-components should be reviewed again at that time in order to make any necessary adjustments.

1. No changes are recommended for either the state waters or other sub-component values for GB cod, GOM cod, GB haddock, plaice, witch flounder, GB winter flounder, redfish, white hake, pollock, southern windowpane, or wolffish.

2. GOM haddock: Both the other sub-component and state waters catch have each been less than 10 mt since fishing year 2010. The PDT discussed that although this stock is abundant, there is no reason to expect other sub-component or state waters catch to increase dramatically from levels observed since FY 2010. As a result, the PDT recommends reducing the other sub-component from 3% to 2% of the ABC and the state sub-component from 2% to 1% of the ABC.
3. GB yellowtail flounder: The other sub-component catch declined to 0 mt in fishing year 2013. The small-mesh fisheries catch historically made up the majority of the other sub-component catch; however, with the adoption of the small-mesh fisheries sub-ACL beginning in FY 2013, these catches are no longer attributed to the other sub-component. As a result, the PDT recommends reducing the other sub-component from 2% to 1% of the ABC. The PDT does not recommend reducing the other sub-component beyond 1%.
4. SNE/MA yellowtail flounder:
 - a. State waters catch remained relatively constant from FY 2012 to FY 2013 despite the large reduction to the ACL. In FY 2012 and 2013, the state sub-component catch exceeded the sub-component value, although only by a relatively small amount (2 and 8 mt, respectively). The PDT noted that it was not clear why state waters catch remained constant in fishing year 2013. Given the uncertainty around expected state waters catch, and the recent “overages” of the sub-component value, the PDT recommends increasing the state sub-component to 2% of the ABC (from 1%).
 - b. Although the other sub-component catch exceeded the sub-component value in FY 2013, the PDT noted that the “overage” was only 2 mt, which is relatively minor compared to total catch of the stock. The PDT also noted that there was no reason to expect that FY 2015 catches should vary dramatically from FY 2013. As a result, the PDT is recommending no change to the other sub-component.
5. CC/GOM yellowtail flounder:
 - a. State waters catch increased by approximately 10 mt in FY 2013 compared to FY 2012 despite the large reduction to the ACL. The PDT noted that there has been a general increase of state waters catch over time since FY 2013. The PDT discussed possible reasons for this increase, but could not pinpoint a clear reason, particularly for the increase from FY 2012 to FY 2013. As a result, it is difficult to predict expected state waters catch in FY 2015, although there does not seem to be any reason to expect dramatic changes in FY 2015 state waters catch compared to FY 2013. As a result, the PDT recommends increasing the state sub-component to 7% of the ABC (from 6%).
 - b. The other sub-component catch increased by approximately 10 mt in FY 2013 compared to FY 2012, primarily due to a small increase in estimated discards from the scallop fishery. The other sub-component catch exceeded the sub-component value by approximately 20 mt. This increase in the other sub-component catch was anticipated because of an increase in scallop fishery effort, particularly in statistical area 521, compared to previous years. The PDT discussed likely scallop fishery measures for FY 2015, and noted that estimated

discards of this stock from the scallop fleet may be similar in FY 2015 compared to FY 2013. As a result, the PDT recommends increasing the state sub-component to 5% of the ABC (from 2%).

6. Witch flounder: State waters catch exceeded the sub-component value in FY 2013; however, the “overage” was small, only 4 mt. As a result, the PDT recommends no change to the state sub-component.
7. GOM winter flounder:
 - a. State waters catch has fluctuated around 60-70 mt since FY 2010, although FY 2011 catches were slightly above 100 mt. However, in general, recent catches are well below the current state sub-component value of 272 mt. During the development of FW 50, the PDT discussed reducing the state sub-component because catches had typically been well below the sub-component value. However, at the time, the PDT recommended that no changes be made until it was more clear what management measures the states would implement. Now that data is available for two additional fishing years, the PDT noted that there is no reason to expect that states would liberalize measures for this stock, and expects that state waters catch in FY 2015 will be similar to recent years. As a result, the PDT recommends reducing the state sub-component to 17% of the ABC (from 25%).
 - b. Other sub-component catch has been less than 10 mt since FY 2012. The PDT noted that FY 2015 catch from this component is not expected to differ dramatically from recent years. The PDT also noted that if the other sub-component catch in FY 2015 was similar to recent years, it would be much less than the sub-component value, even when considering the expected reduction in the total ACL. As a result, the PDT recommends reducing the other sub-component to 2% of the ABC (from 5%).
8. SNE/MA winter flounder:
 - a. State waters catch has been below 60 mt since FY 2011, which is well below the current state sub-component value of 235 mt. The PDT noted that based on initial ASMFC discussions, the state waters trip limit is not expected to change, and FY 2015 state waters catch is expected to be similar to recent years. As a result, the PDT recommends reducing the state sub-component to 7% of the ABC (from 14%).
 - b. Other sub-component catch increased by approximately 30 mt in FY 2013 compared to FY 2012, primarily due to a slight increase in estimated discards from the scallop fishery. This increase is not surprising considering scallop management measures in FY 2013. The PDT noted that scallop effort could increase in the SNE/MA winter flounder stock area in FY 2015 due to an increase in access area trips compared to previous years. The other biggest contributor to the other sub-component catch in FY 2013 was landings that occurred on scientific research trips operating under a Letter of Acknowledgement (LOA). Research landings in FY 2013 were approximately 20 mt, which is a large increase from recent years. In FY 2013, there was an ongoing SNE/MA winter

flounder gear project that presumably contributed to most of these landings, but the PDT noted that it is difficult to predict landings that may occur under LOAs in future years. The PDT recommends increasing the other sub-component to 11% of the ABC (from 10%).

9. Pollock:

- a. The FY 2013 state waters catch exceeded the sub-component by approximately 45 mt. In addition, the PDT noted that FY 2013 state waters catch increased by approximately 400 mt compared to FY 2012, largely due to an increase in recreational discards. The PDT discussed whether state waters catch may increase in FY 2015 compared to FY 2013, but there was no clear indication that this would occur. The PDT recommends no change to the state sub-component.
- b. Other sub-component catch increased slightly in FY 2013 compared to FY 2012, and was approximately 40 mt over the sub-component value. Similar to the discussion on expected state waters catch, the PDT discussed whether the other sub-component catches would increase in FY 2015 compared to FY 2013. However, other sub-component catches have generally been below the sub-component value, and there is a slight increase in the ABC expected for FY 2015. As a result, the PDT recommends no change to the other sub-component.

10. Northern windowpane flounder: Other sub-component catches decreased by approximately 35 mt in FY 2013 compared to FY 2012, primarily due to a decrease in the estimated discards from the scallop fishery. Since FY 2010, the scallop fishery has made up over 90% of the total other sub-component catches. The PDT discussed potential FY 2015 scallop management measures, and noted that scallop fishery effort on GB would likely be similar in FY 2015 to FY 2013 and that discards from the scallop fishery are also expected to be similar. However, FW 53 is considering an alternative that would allocate a sub-ACL to the scallop fishery. If the Council selects this alternative as preferred, the PDT recommends reducing the other sub-component to 1% of the ABC (from 29%). If the Council does not select the scallop fishery sub-ACL as the preferred alternative, the PDT recommends no changes to the other sub-component.

11. Ocean pout: Other sub-component catch exceeded the sub-component value in FY 2013, but only by 3 mt. However, the PDT noted that this small “overage” is approximately 3% of the total catch of ocean pout. Other sub-component catches have typically been greater than 25 mt, and the sub-component value has frequently been exceeded in recent years. As a result, the PDT recommends increasing the other sub-component to 10% of the ABC (from 9%).

12. Halibut:

- a. State waters catch has generally been well below the state sub-component value, which has fluctuated around 35-40 mt since FY 2010. Although there are reports that the stock is increasing, the PDT noted that there was no reason to expect state waters catch to change dramatically in FY 2015 compared to recent years. As a result, the PDT recommends decreasing the state sub-component to 30% of the ABC (from 40%).

- b. Other sub-component catch has typically been below the sub-component value since FY 2010; however, the PDT noted that the sub-component is small (less than 5 mt). Although there are reports that the stock is increasing, the PDT could not point to any reason that FY 2015 catches would differ dramatically compared to recent years. As a result, the PDT recommends decreasing the other sub-component to 3% of the ABC (from 5%).
- 13. Wolffish: The other sub-component catches exceeded the sub-component value in FY 2013, but only be 0.3 mt. As a result, the PDT recommends no change to the other sub-component.

Table 4- Summary of ABC Distribution to State and Other sub-Components (as percent of ABC)

Stock	State sub-Component					Other sub-Component				
	FW 44 (FY10-11)	FW 47 (FY 12)	FW 50 (FY13-14)	FW51 (FY14)	FW53 (FY15-17)	FW 44 (FY10-11)	FW 47 (FY 12)	FW 50 (FY13-14)	FW51 (FY14)	FW53 (FY15-17)
GB cod	1%	1%	1%	1%	1%	4%	4%	4%	4%	4%
GOM cod	10%	10%	10%	10%	10%	5%	5%	5%	5%	5%
GB Haddock	1%	1%	1%	1%	1%	4%	4%	4%	4%	4%
GOM Haddock	1%	2%	2%	2%	1%	4%	3%	3%	3%	2%
GB Yellowtail Flounder	0%	0%	0%	0%	0%	5%	4%	4%	2%	1%
SNE/MA Yellowtail Flounder	1%	1%	1%	1%	2%	4%	4%	4%	4%	4%
CC/GOM Yellowtail Flounder	1%	3%	6%	6%	7%	4%	2%	2%	2%	5%
Plaice	1%	1%	2%	2%	2%	4%	4%	2%	2%	2%
Witch Flounder	1%	3%	3%	3%	3%	4%	4%	15%	15%	15%
GB Winter Flounder	0%	0%	0%	0%	0%	5%	5%	3%	3%	3%
GOM Winter Flounder	25%	25%	25%	25%	17%	5%	5%	5%	5%	2%
SNE/MA Winter Flounder	8%	28%	14%	14%	7%	5%	20%	10%	10%	11%
Redfish	1%	1%	1%	1%	1%	4%	4%	2%	2%	2%
White Hake	1%	2%	1%	1%	1%	4%	3%	2%	2%	2%
Pollock	6%	5%	6%	6%	6%	6%	9%	7%	7%	7%
Northern Windowpane	1%	1%	1%	1%	1%	29%	19%	29%	29%	1%-29%
Southern Windowpane	1%	10%	10%	10%	10%	29%	70%	34%	34%	34%
Ocean Pout	1%	1%	1%	1%	1%	4%	9%	9%	9%	10%
Halibut	50%	50%	40%	40%	30%	5%	5%	5%	5%	3%
Wolffish	1%	1%	1%	1%	1%	4%	4%	4%	4%	4%

Note: Highlighted cells indicate changes from the previous specifications (RED = increase to sub-component percentage; GREEN = decrease to sub-component percentage).

Sections 4.1.3 and 4.1.4: SNE/MA and GOM/GB Windowpane Flounder Groundfish sub-ACLs for sector and common pool

The PDT examined recent catch information of both SNE/MA and GOM/GB windowpane flounder by sector and common pool components of the groundfish fishery and included this information in the draft alternatives. The PDT notes both windowpane flounder stocks are not allocated, and that fleet specific (sector and common pool) catches are extrapolated from observed trips, since both windowpane flounder stock are not retained and landed.

The PDT reviewed catch data from final year-end results from FY 2010-FY 2013. For northern windowpane flounder, common pool catches are less than 1% of groundfish fishery-wide catches in recent years. For southern windowpane flounder, common pool catches range from 10% to 28% of groundfish fishery-wide catches.

The PDT discussed how to calculate the split between sectors and the common pool. The PDT raised concerns with a fixed percentage approach, since the decision to join sectors or remain in the common pool (i.e., how to use PSC) varies from year to year, and fishing activity by these fleets may change based on sector enrollment. A percentage based approach is currently marked “placeholder” in the draft alternatives. Since the alternative lacks sufficient details to analyze, the PDT did not complete impacts analysis.

The Council did not provide explicit guidance on whether or not it intended to create separate AMs for sectors and the common-pool. Splitting the ACL does not necessarily make groundfish sectors and the common pool accountable for their own catches of SNE/MA and GOM/GB windowpane flounder, because it does not change the AM. The AM is triggered for all commercial groundfish vessels (common pool and sectors) if the groundfish sub-ACL is exceeded and the total ACL is also exceeded by the greater than the management uncertainty buffer.

PDT recommendation: That the Committee further develop these alternatives, including their intent and any associated AMs, or potentially, move this section to “Considered but Rejected”.

Section 4.2.1: GOM Cod Inshore Spawning Area Closures

At its September/October meeting, the Council tasked the PDT with evaluating the biological impacts of spawning closures options for GOM cod in FW 53. These options were identified at the Council meeting and the PDT requested that it work with the Committee after the Council meeting to further evaluate the efficacy of those time/areas for protecting spawning GOM cod. The options in FW 53 include 30 minute blocks that would be closed for specific months throughout the year to protect spawning cod. The PDT evaluated several independent data sources and methods to examine the time-area blocks with high concentrations of spawning cod.

Multiple data sources identify the same month-blocks as being important to spawning cod in the GOM (Table 5; Appendix 2). These multiple, often independent data sets can be used to evaluate areas with respect to spawning at the scale of the 30-min month-block. The month-blocks identified in Sub-Option A and Sub-Option B are overly conservative in some areas for March and provide inadequate coverage in other spawning areas (i.e., Alt A: Nov-Feb, June, July; Alt B: all months) and therefore in their current configuration are inadequate to protect spawning cod. An alternative Sub-Option C should be considered that will more fully protect

block-months of spawning cod indicated by these analyses and also allowing fishing in block-months that do not have aggregations of spawning cod.

Table 5- Summary of time/areas for winter and spring GOM cod spawning closure based on multiple sources of information.

Source	Winter months (Nov-Feb)	Spring months (April-July)
Spawner CPUE Skewed sex ratios	124, 125, 132, 133	
Egg surveys Acoustic telemetry Passive acoustic monitoring		124,125,132,133,139,140

The biological impacts analyses suggest that additional 30 minute blocks are needed and should be considered to protect spawning cod, because research has shown that in order for spawning closures to be effective that they need to be relatively large to insure that fishing activity does not disrupt courtship and spawning behavior which will ultimately determine spawning success.

The PDT suggested option should provide the needed protection for both remaining spawning components (winter and spring) for the GOM cod stock. The PDT recommends this option to ensure that the low SSB of this stock has the opportunity for successful spawning events which is essential to prevent failures in future year classes through recruitment success. Spawning success from a low stock biomass does have the potential for rapid stock rebuilding. However further declines in SSB and disruption of spawning behavior will further reduce the probability of rebuilding an important future cod resource.

After a detailed examination of data on GOM cod spawning with respect to the biological impacts of cod spawning closure Sub-Option A and Sub-Option B, the PDT recommends that the Committee add an additional alternative for consideration as “Sub-Option C” in Section 4.2.1 (Figure 1):

Sub-Option C: This would include 30 minute blocks in April- July (124, 125, 132, 133, 139, and 140) and November- February (124, 125, 132 and 133).

Based on the information examined and compared to the other sub-options, the PDT notes that our recommendation does not include closures in March, August, September, or October or the entire Western Gulf of Maine Closure (i.e., only that portion overlapping the specified 30-minute blocks/months) for cod spawning.

PDT recommendation: The PDT recommends that the Committee add an additional alternative for consideration as “Sub-Option C” in Section 4.2.1 (GOM cod spawning closures), that would include 30 minute blocks in April- July (124, 125, 132, 133, 139, and 140) and November- February (124, 125, 132 and 133).

4.2.2 Prohibition on the Possession of GOM cod

The prohibition on the possession of GOM cod is likely to have differing effects for recreational and commercial fisheries (Appendix 3). The PDT remains concerned about the potential loss of

information on GOM cod (i.e., collection of biological samples from landed fish) and zero possession increases uncertainty of catch estimates. The general lack of biological data and increases in the discards will result in higher uncertainty with the removals which will degrade the stock assessment and knowledge with regards to potential changes in future stock status. No possession will likely further increase the concerns with observer effects and unaccounted for mortality. A no possession measure would force the entire commercial catch to be estimated through the discard estimation method. The potential of unlucky high cod catch on an observed tow will have larger implications on the discard estimates for all members of a sector. One large observed tow could have the potential of a sector ACE overage and shutdown. In addition, previous work on the discard monitoring showed that trimming of large tows from the estimator will result in a large bias in the discard estimate (<http://nefsc.noaa.gov/groundfish/discard/>). The discard estimation methodology review did not recommend omitting observed large or low discard tow information from the data stream in the discard estimator when monitoring the discards. The PDT also discussed potential enforcement concerns on discarding GOM cod in commercial and recreational fisheries.

4.2.3 Observer Requirements in the Gulf of Maine

The PDT reiterates its concerns that prohibiting certain fishing activity unless there is an observer onboard would likely create a bias in the discard estimates. Requiring observer coverage for a portion of fleet based on behavior criteria deviates from the current observer sampling design, which is a random stratified design. The requirement of a non-representative sample may induce bias into the estimates of discards. The direction and magnitude of the bias is unknown. This measure could potentially result in erroneous higher or lower discard being monitored for some stocks.

In addition, the existing observer program is resource-limited (i.e., a new program may create additional observer costs beyond the cost of the observer including shore-side data processing. The PDT also recognizes that observers should not be used for enforcement.

4.2.4 Rollover of Groundfish Specifications

The PDT examined four options for groundfish specifications rollover: No Action (0%), 35% Rollover, 20% Rollover, and 10% Rollover. The PDT also summarized how the options compare on a stock by stock basis between past fishing years FY 2012 and FY 2013 (Table 6), FY 2013 and FY 2014 (Table 7), and FY 2014 and FY 2015 (Table 8) had they already been in place. Rollover values (as a % of the prior year's ACL) that are highlighted and in red, exceed the ABC for that stock in the upcoming fishing year.

Table 6- Rollover comparison of ACLs and ABCs for FY 2012 – FY 2013.

