



New England Fishery Management Council

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Eric Reid, *Chairman* | Thomas A. Nies, *Executive Director*

MEMORANDUM

DATE: October 22, 2021
TO: Scientific and Statistical Committee
CC: Groundfish Committee
FROM: Groundfish Plan Development Team
SUBJECT: **Candidate OFLs and ABCs for Georges Bank cod and Gulf of Maine cod for fishing years 2022 to 2024**

The Groundfish Plan Development Team (PDT) discussed candidate overfishing limits (OFLs) and acceptable biological catches (ABCs) for Georges Bank (GB) cod and Gulf of Maine (GOM) cod, following the Management Track Assessments in September 2021. The Groundfish Plan Development team met by webinar on October 13, 2021 and October 20, 2021.

1. Information reviewed included:

2019 and 2021 stock assessments and peer review reports, SSC reports, and PDT reports, Atlantic cod stock structure reports, survey information, and economic information.

2. Overview

This memorandum provides information to support FY2022 – FY2024 OFL and ABC recommendations by the SSC for GB cod and GOM cod. **The PDT offers some options for the SSC to consider, and the PDT does not make any specific recommendations.** Rather, the PDT applies the Council’s default ABC control rule for groundfish stocks (see Amendment 16):

The ABC control rules will be used in the absence of better information that may allow a more explicit determination of scientific uncertainty for a stock or stocks. If such information is available – that is, if scientific uncertainty can be characterized in a more accurate fashion -- it can be used by the SSC to determine ABCs. These ABC control rules can be modified in a future Council action (an amendment, framework, or specification package):

- a. *ABC should be determined as the catch associated with 75% of F_{MSY} .*
- b. *If fishing at 75% of F_{MSY} does not achieve the mandated rebuilding requirements for overfished stocks, ABC should be determined as the catch associated with the fishing mortality that meets rebuilding requirements ($F_{rebuild}$).*
- c. *For stocks that cannot rebuild to B_{MSY} in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).*

- d. *Interim ABCs should be determined for stocks with unknown status according to case-by case recommendations from the SSC*

Appendices

This memorandum includes 3 appendices.

- Appendix I- CY2020 Catch estimates from PDT used in the assessments for GB cod and GOM cod
- Appendix II-Excerpt from Framework Adjustment 59 (FW59) on the GB cod recreational fishery
- Appendix III- Excerpt from FW61 on the GOM cod recreational fishery

3. Overview of Stock Status and Rebuilding Plans

GB cod and GOM cod stocks are overfished with overfishing occurring, and subject to rebuilding plans with rebuild by dates of 2026 and 2024, respectively (Table 1). GARFO notified the Council on August 13, 2021 that GOM cod is not making adequate rebuilding progress. The Council is required to prepare and implement a revised rebuilding plan for GOM cod within two years of the notification. The Council is expected to take up this issue in 2022.

4. Atlantic Cod Stock Structure

The Atlantic Cod Stock Structure Working Group determined five distinct biological stocks in the United States, instead of the two that are currently managed (Figure 1)¹. A sub-panel of the SSC reviewed the work. This led to a re-thinking of the current science and management approaches to the fishery and a series of Council and NEFSC sponsored workshops covering data/assessment prospects and management [<https://seagrant.unh.edu/2021-atlantic-cod-stock-workshops>]. Summary reports on the findings will be provided to the NEFSC's Research Track Working Group for Atlantic cod and the Council later this year.

5. 2020/21 Data - Treatment of Missing 2020 Surveys, Results of 2021 Spring Surveys, 2020/21 Catch Estimates

The 2020 trawl surveys were canceled due to COVID-19 restrictions. The 2021 spring surveys did occur and provide additional information on trends in the stocks. The PDT estimated 2020 catches for both stocks (see Appendix I).

6. Economic Information

Commercial Fishery – Figure 2 and Figure 3 show groundfish commercial (sector and common pool) GB cod and GOM cod catches since FY2017 along with the FY2021 commercial ACL.

Sectors - ACE lease prices were estimated for 11 allocated groundfish stocks for fishing years 2015-2019 using a hedonic price model. Figure 4 displays GB cod sub-divided into east and west components and GOM cod. Input data into the model is comprised of 5,169 inter-sector ACE leases over the FY2015-2019 period.

Table 2 and Table 3 compares the performance of the quota-change model (QCM) since FY 2011 to realized outcomes. Performance of the QCM varies year to year (in some years it underpredicts, while in others it overpredicts). Generally, utilization of GB and GOM cod is high in most years. Notably, there are several years where GOM cod was predicted to be a

¹ Summary available at: https://seagrant.unh.edu/sites/default/files/media/pdfs/R20/Cod-Population/2021/draft_tmchap9_syn_acsswg_mar2021.pdf

constraining stock in a large number of model runs, with mean utilization rates of 1.00 or 0.99. GB cod was also predicted to be a constraining stock for a few years, primarily FY2016 and FY2017.

Recreational Fishery- see Appendix II and III for an overview of GB cod and GOM cod in the recreational fishery.

7. Candidate OFLs and ABCs

A. Georges Bank Cod

As indicated in the 2021 stock assessment for GB cod, the PlanBsmooth approach estimates the rate of change in the recent three years (from 2018-2021 surveys) of the smoothed survey biomass to be 0.611. This multiplier is applied to the average of the recent three years (2018-2020) of catch (1,193 mt) to produce the catch advice for 2022 of 729 mt. Although the 2020 surveys are missing, surveys in fall 2019 and 2021 spring surveys are used in the empirical approach this year. Sources of uncertainty include missing 2020 surveys, cod stock structure, stock status determination, and evaluation of rebuilding progress.

Table 4 and Figure 5 summarize catch performance and changes in overfishing status for GB cod.

Following the recommendations from the 2019 SSC’s review of GB cod, this value could be considered an ABC with an unknown OFL². This approach would fall under option D of the default ABC control rule (*Interim ABCs should be determined for stocks with unknown status according to case- by case recommendations from the SSC*).

Possible candidate OFLs and ABCs (mt) for FY2022- FY2024 for Georges Bank cod, using a constant approach for three years.

year	OFL	ABC
2022	undefined	729
2023	undefined	729
2024	undefined	729

B. Gulf of Maine Cod

The terminal year of the assessment is 2019. The spring 2021 surveys indicate that the NMFS spring biomass is the lowest on record and the MA DMF spring biomass is the second lowest on record (Figure 6 and Figure 7)– although these surveys are not included in the assessment models. The catch projections use two bridge years (2020 and 2021), which creates a higher level of uncertainty than compared to previous years when one bridge year was needed. Rebuilding