FY2012-FY2013 Comparison										
Stock	Total ACL 2012	35% Rollover of 2012 Total ACL	30% Rollover of 2012 Total ACL	25% Rollover of 2012 Total ACL	20% Rollover of 2012 Total ACL	15% Rollover of 2012 Total ACL	10% Rollover of 2012 Total ACL	Total U.S. ABC 2013	Total ACL 2013	% Change in ACL: 2012 to 2013
GB cod	4,861	1,701	1,458	1,215	972	729	486	2,002	1,907	-61%
GOM cod	6,700	2,345	2,010	1,675	1,340	1,005	670	1,550	1,470	-78%
GB Haddock	29,260	10,241	8,778	7,315	5,852	4,389	2,926	29,335	27,936	-5%
GOM Haddock	958	335	287	240	192	144	96	290	274	-71%
GB Yellowtail Flounder	547.8	192	164	137	110	82	55	215	208.5	-62%
SNE Yellowtail Flounder	936	328	281	234	187	140	94	700	665	-29%
CC/GOM Yellowtail Flounder	1,104	386	331	276	221	166	110	548	523	-53%
Plaice	3,459	1,211	1,038	865	692	519	346	1,557	1,482	-57%
Witch Flounder	1,563	547	469	391	313	234	156	783	751	-52%
GB Winter Flounder	3,575	1,251	1,073	894	715	536	358	3,750	3,641	2%
GOM Winter Flounder	1,040	364	312	260	208	156	104	1,078	1,040	0%
SNE/MA Winter Flounder	603	211	181	151	121	90	60	1,676	1,612	167%
Redfish	8,786	3,075	2,636	2,197	1,757	1,318	879	10,995	10,462	19%
White Hake	3,465	1,213	1,040	866	693	520	347	4,177	3,974	15%
Pollock	14,736	5,158	4,421	3,684	2,947	2,210	1,474	15,600	14,921	1%
Northern Windowpane	163	57	49	41	33	24	16	151	144	-12%
Southern Windowpane	381	133	114	95	76	57	38	548	527	38%
Ocean Pout	240	84	72	60	48	36	24	235	220	-8%
Halibut	83	29	25	21	17	12	8	99	96	16%
Wolffish	77	27	23	19	15	12	8	70	65	-15%

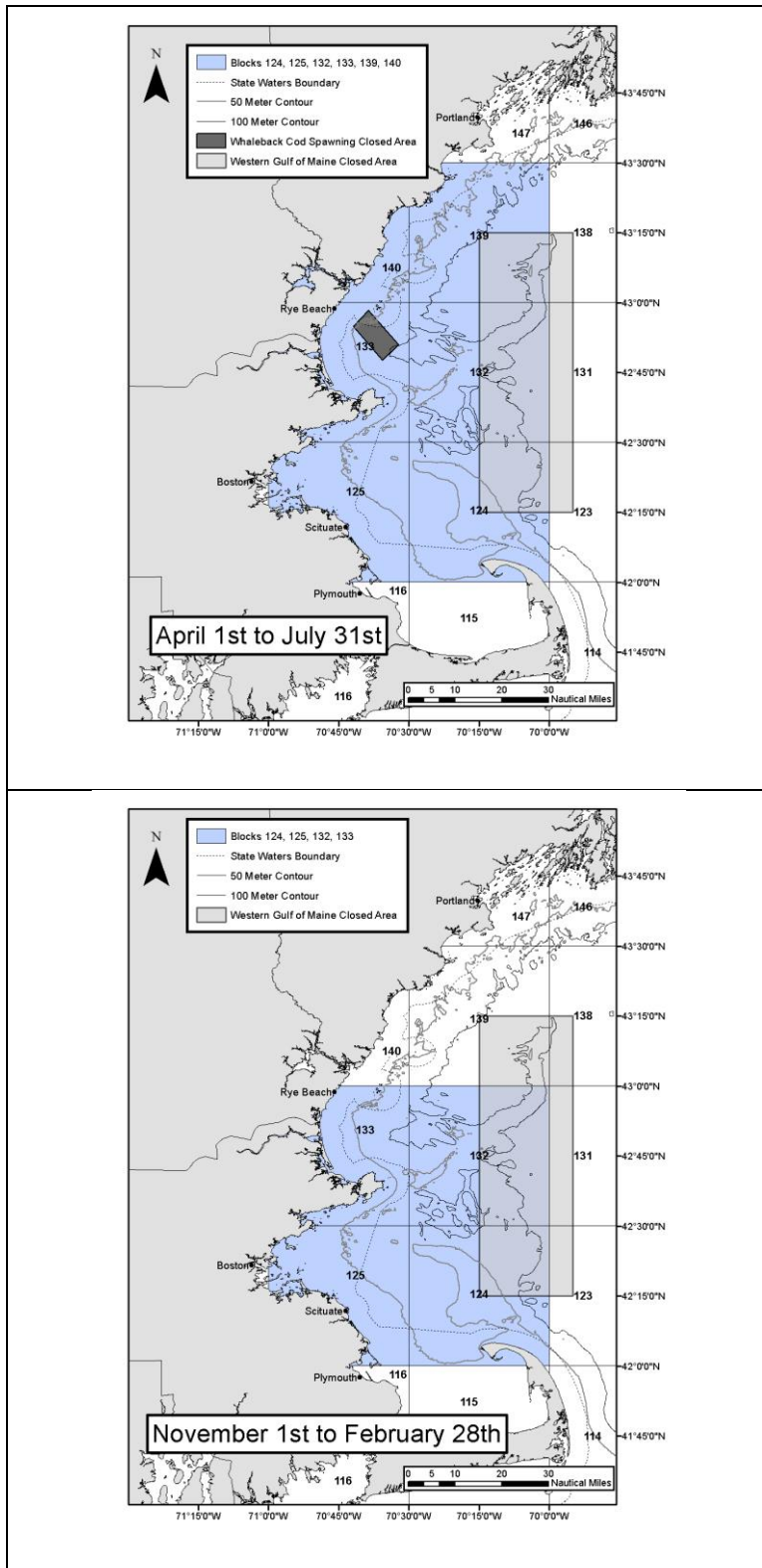
Table 7- Rollover comparison of ACLs and ABCs for FY 2013 – FY 2014.

FY2013-FY2014 Comparison										
Stock	Total ACL 2013	35% Rollover of 2013 Total ACL	30% Rollover of 2013 Total ACL	25% Rollover of 2013 Total ACL	20% Rollover of 2013 Total ACL	15% Rollover of 2013 Total ACL	10% Rollover of 2013 Total ACL	Total U.S. ABC 2014	Total ACL 2014	% Change in ACL: 2013 to 2014
GB cod	1,907	667	572	477	381	286	191	1,960	1,867	-2%
GOM cod	1,470	515	441	368	294	221	147	1,550	1,470	0%
GB Haddock	27,936	9,778	8,381	6,984	5,587	4,190	2,794	19,229	18,312	-34%
GOM Haddock	274	96	82	69	55	41	27	341	323	18%
GB Yellowtail Flounder	208.5	73	63	52	42	31	21	328	318	53%
SNE Yellowtail Flounder	665	233	200	166	133	100	67	700	665	0%
CC/GOM Yellowtail Flounder	523	183	157	131	105	78	52	548	523	0%
Plaice	1,482	519	445	371	296	222	148	1,515	1,442	-3%
Witch Flounder	751	263	225	188	150	113	75	783	751	0%
GB Winter Flounder	3,641	1,274	1,092	910	728	546	364	3,598	3,493	-4%
GOM Winter Flounder	1,040	364	312	260	208	156	104	1,078	1,040	0%
SNE/MA Winter Flounder	1,612	564	484	403	322	242	161	1,676	1,612	0%
Redfish	10,462	3,662	3,139	2,615	2,092	1,569	1,046	11,465	10,909	4%
White Hake	3,974	1,391	1,192	994	795	596	397	4,642	4,417	11%
Pollock	14,921	5,222	4,476	3,730	2,984	2,238	1,492	16,000	15,304	3%
Northern Windowpane	144	50	43	36	29	22	14	151	144	0%
Southern Windowpane	527	184	158	132	105	79	53	548	527	0%
Ocean Pout	220	77	66	55	44	33	22	235	220	0%
Halibut	96	34	29	24	19	14	10	109	106	10%
Wolffish	65	23	20	16	13	10	7	70	65	-1%

Table 8- Rollover comparison of ACLs and ABCs for FY 2013 – FY 2014.

FY2014-FY2015 (Option 2) Comparison										
Stock	Total ACL 2014	35% Rollover of 2014 Total ACL	30% Rollover of 2014 Total ACL	25% Rollover of 2014 Total ACL	20% Rollover of 2014 Total ACL	15% Rollover of 2014 Total ACL	10% Rollover of 2014 Total ACL	Option 2: Total U.S. ABC 2015	Option 2: Total ACL 2015	% Change in ACL: 2014 to 2015
GB cod	1,867	653	560	467	373	280	187	1,980	1,886	1%
GOM cod	1,470	515	441	368	294	221	147	386	366	-75%
GB Haddock	18,312	6,409	5,494	4,578	3,662	2,747	1,831	24,366	23,204	27%
GOM Haddock	323	113	97	81	65	48	32	1,454	1,375	326%
GB Yellowtail Flounder	318	111	95	80	64	48	32	248	240	-25%
SNE Yellowtail Flounder	665	233	200	166	133	100	67	700	666	0%
CC/GOM Yellowtail Flounder	523	183	157	131	105	78	52	548	524	0%
Plaice	1,442	505	433	361	288	216	144	1,544	1470	2%
Witch Flounder	751	263	225	188	150	113	75	783	751	0%
GB Winter Flounder	3,493	1,223	1,048	873	699	524	349	2,124	1,952	-44%
GOM Winter Flounder	1,040	364	312	260	208	156	104	510	489	-53%
SNE/MA Winter Flounder	1,612	564	484	403	322	242	161	1,676	1,607	0%
Redfish	10,909	3,818	3,273	2,727	2,182	1,636	1,091	11,974	11,393	4%
White Hake	4,417	1,546	1,325	1,104	883	663	442	4,713	4,484	2%
Pollock	15,304	5,356	4,591	3,826	3,061	2,296	1,530	16,600	15,878	4%
Northern Windowpane	144	50	43	36	29	22	14	151	144	0%
Southern Windowpane	527	184	158	132	105	79	53	548	527	0%
Ocean Pout	220	77	66	55	44	33	22	235	220	0%
Halibut	106	37	32	27	21	16	11	109	97	-8%
Wolfish	65	23	20	16	13	10	7	70	65	0%

Figure 1- PDT suggested additional alternative for consideration as “Sub-Option C” in Section 4.2.1: GOM Cod Spawning Closures. Areas as indicated as 30 minute blocks in April- July (top) and November- February (bottom).





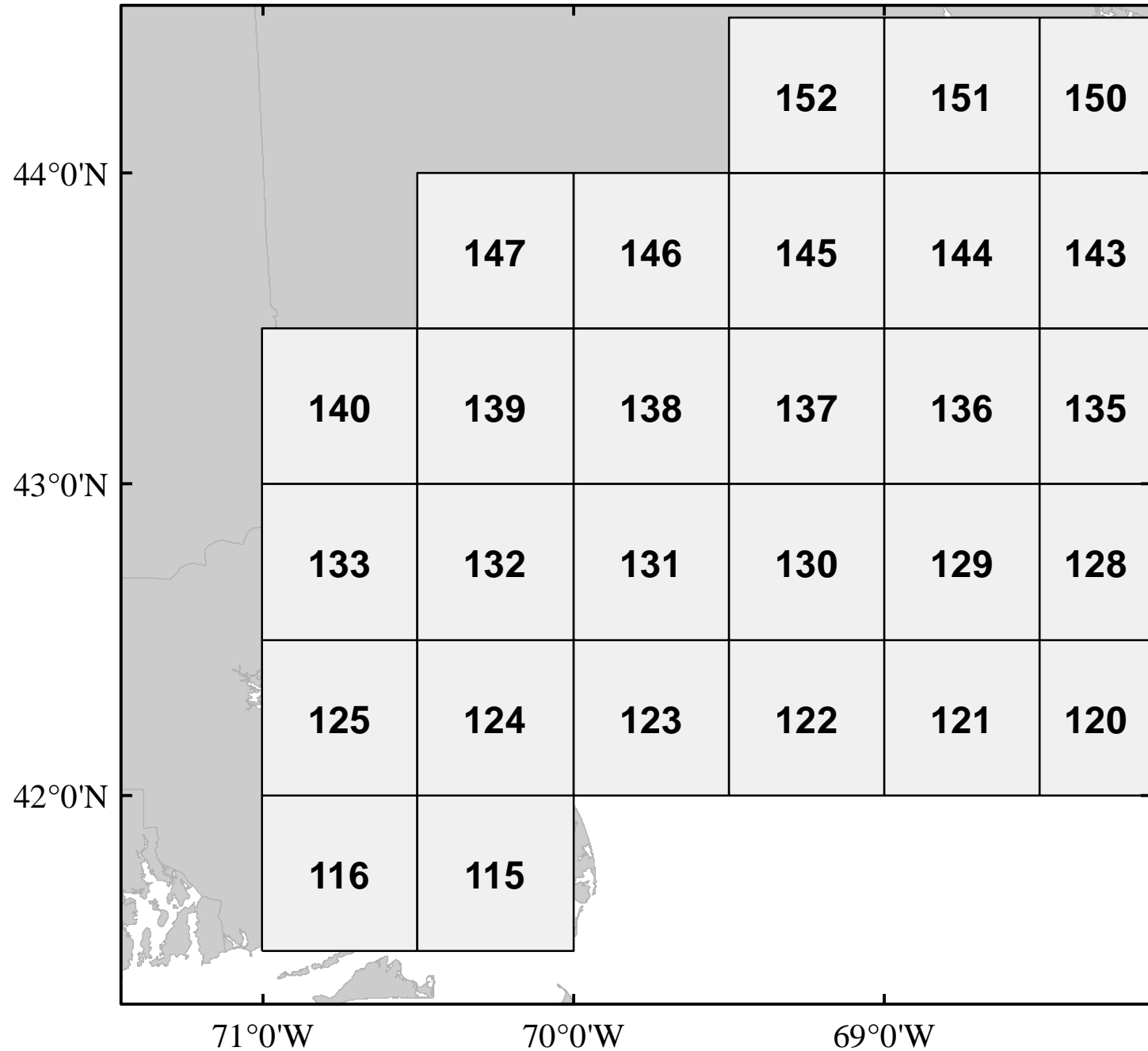
NOAA
FISHERIES

Evaluation of VTR landings of Gulf of Maine Atlantic cod

Michael Palmer

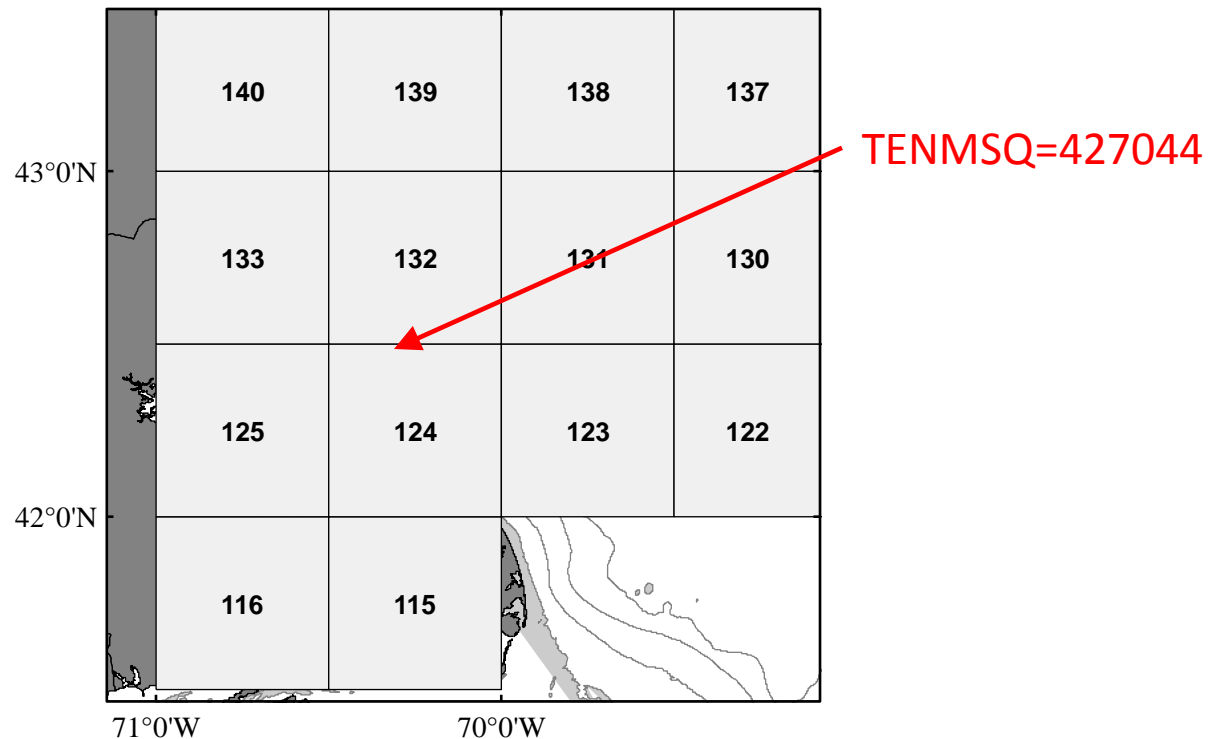
*Northeast Fisheries Science Center
National Marine Fisheries Service
166 Water St. Woods Hole, MA 02543*

30 minute closure blocks in the Gulf of Maine



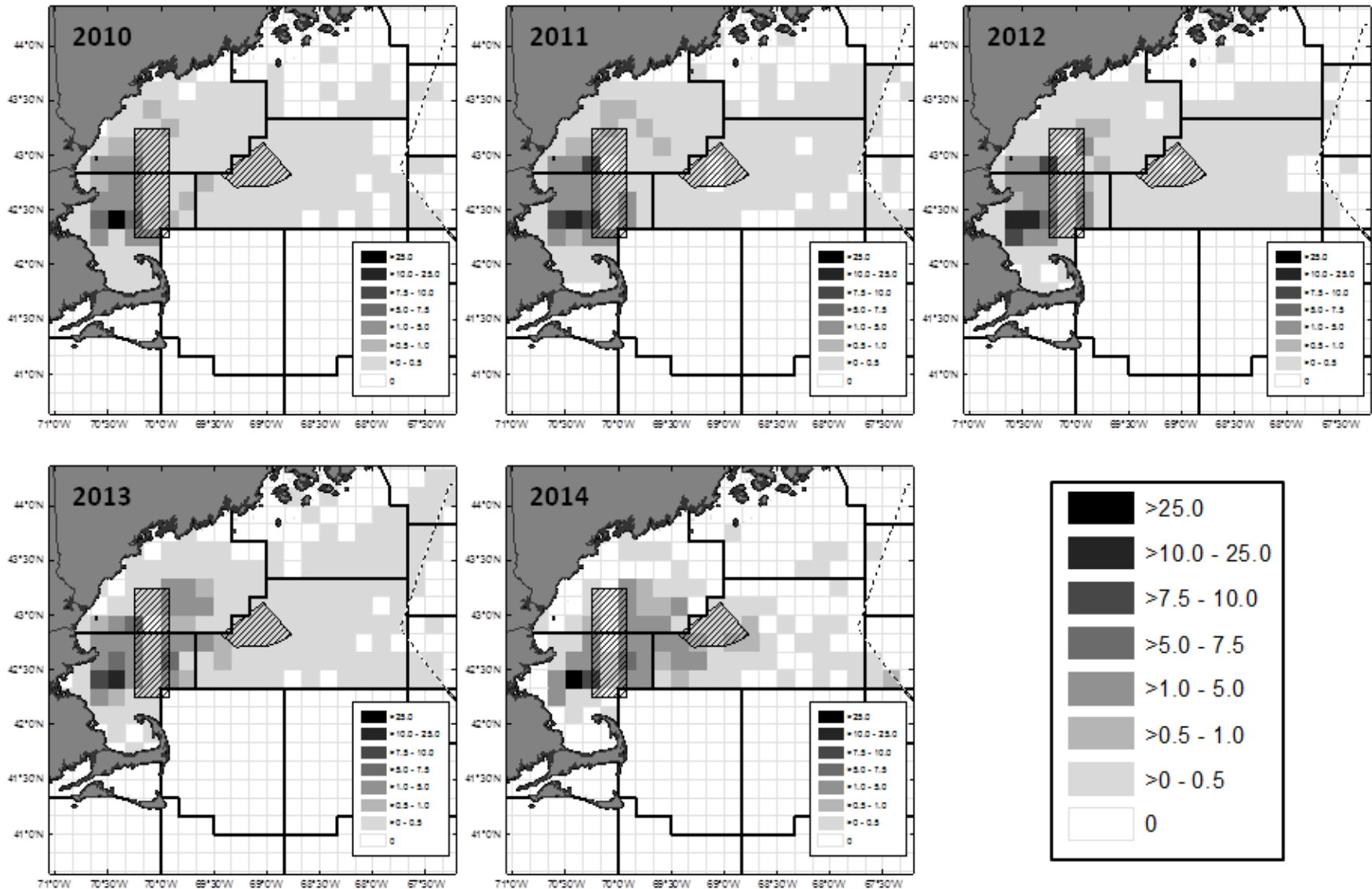
Justification for year-round closure of 30-min block 124

- 30-minute block 124 encompasses the entirety of Stellwagen Bank (geographic feature, not marine sanctuary boundaries)
- When sand lance are abundant, 30 minute block 124 can be a region of high cod abundance.
 - One 10 minute square (427044) in particular
 - Documented in Richardson et al. 2014 (CJFAS).



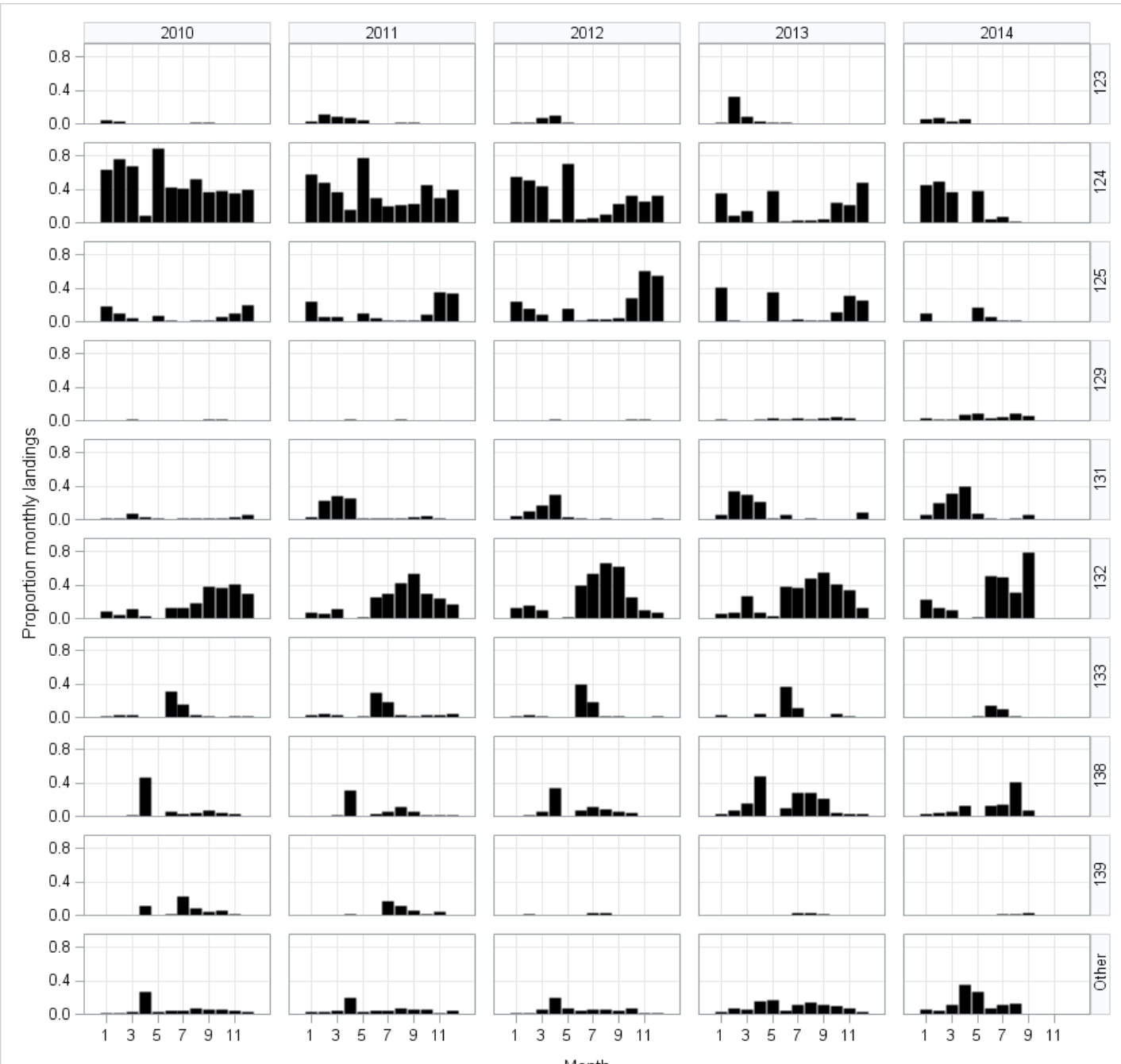
VTR landings: spatial patterns

- Annual percentage of Gulf of Maine cod landings by ten minutes square from 2010-2014*
 - *2014 is a partial year (this plot only contains data through July)



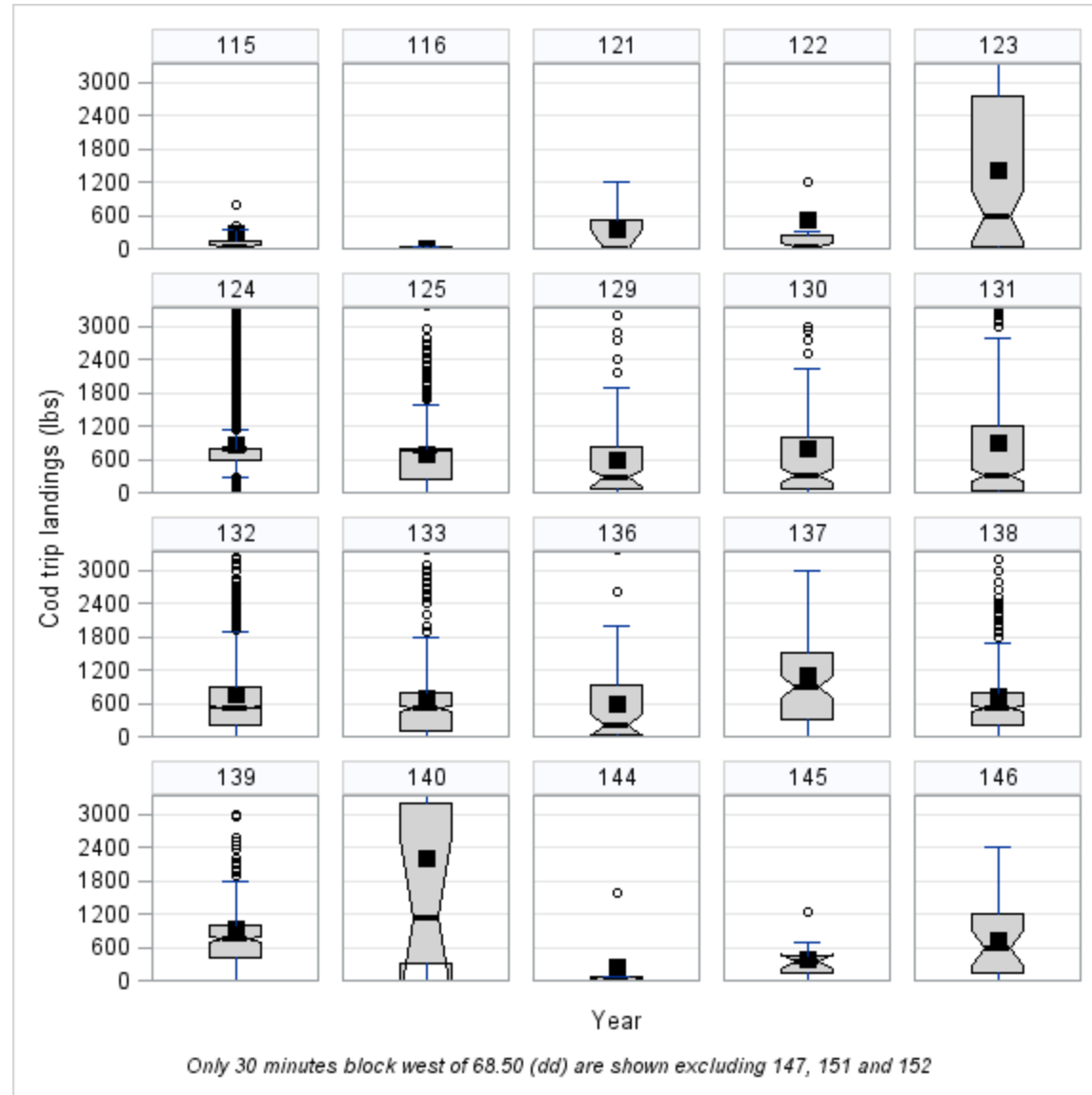
Fraction monthly landings

- Spatial shifts in
- cod landings over time.



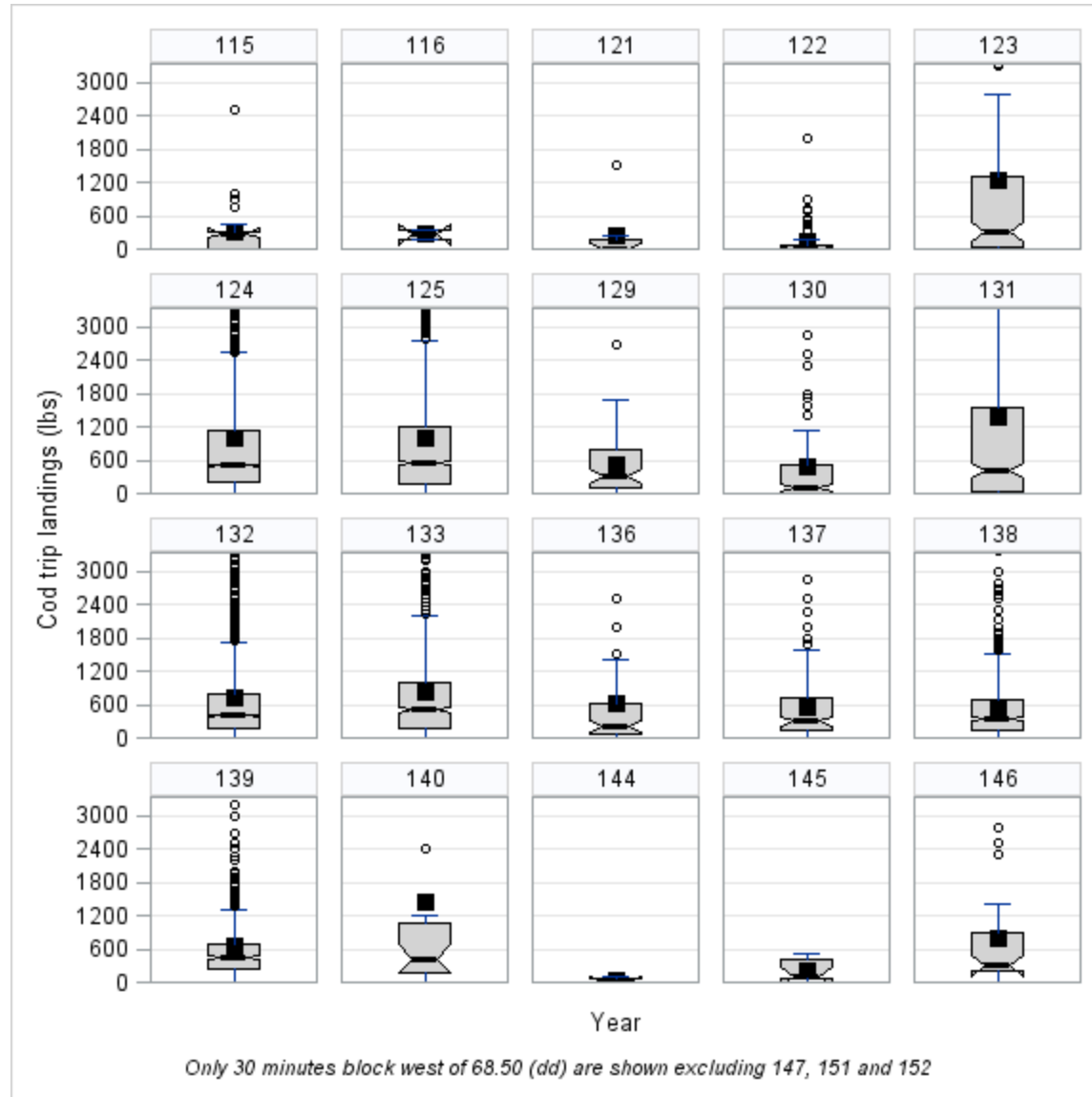
Distribution of trip landings by 30 minute block

- 2010.



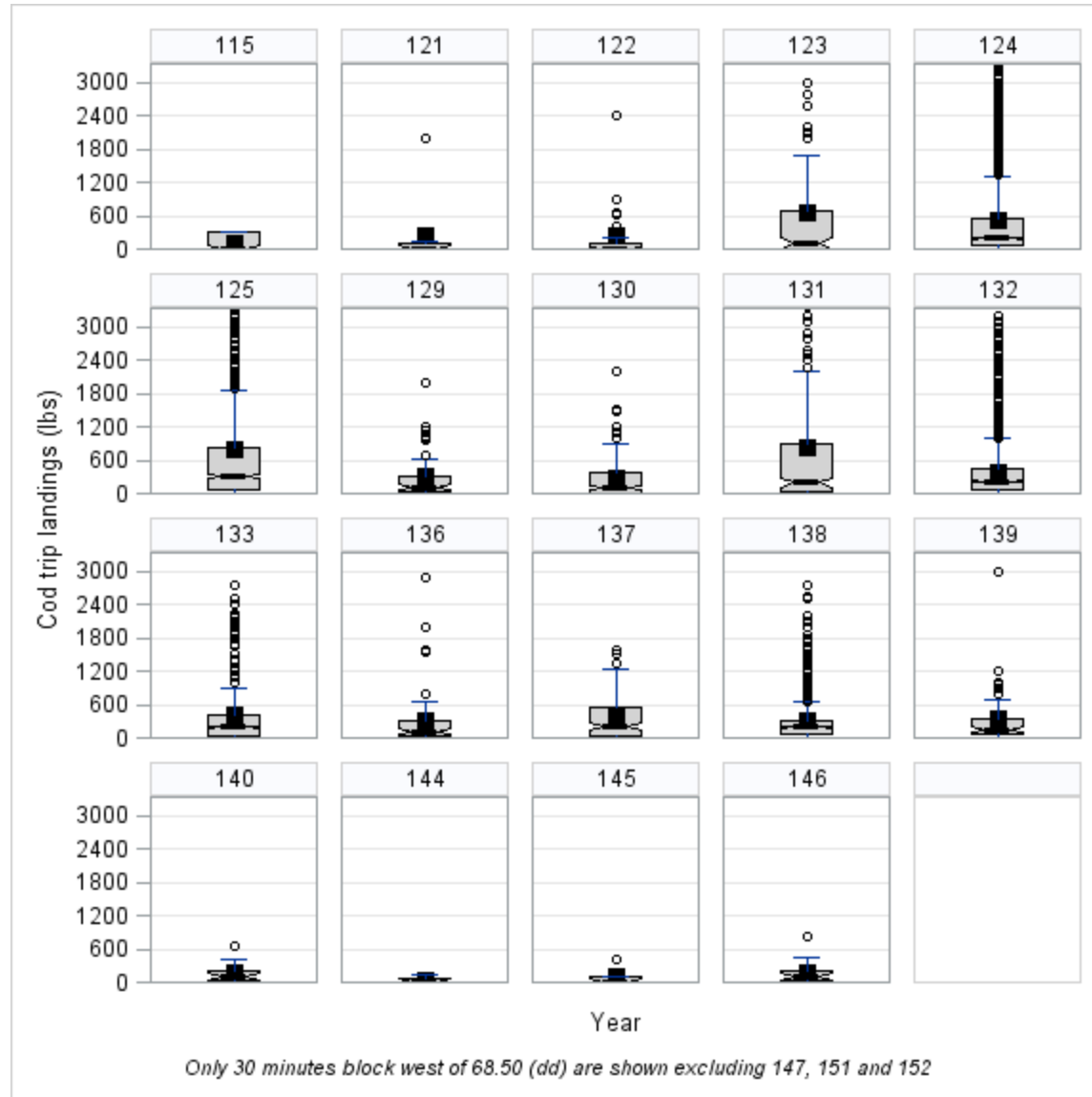
Distribution of trip landings by 30 minute block

- 2011.



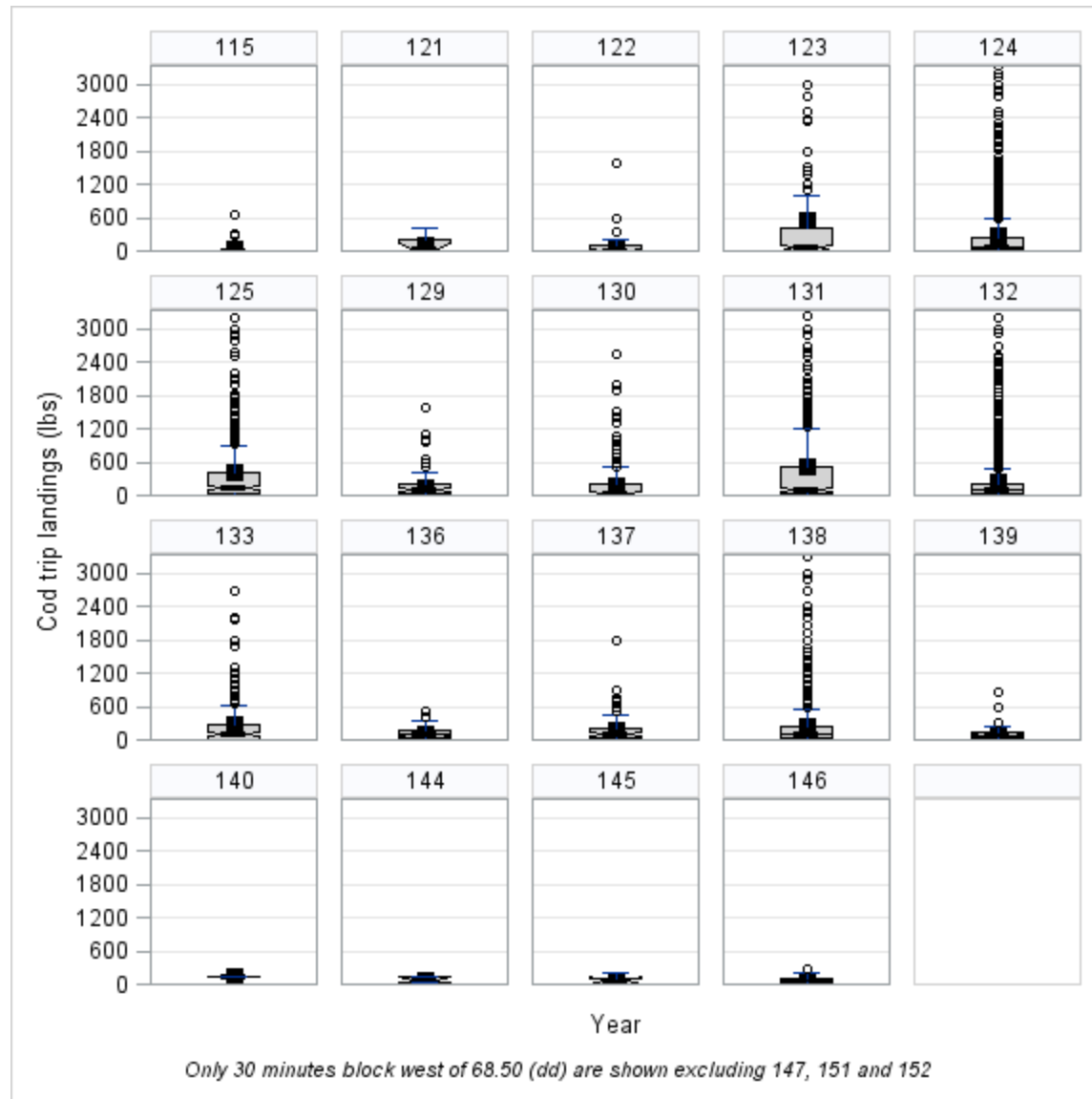
Distribution of trip landings by 30 minute block

- 2012.



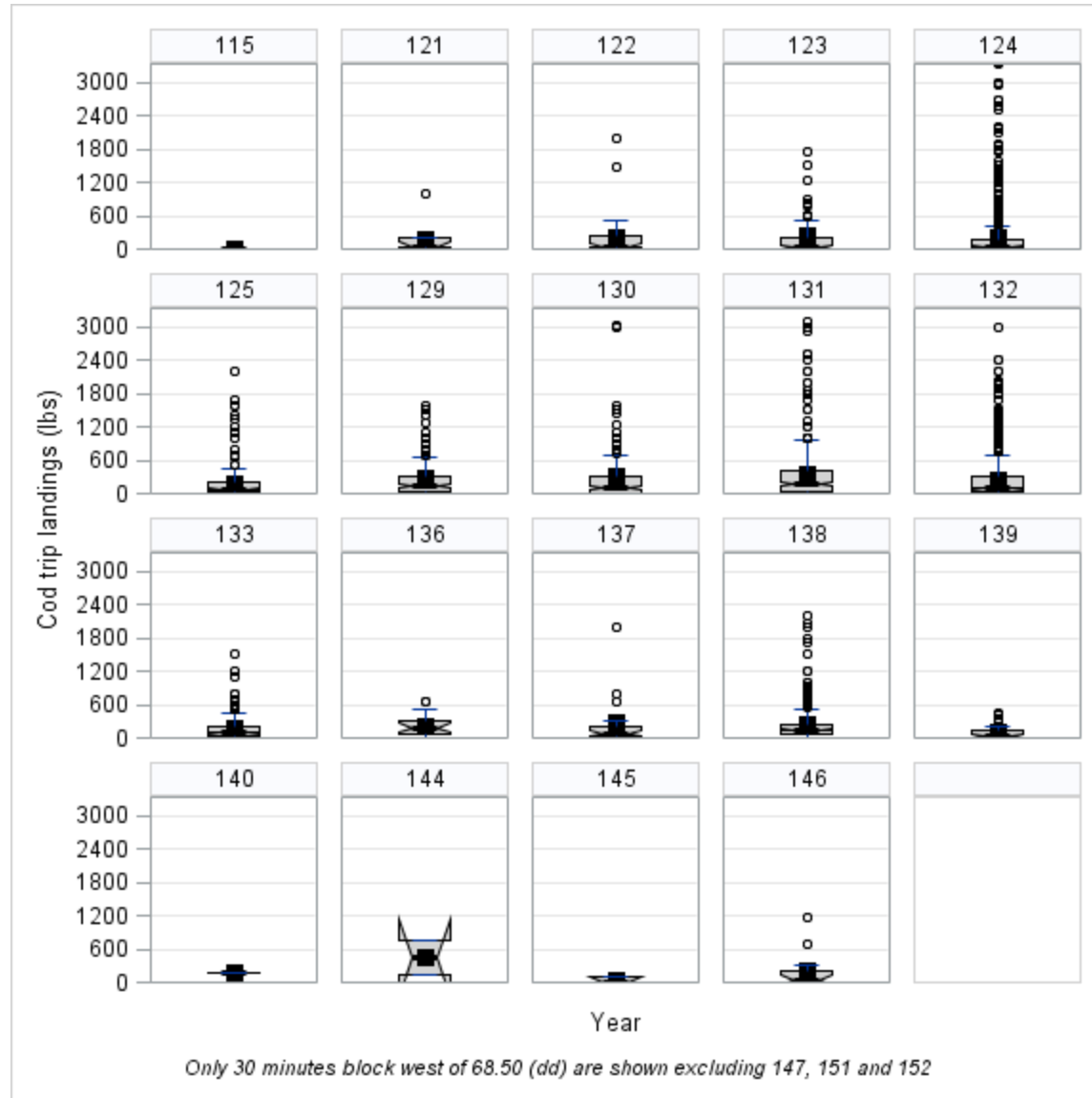
Distribution of trip landings by 30 minute block

- 2013.



Distribution of trip landings by 30 minute block

- 2014.



GOM Cod Spawning


Micah Dean & Steve Correia

MA Division of Marine Fisheries

Oct 2014

Data Sources

Most relevant
datasets



- Surveys

- Industry Based Survey for GOM Cod (Nov-May; 2003-2007)
- MARMAP Ichthyoplankton (Jan-Dec; 1977-1987)
- NEFSC Bottom Trawl (Oct/Nov & Apr/May; 1968-on)
- MADMF Bottom Trawl (Sep & May; 1978-on)

- Acoustic Telemetry

- Spawning season, behavior, fidelity of specific groups
 - Spring – Ipswich Bay & Mass Bay
 - Winter – Mass Bay

- Passive Acoustic Monitoring

- Spawning season of specific groups

Why COD IBS?

Industry-Based Survey for GOM Cod

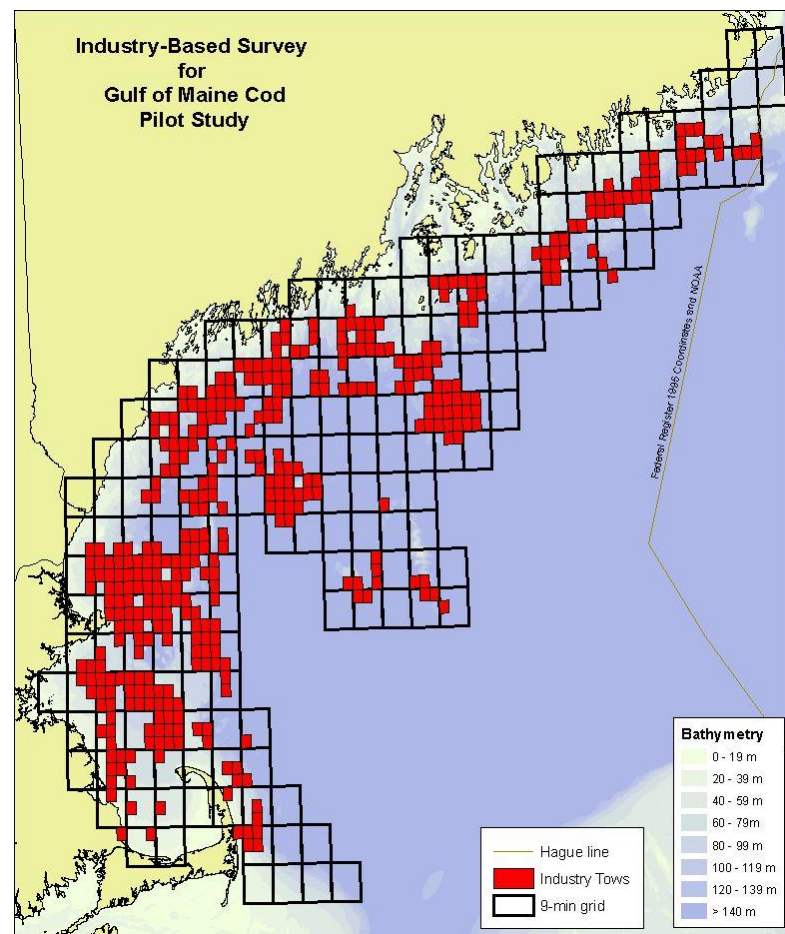
Survey Design

- Entire GOM <140m surveyed 5 times per year (Nov – May)

Cruise	Dates	Season
1	Nov 14 - Dec 31	Winter
2	Jan 1 - Feb 12	Winter
3	Feb 13 - Mar 17	Winter
4	Mar 18 - Apr 19	Spring
5	Apr 20 - May 31	Spring

- Tow Allocation per Cruise
 - Systematic grid (9-min) – 1 per cell (145 tow - 65%)
 - Random sample of 3-min cells identified by industry* as having high cod abundance (80 tows - 35%)
 - purpose: *collect data from entire area, but allocate more effort where cod are more abundant*
- 225 tows x 5 cruises = 1125 tows per year

Survey was specifically designed to describe the spatial and seasonal distribution of GOM cod



*High abundance areas were identified by industry prior to initiation of survey in 2003

Industry-Based Survey for GOM Cod

Biological Sampling

Study area, net design, sampling protocol were prioritized for cod



Large sample sizes

Cod lengths
~ 5000 / cruise
~ 25000 / year

Cod sex/maturity
~ 1400 / cruise
~ 7000 / year



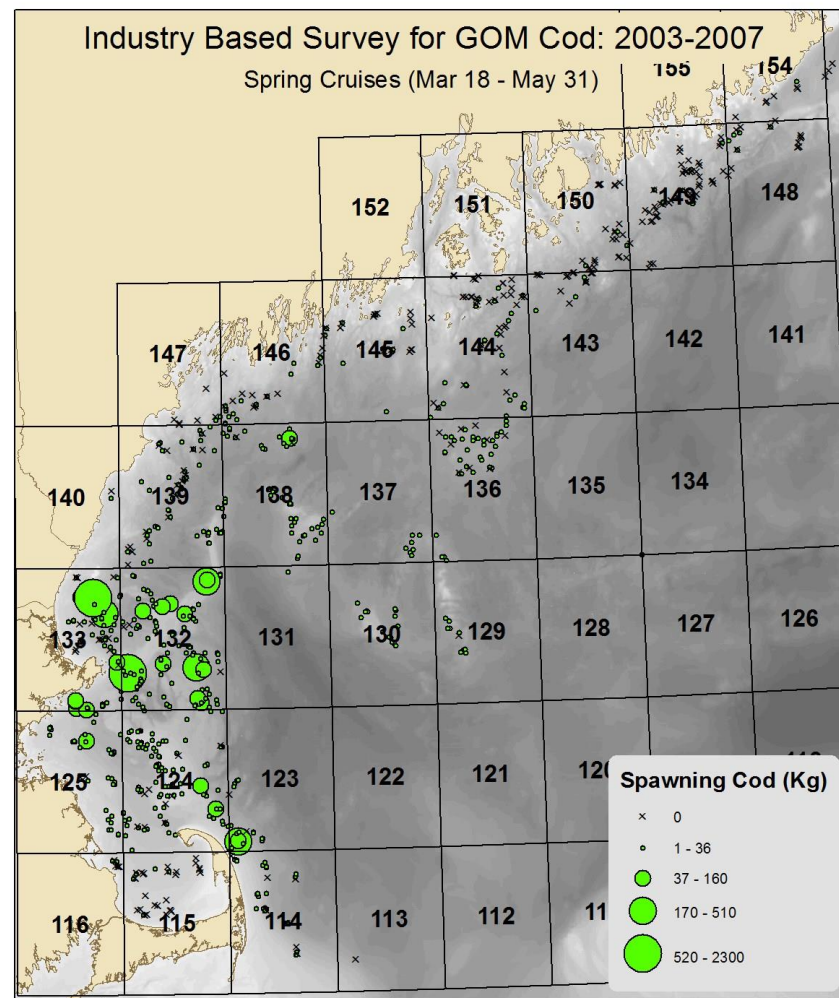
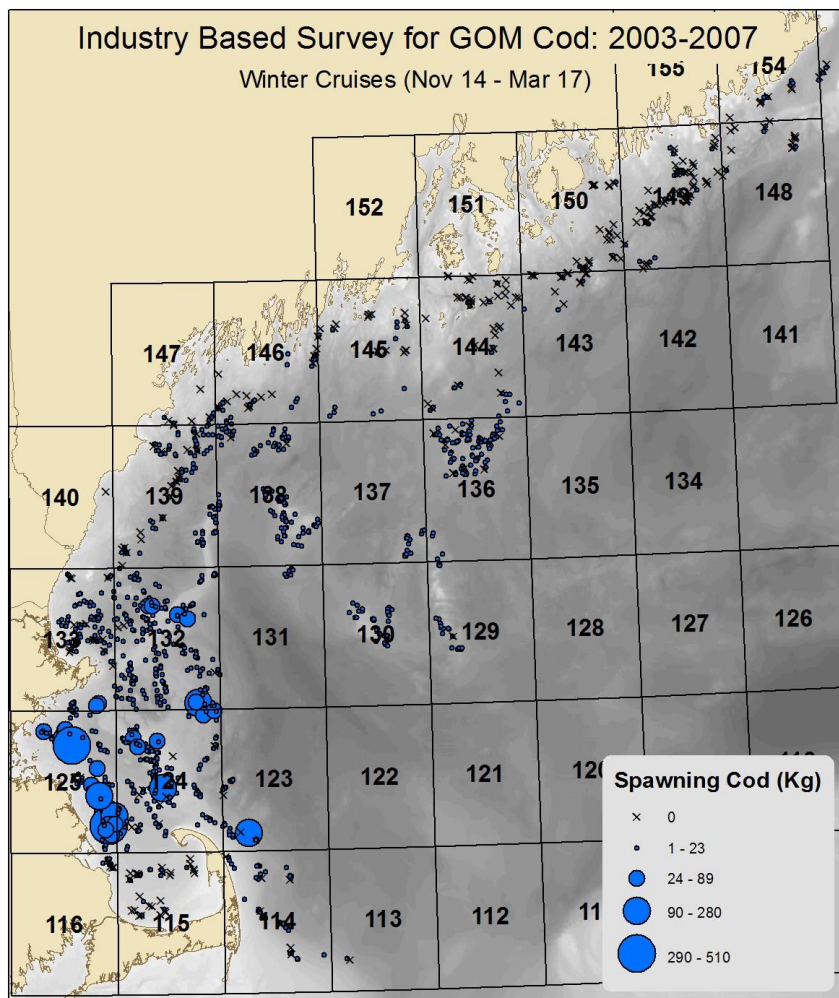
Number of cod sex/maturity observations far greater than other surveys

MATURITY OBSERVATIONS

(where do you find cod in spawning condition?)

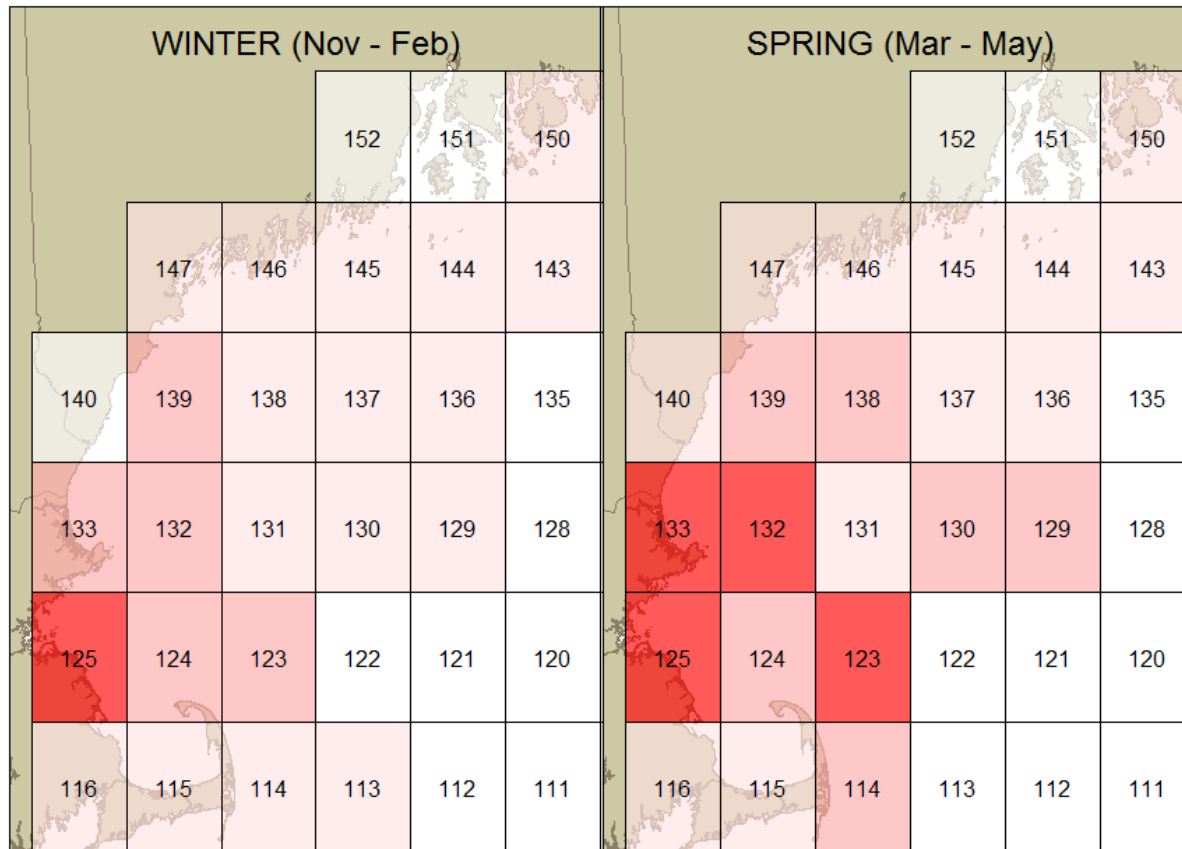
Cod IBS – Spawner CPUE

Kg/tow of ripe, ripe & running or spent cod

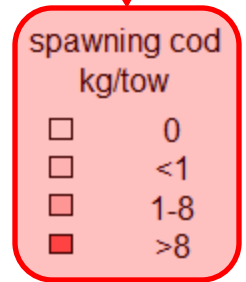


Cod IBS – Spawner CPUE

Mean CPUE of spawning cod by block and season



Arbitrarily chosen class breaks. There were clear groups of trace (<1) and high (>8) values. The remaining non-zero blocks fall in the mid-range (1-8)

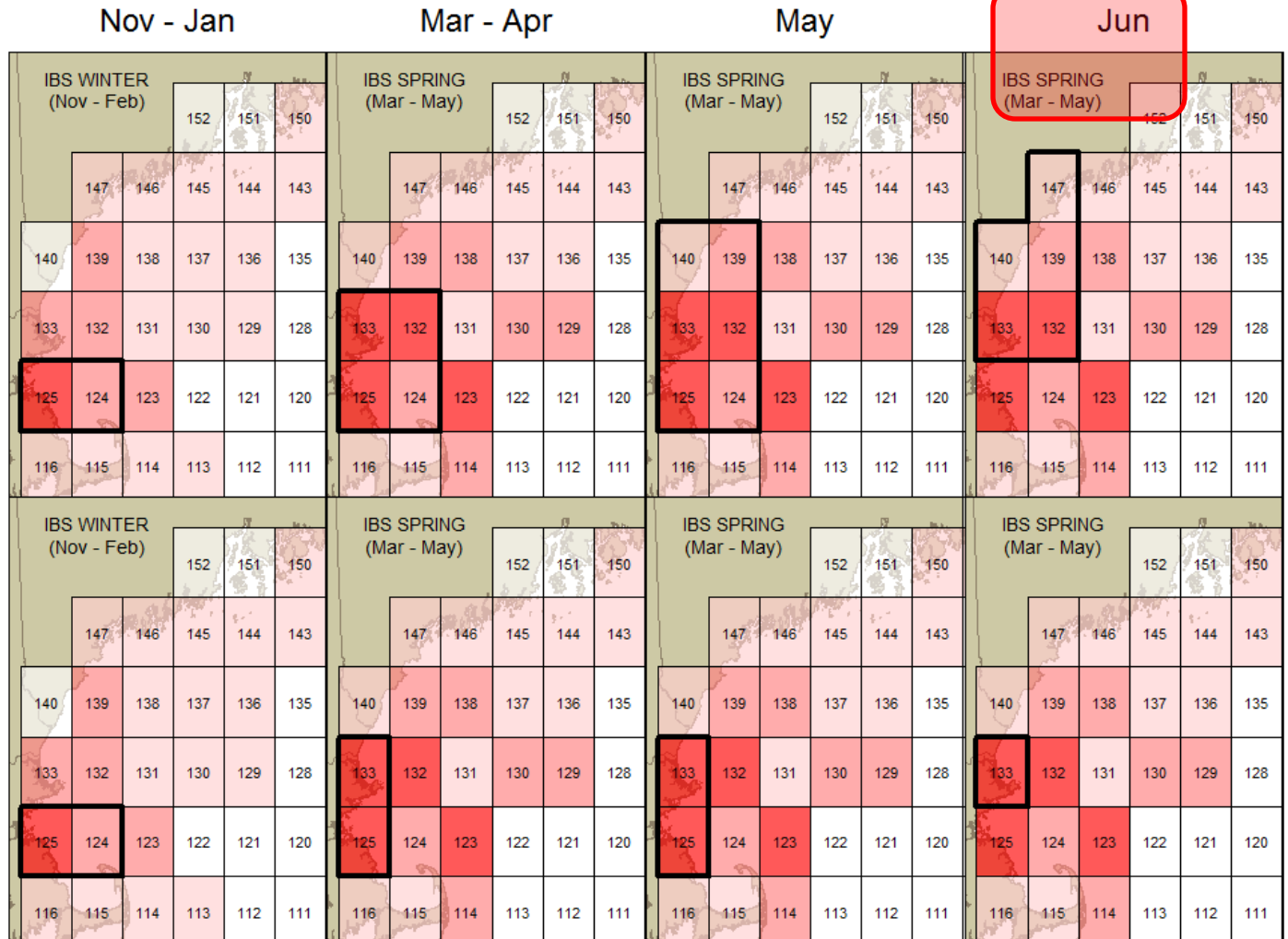


Cod IBS –Spawner CPUE

There were no IBS tows in June. IBS Data for Mar-May are shown

ALTERNATIVE
A

ALTERNATIVE
B



Cod IBS – Spawner CPUE

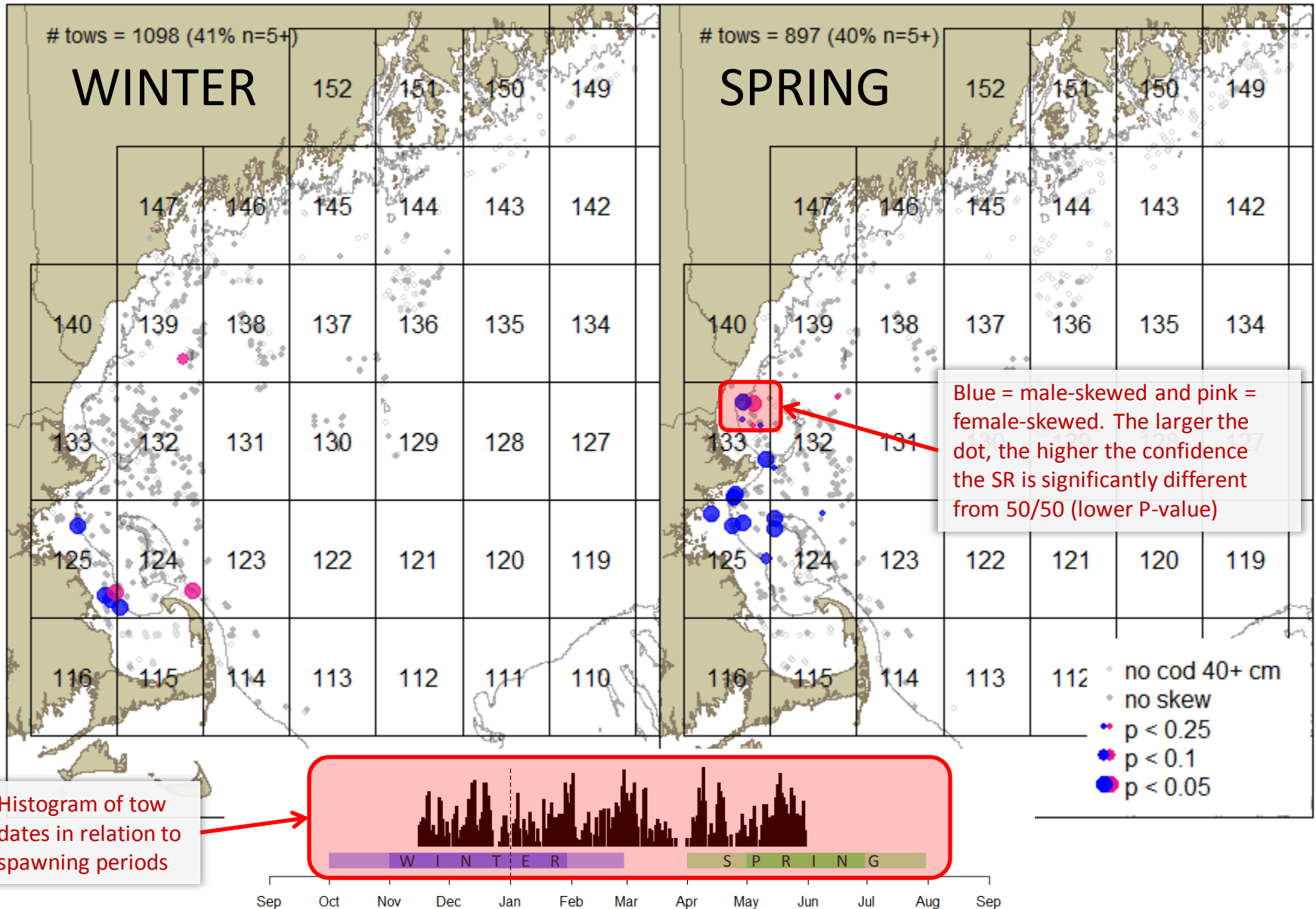
CAVEATS

- High spatial/seasonal resolution, but short time series (4 yrs: 2003-2007)
- No information from beginning of winter spawning (< Nov 15) nor from end of spring spawning (> May 31)
- Cod in spawning condition (ripe, running, spent) could be some distance from actual spawning location
 - Less so for females - hydrated eggs (i.e., “ripe”) are released within 36 h; ovulated eggs (i.e., “running”) within 5 h (Kjesbu et al., 1990)
- High outlier tows?
 - Mean is influenced by high CPUE outliers (but outliers represent aggregations of spawning cod)

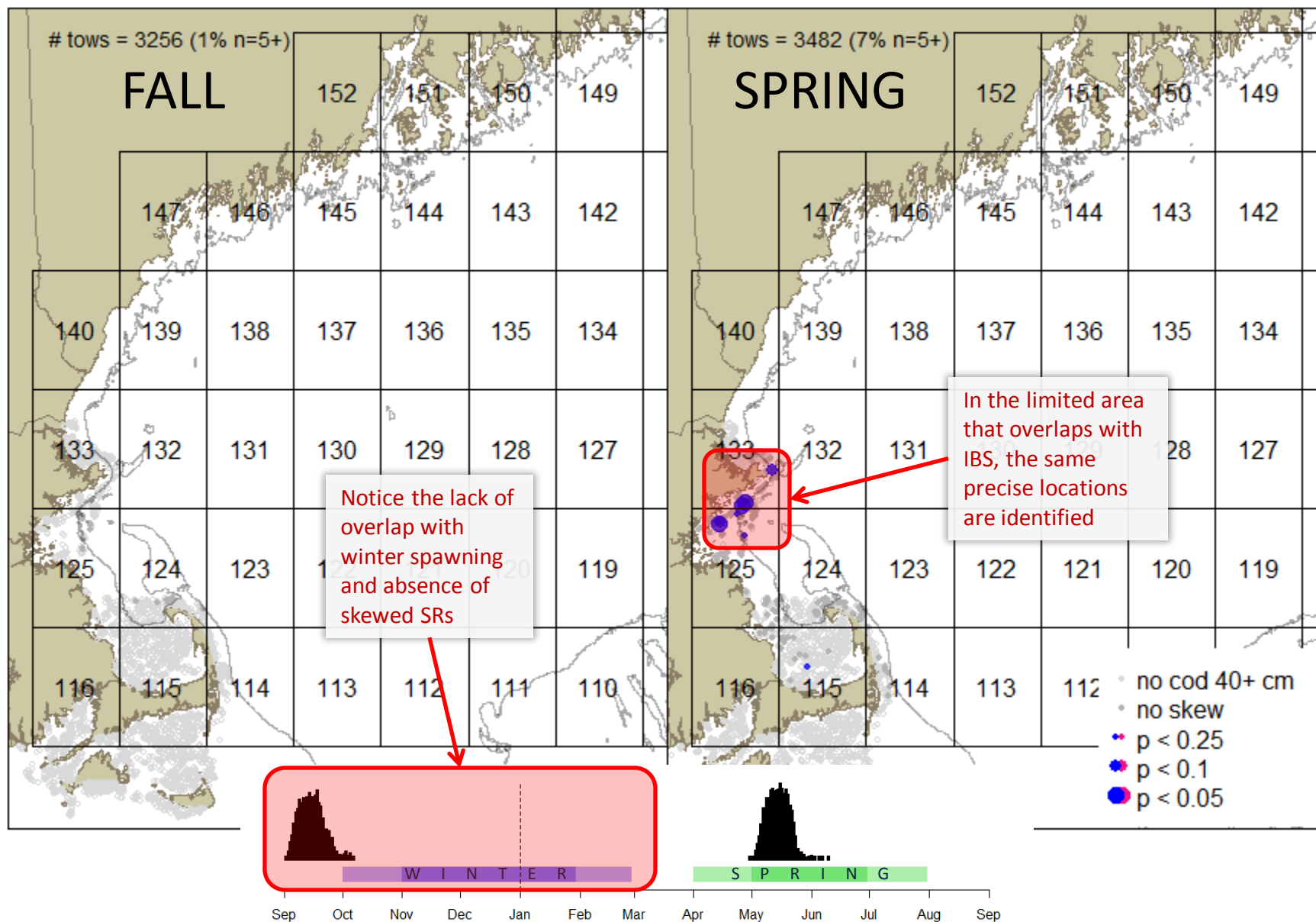
SKEWED SEX RATIOS

(Where do you find evidence of spawning behavior?)

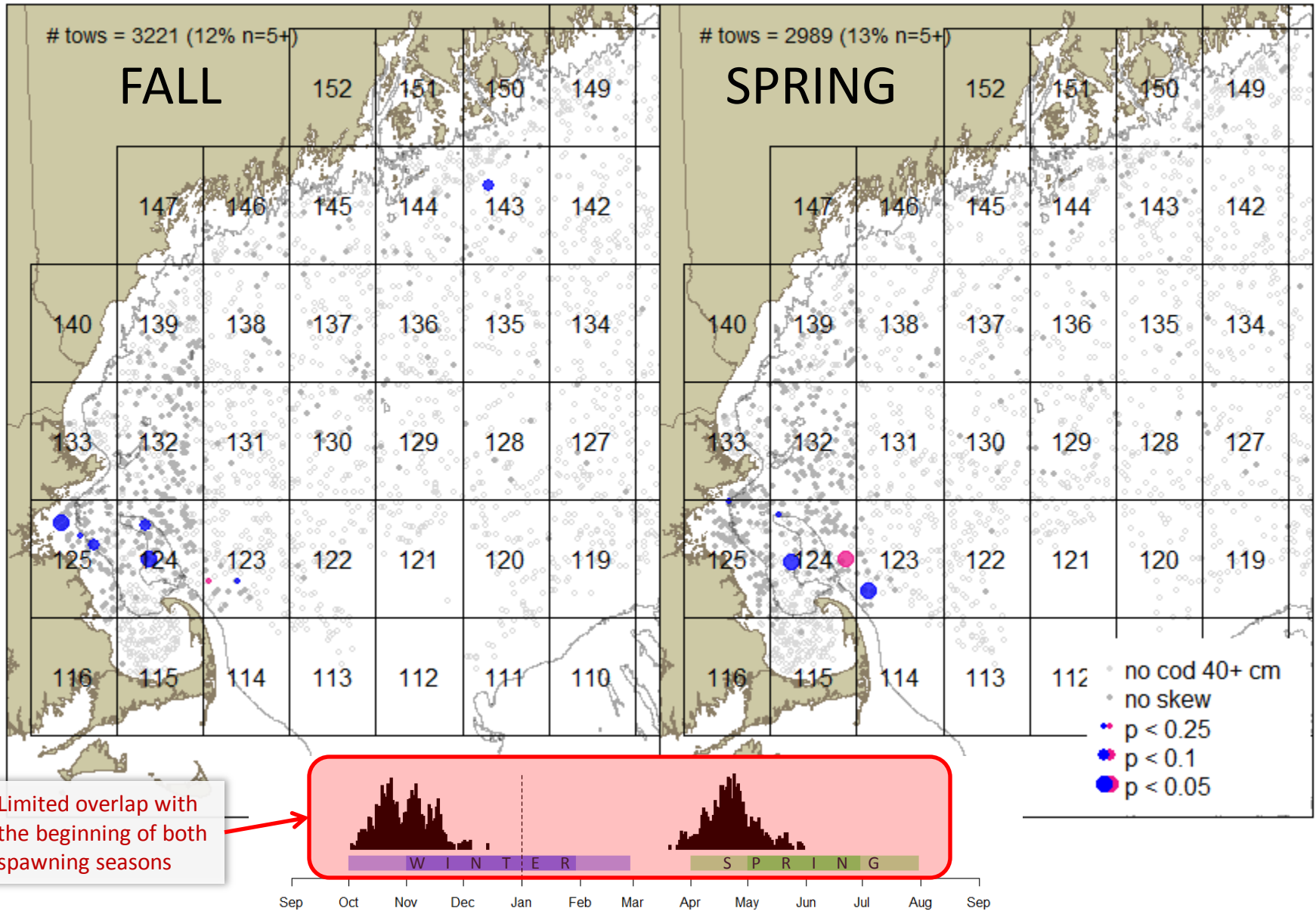
GOM Cod IBS Survey (2003-2007)



MADMF Bottom Trawl Surveys (1978-2013)



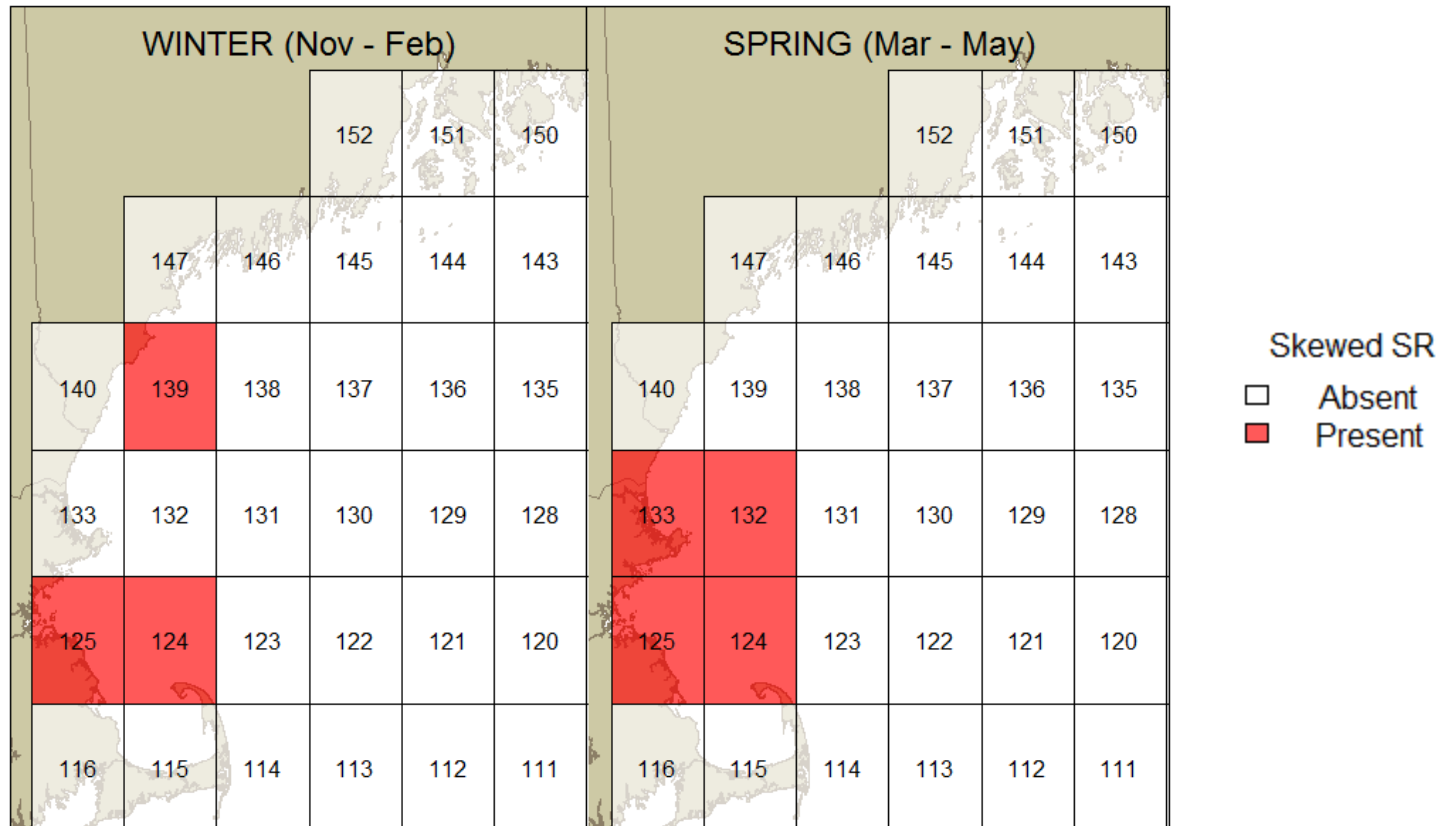
NEFSC Bottom Trawl Surveys (1968-2013)



Skewed Sex Ratios

(Cod IBS 2003-2007)

Blocks with significantly skewed sex ratios



Skewed Sex Ratios

(Cod IBS 2003-2007)

There were no IBS
tows in June. IBS
Data for Mar-May
are shown

Nov - Jan

Mar - Apr

May

Jun

ALTERNATIVE
A



ALTERNATIVE
B

Skewed Sex Ratios

CAVEATS

- Skewed SRs are indicative of where spawning behavior occurs
 - Males and females segregate themselves on the spawning ground, with males exhibiting higher activity over a larger area . This causes males to become more vulnerable to capture, which leads to predominantly male-skewed sex ratios (Dean et al., 2014)
 - Spawning behavior occurs in small persistent areas - systematic survey (IBS) probably misses some areas (should be seen as a subset of what occurs)
 - Ripe cod (i.e., spawner CPUE) can be found over much larger area
- Sample sizes
 - Power of the test to detect a skewed sex ratio increases with sample size (cannot detect a skewed sex ratio when $n < 5$)
 - MADMF & NEFSC bottom trawl surveys have relatively few tows with $n > 5$
- Seasonality
 - Cod IBS - good overlap with both spawning seasons (yet incomplete coverage, particularly in spring)
 - MADMF bottom trawl – only spring survey has good overlap with spawning
 - NEFSC bottom trawl – captures just the early portion of both spring and winter seasons
- Spatial coverage
 - Cod IBS – good coverage of likely cod spawning areas
 - MADMF – limited study area, but results corroborate IBS
 - NEFSC – limited coverage of inshore areas (<50m)

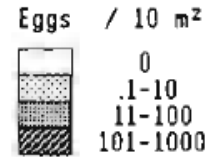
ICTHYOPLANKTON SURVEYS

(Where do you find cod eggs?)

Cod Egg Density

Two decades prior to IBS.
These data may capture
spawning groups that are
now absent or depleted

MARMAP Surveys 1977-1987



September

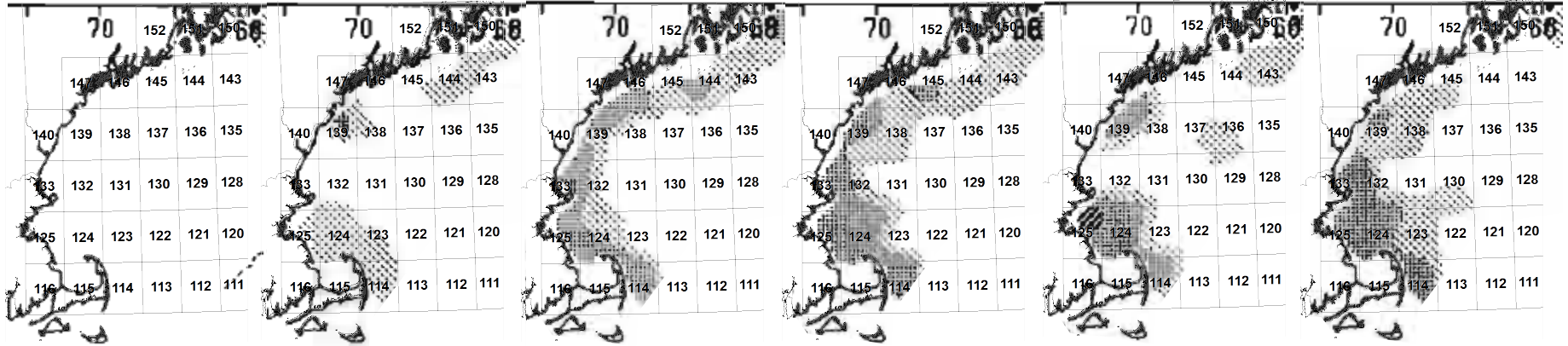
October

November

December

January

February



March*

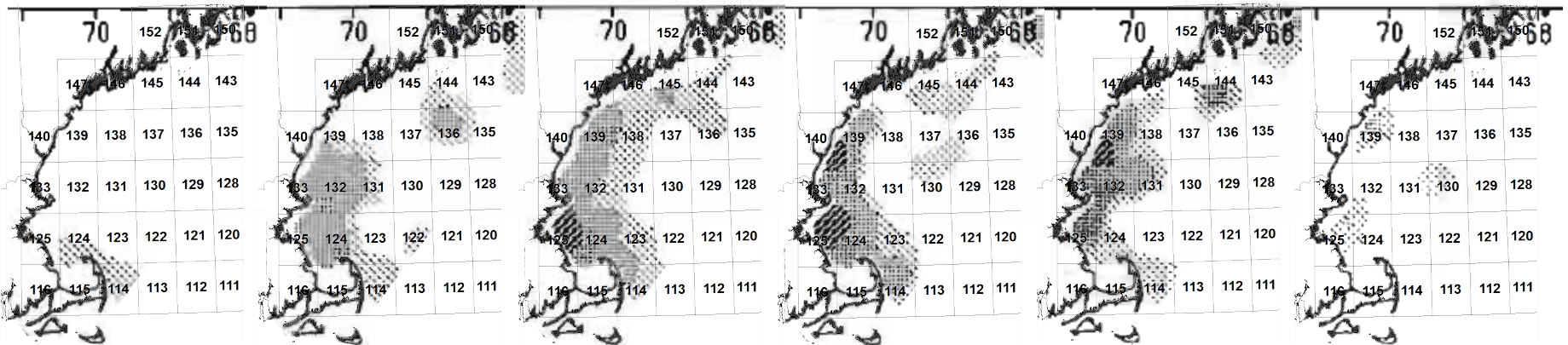
April

May

June

July

August

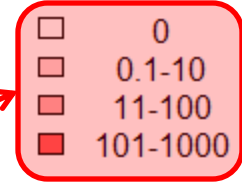


*limited samples

Cod Egg Density

MARMAP Surveys 1977-1987

eggs/10m²



Egg density bins mirror those from original report (Berrien and Sibunka 1999). Highest bin is 3 orders of magnitude larger than lowest.

Blocks classified by maximum egg density per month

WINTER

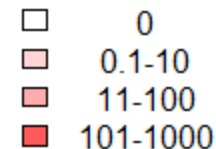
SPRING



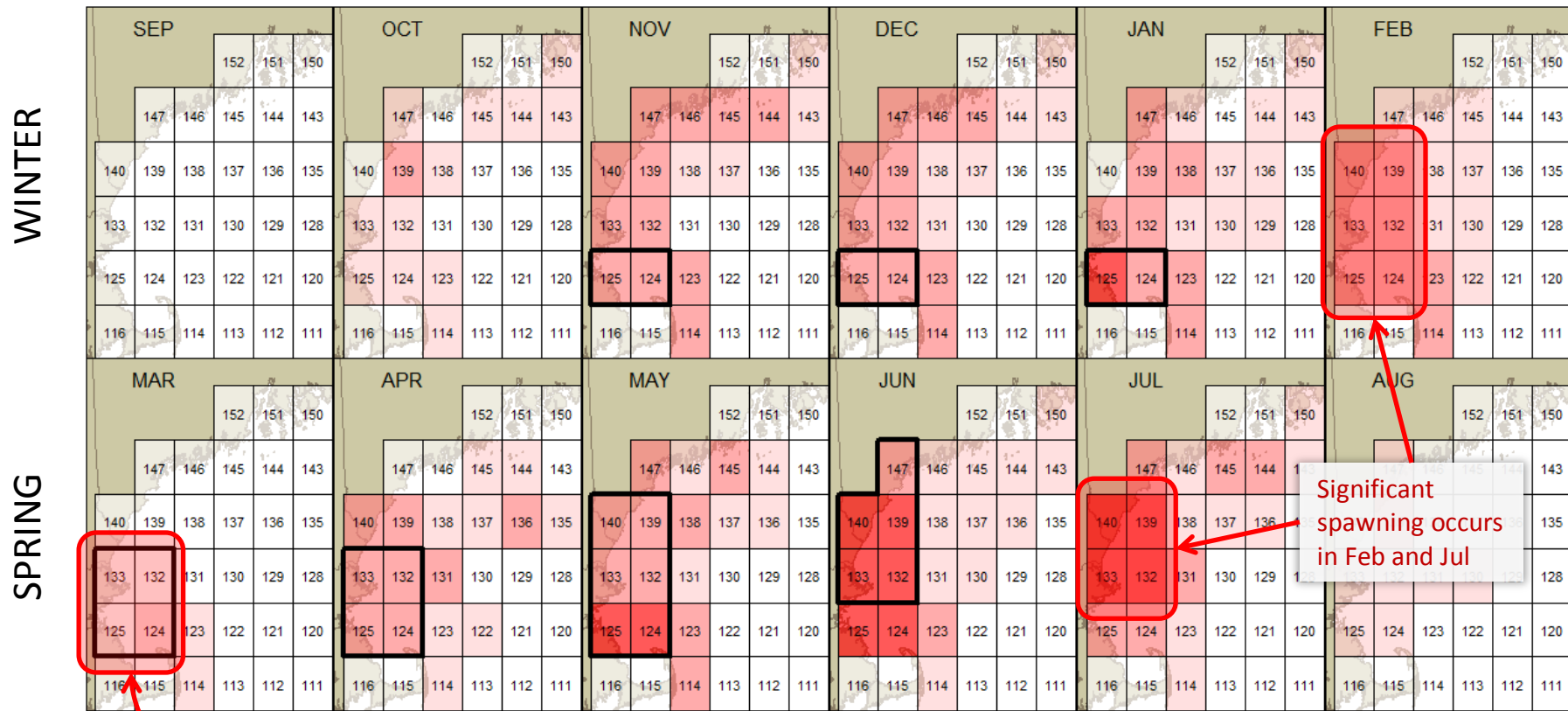
Cod Egg Density

MARMAP Surveys 1977-1987

eggs/10m²



Blocks classified by maximum egg density per month



Very few samples from GOM in Mar, but other evidence (IBS) suggest limited spawning in Mar

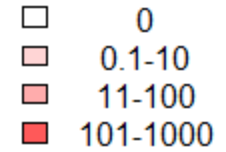
Alternative A

Significant spawning occurs in Feb and Jul

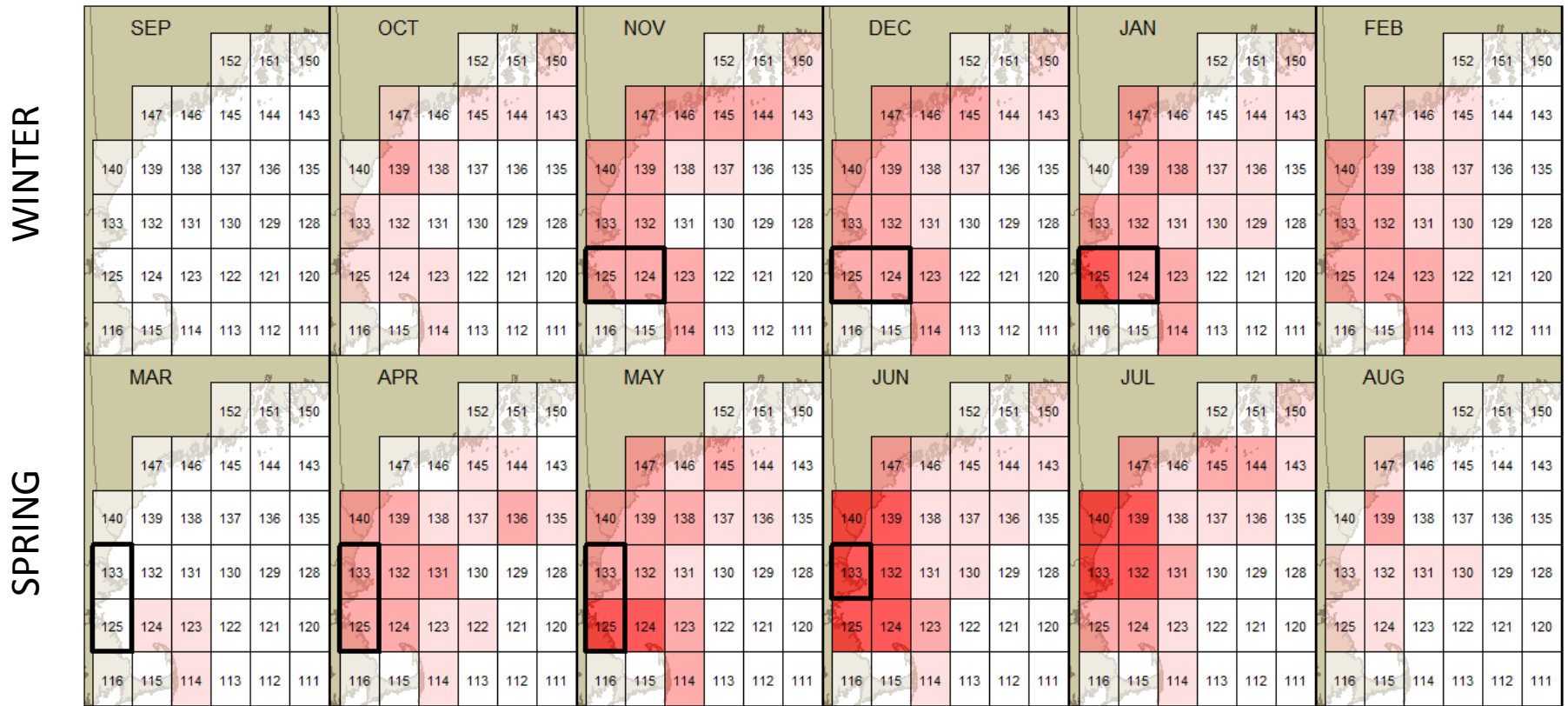
Cod Egg Density

MARMAP Surveys 1977-1987

eggs/10m²



Blocks classified by maximum egg density per month

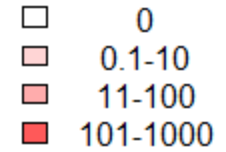


Alternative B

Cod Egg Density

MARMAP Surveys 1977-1987

eggs/10m²



Blocks classified by maximum egg density per month



Another Option?

Cod Egg Density

MARMAP Surveys 1977-1987

CAVEATS

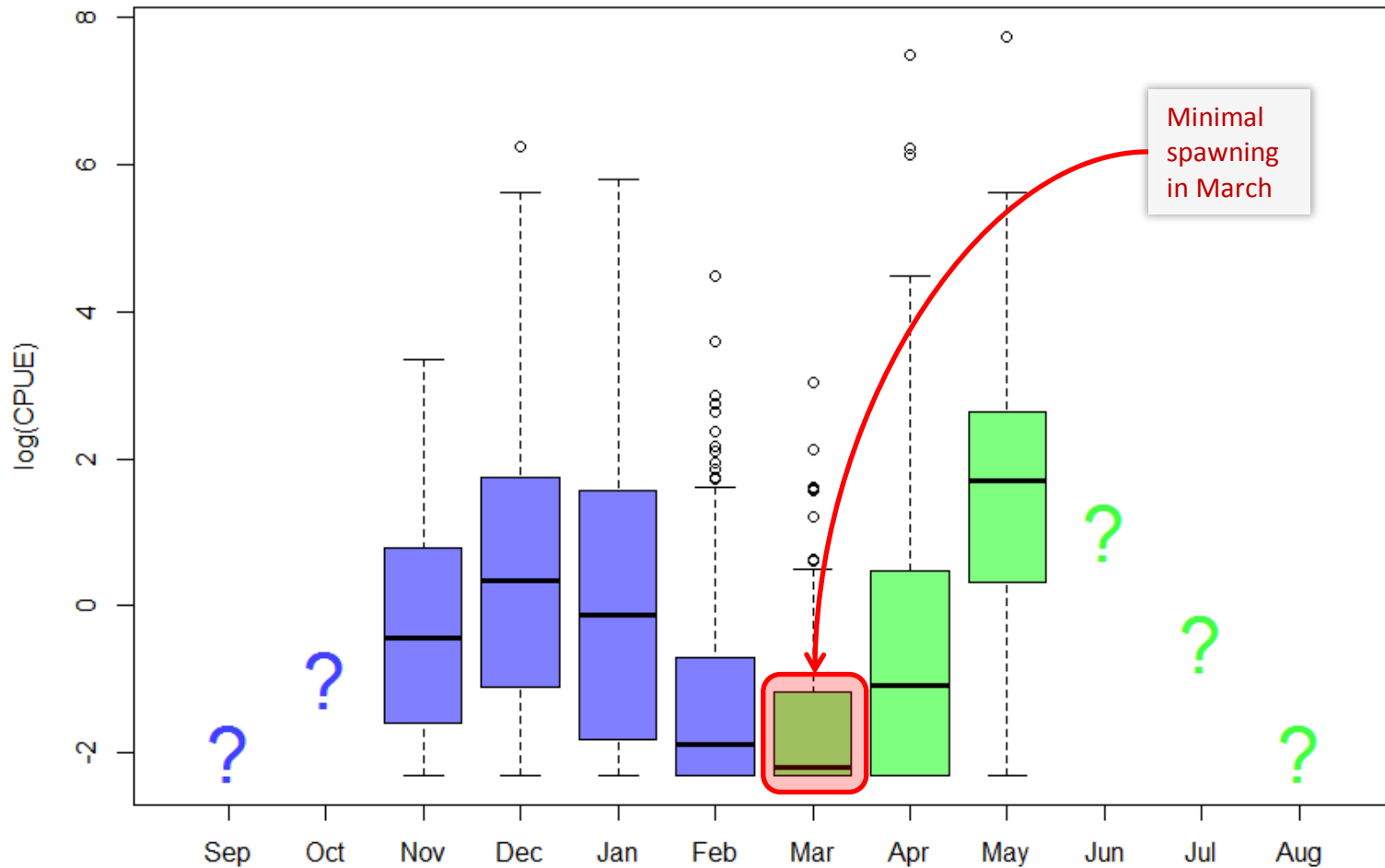
- Original raw station data unavailable (to me)
 - hence my summarization method (max egg density per block)
- Incubation period and vertical position of eggs is temperature dependent
 - Spring: eggs hatch in ~5-18 days (mean = 9 days) - reside in or above thermocline – less dispersal
 - Winter: eggs hatch in ~8-28 days (mean = 15 days) - reside at or near surface – more dispersal
 - Assumes:
 - Average daily water temperature and density 2002-2011 (“A” buoy – www.neracoos.org)
 - T°-Incubation relationship for cod eggs (Marteinsdottir et al., 2000)
 - Density of GOM cod eggs (Clapp et al., 2012)
- Egg density is assumed representative of spawning location at 30-min block resolution
 - Maximum egg dispersal over 15 days ~100 km (Churchill et al., 2011 – assumes buoyant eggs released in Ipswich bay in May)
 - Given expected incubation period and egg mortality rate of 10% day⁻¹ (Mountain et al., 2003)
 - Peak egg density should occur ~3 days after peak spawning in spring (~7 days after peak spawning in winter)
 - Median age of eggs at peak would be ~4 days in spring (~6 days in winter)
 - Therefore:
 - Max dispersal of average observed eggs ~25 km in spring (~40 km in winter)
 - Block size ~40 x 55 km

SPAWNING SEASONS

Cod IBS

(2003-2007)

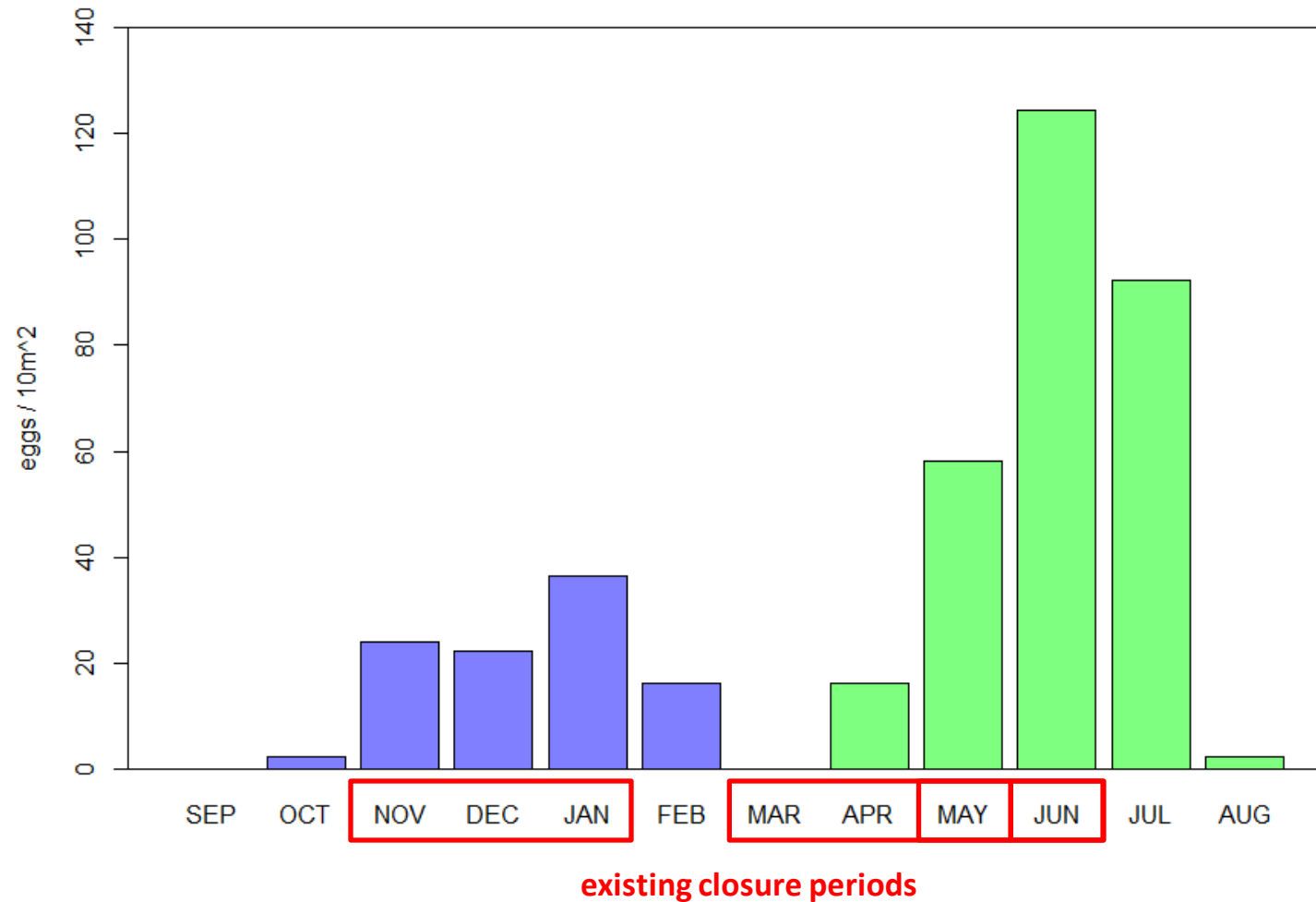
CPUE (Kg/tow) of Cod in Spawning Condition



Cod Egg Density

MARMAP Surveys (1977-1987)

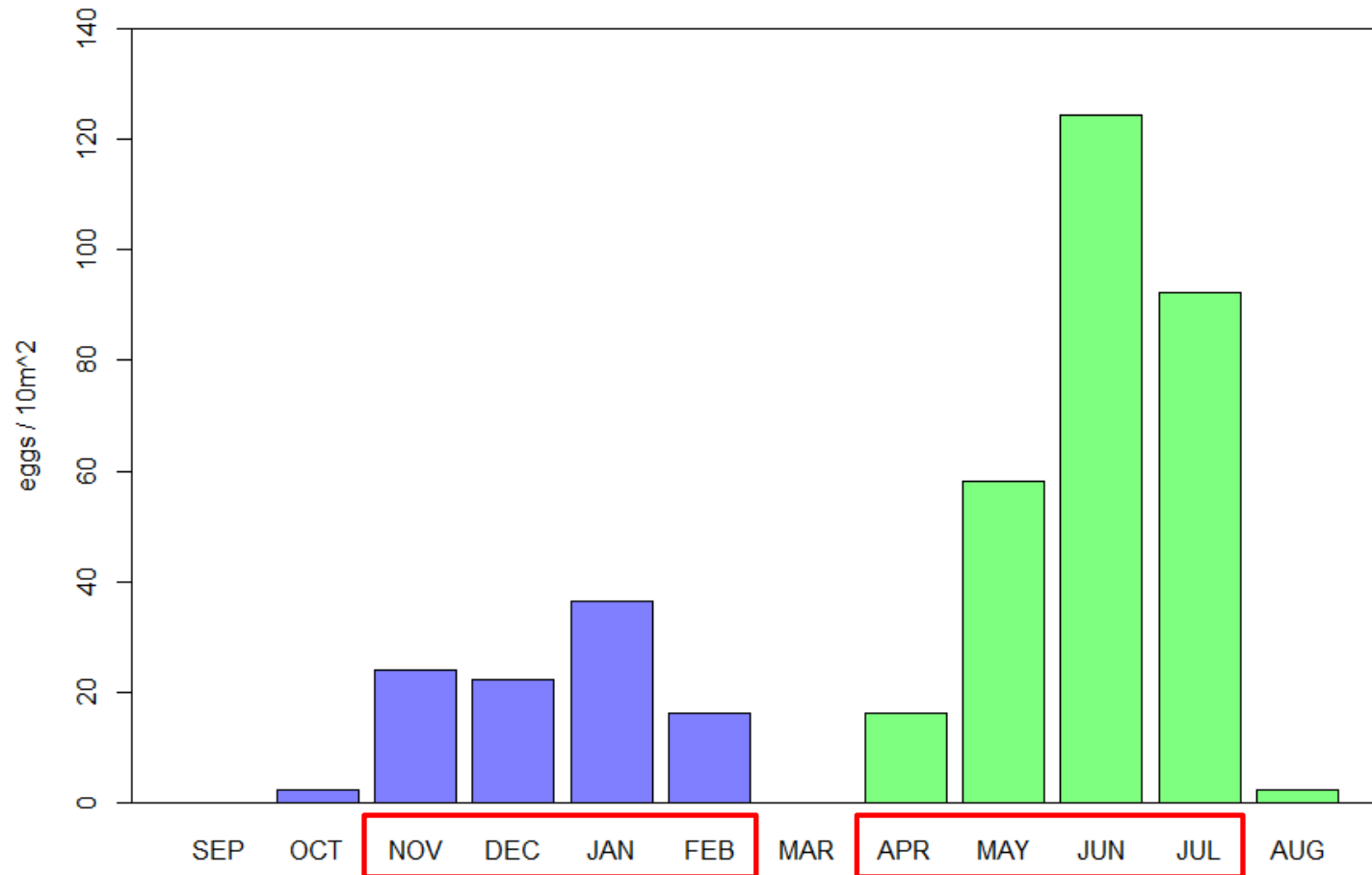
Average block classification by Month



Cod Egg Density

MARMAP Surveys (1977-1987)

Average block classification by Month



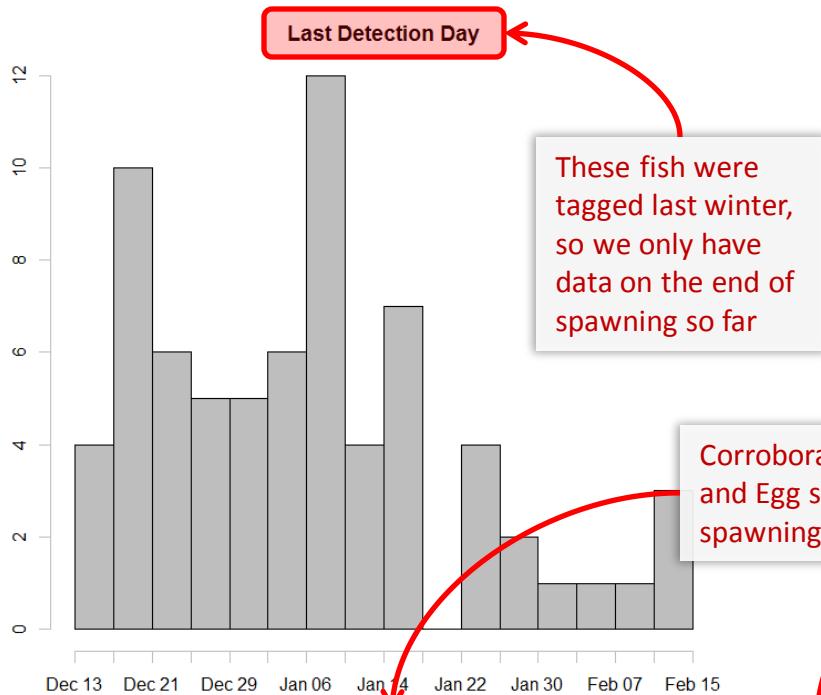
Another option?

Acoustic Telemetry

(when do we detect tagged cod on spawning ground?)

WINTER

Mass Bay 2014 - Blocks 124,125



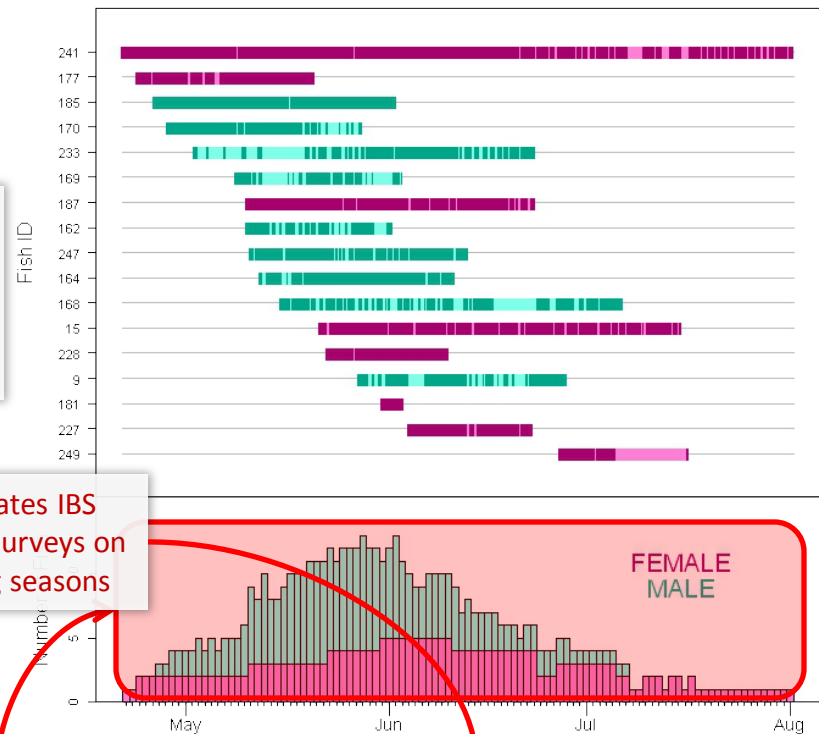
Peak = ?
Season = ? – early Feb

Corroborates IBS and Egg surveys on spawning seasons

These are returning spawners that were tagged 1yr+ earlier

SPRING

SCCZ 2011 - Blocks 125,133



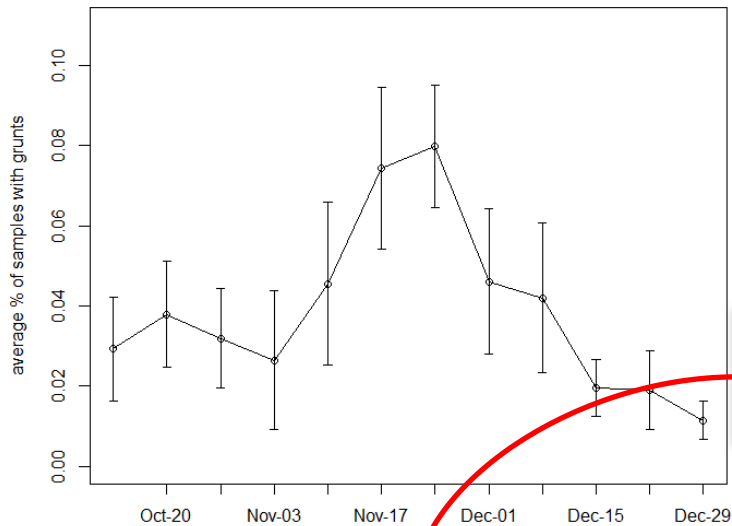
Peak = late May / early Jun
Season = mid Apr - Jul

Passive Acoustic Monitoring

(when do we hear cod spawning grunts?)

WINTER

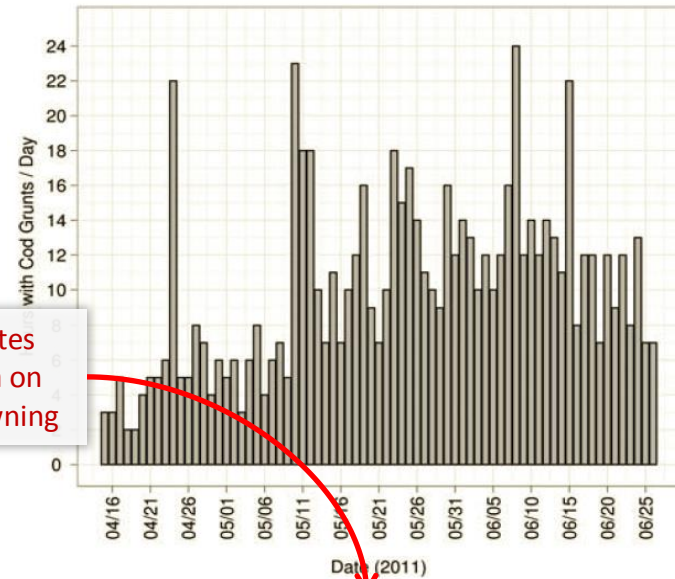
Gateway Array (19 rx) – 2007-2012
(Blocks 124,125,133)



Peak = late Nov / early Dec

SPRING



SCCZ (1 rx) – 2011
(Blocks 125,133)

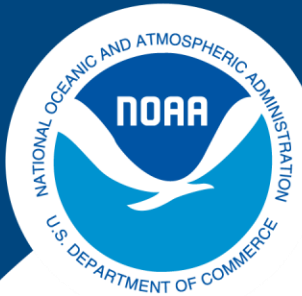


Corroborates other data on peak spawning

Peak = late May / early Jun

Conclusions

- Multiple data sources identify the same Month/Block[s] as being important to spawning cod in the GOM
 - Spawner CPUE  **WINTER** (Nov-Feb)
Blocks 124,125,132,133
 - Skewed sex ratios
 - Egg surveys
 - Acoustic telemetry  **SPRING** (Apr-Jul)
Blocks 124,125,132,133,139,140
 - Passive acoustic monitoring
- Currently proposed alternatives do not match these data
 - Overly conservative in some areas (March)
 - Inadequate in other areas (Alt A: Nov-Feb, June, July; Alt B: all months)
- 30-min blocks appear to be an appropriate spatial scale (insufficient data to support a finer scale description)



**NOAA
FISHERIES**

Gulf of Maine Cod and Haddock: Review of the Recreational Bioeconomic Model and Potential AMs for FY2015

Scott Steinback and Min-Yang Lee

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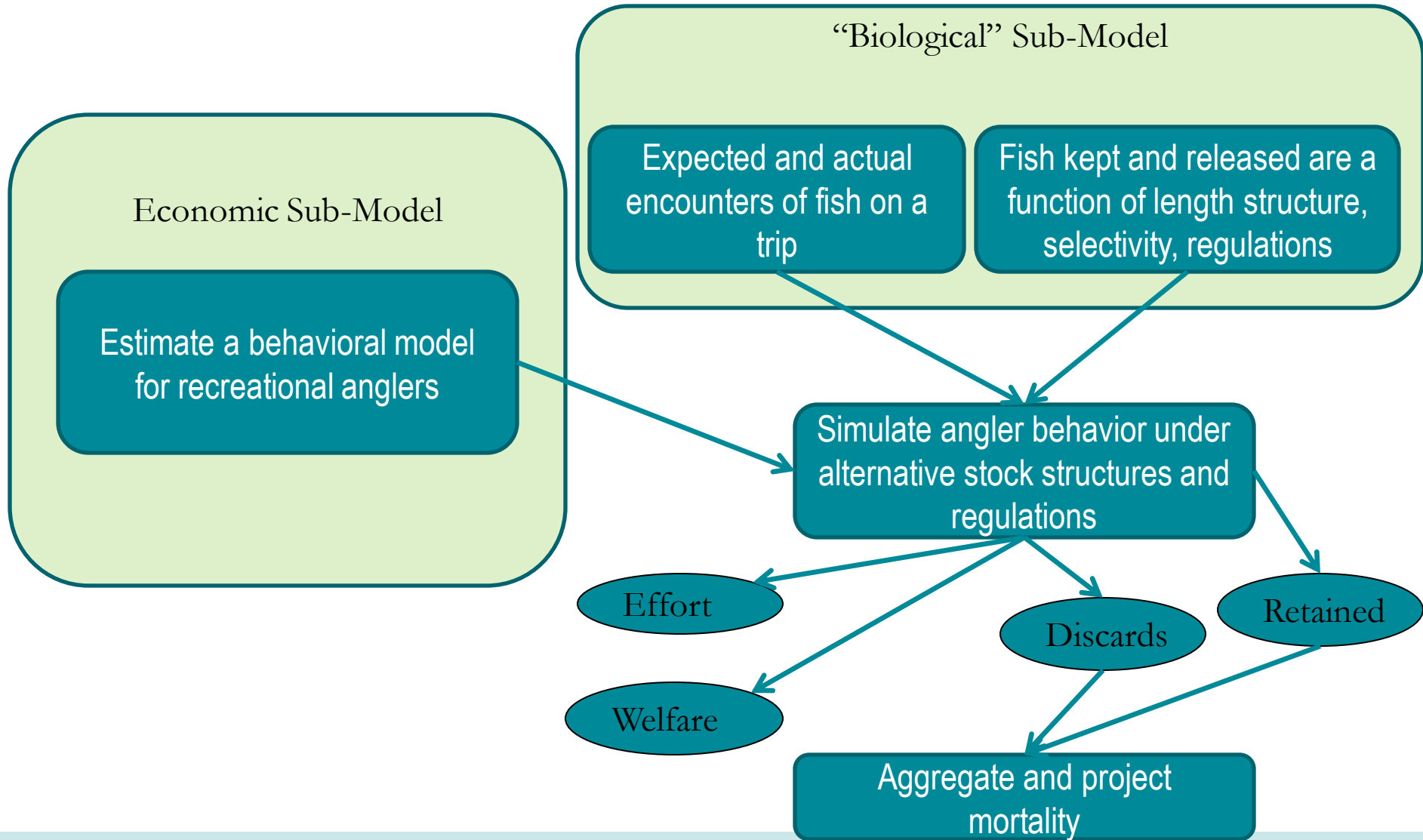
Bioeconomic Model

- Joint Mid-Atlantic and New England Council SSC review conducted in 2012.
- Used to set recreational AMs for GOM cod and haddock in FY2013 and FY2014

Policy/Research Questions

- How will changes in management measures alter angler fishing effort, angler welfare, recreational fishing mortality, and stock levels of Atlantic cod and haddock in the Gulf of Maine?
- What combination of management measures can achieve conservation objectives?

Model Overview

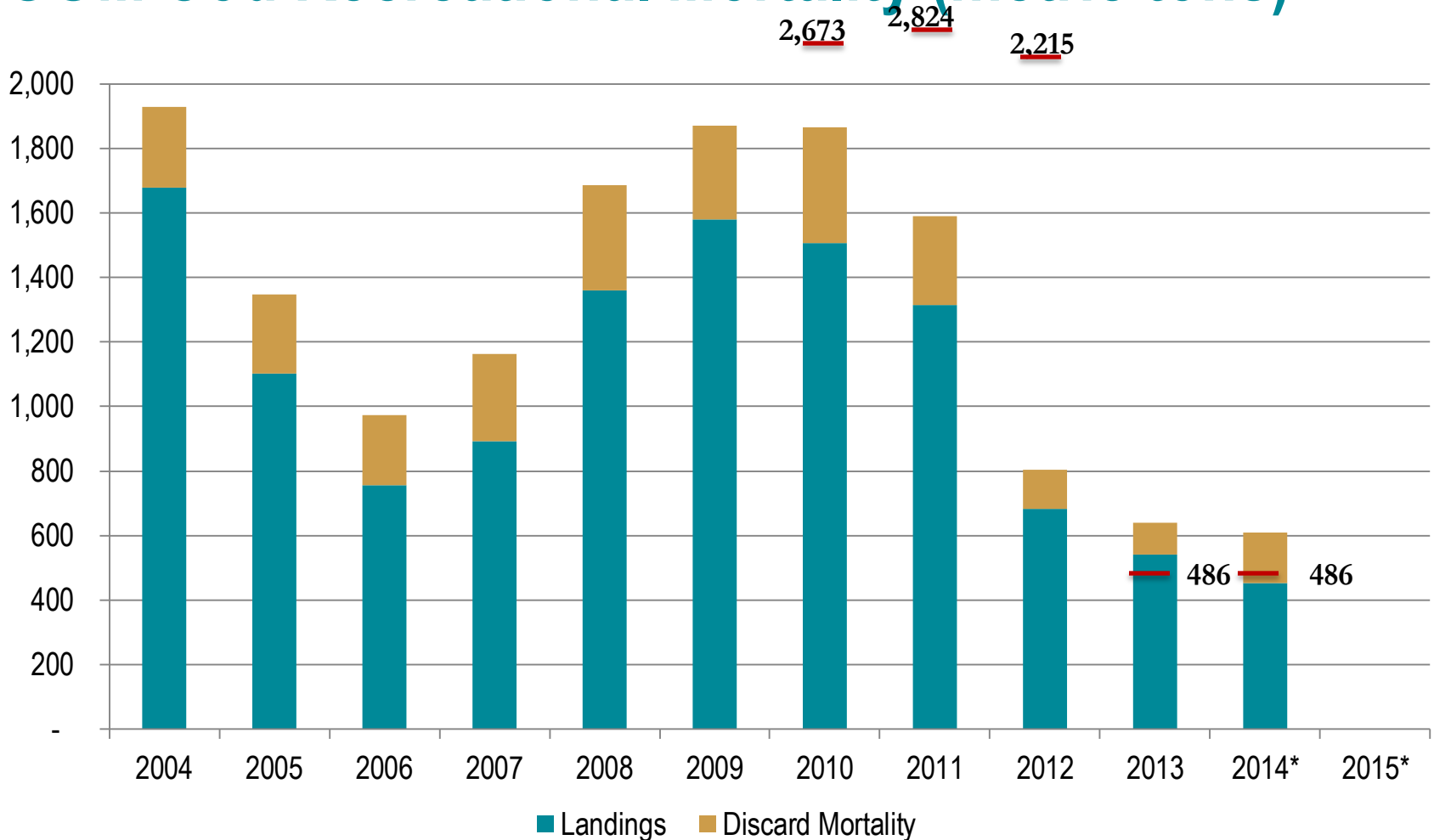


Evaluation of Mortality Predictions

GOM Cod	Actual (mt)	Model (mt)
FY2013	639	409 (36% lower)
FY2014*	609	422 (31% lower)

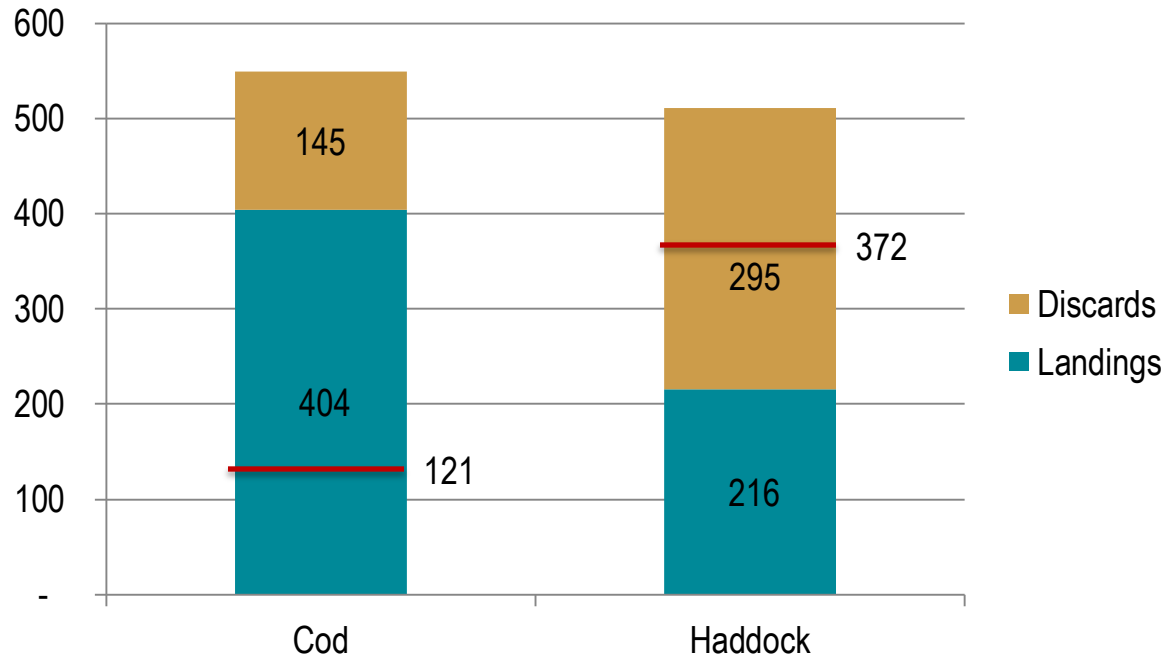
- FY2014 projections incorporated size limit noncompliance
- FY2015 projections incorporated bag limit noncompliance and changed the algorithm for how trips are retained in the simulation

GOM Cod Recreational Mortality (metric tons)



FY2015 Status Quo Mortality Projections

Species	Possession Limit	Minimum Size Limit	Season (Open)
GOM Cod	9	21"	April 16 – Aug 31
GOM Haddock	3	21"	May 1 – Aug 31, Dec 1 – Feb 28



- Medians of 100 model runs

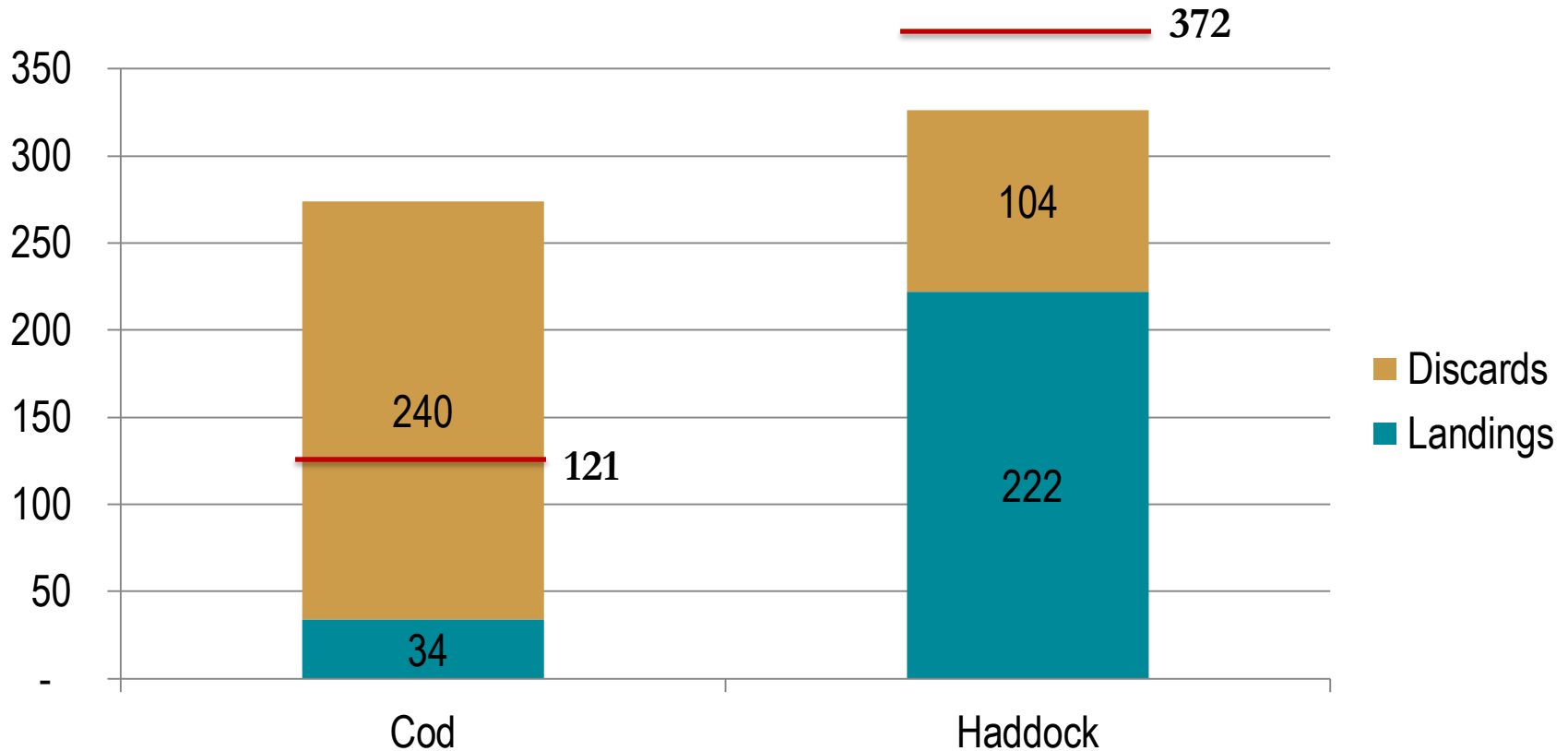
FY2015 Simulation Projections

Option	Cod Bag	Haddock Bag	Haddock Min	Haddock Season Open	Haddock Trips (Median)	% Under Cod ACL (out of 100 trials)	% Under Haddock ACL (out of 100 trials)	Cod Mortality mt (Median)	Haddock Mortality mt (Median)
1	0	3	21	May – Aug	211,982	0	0	280	480
2	0	2	21	May – Aug	210,389	0	0	276	415
3	0	2	17	May – Aug	211,946	0	99	274	326
4	0	0			?			?	?

GOM cod FY2015 Rec sub-ACL = 121mt

GOM haddock FY 2015 Rec sub-ACL = 372mt

Option 3 FY2015 Simulation Projections



Cod Bag
0

Haddock Bag
2

Haddock Min
17"

Haddock Open Season
May 1 – Aug 31

FY2015 Projection Uncertainty

- No consideration of potential avoidance behavior
 - If anglers are able to avoid cod, discard mortality will be lower than projected
- Noncompliance is likely underestimated
- FY2015 mortality projections derived from FY2014 projections
- Model Uncertainty: economic model, biological projections

Proposed GOM Spawning Area Closures

- Assuming a zero possession limit for cod is implemented, the additional conservation benefit of the closures is likely to be minimal – the economic, social, and political costs will not be minimal
 - State management agencies will be unwilling to prohibit anglers from fishing in state waters
 - Largely unenforceable
 - Noncompliance – deliberate or not will be high

Alternative AMs

- Increase awareness of zero possession limit
 - Email to recreational permit holders
- Reduce discard mortality
 - Require circle hooks for bait rigs and j-hooks for jigs
 - Require party and charter boats to use barotrauma descender devices

Questions?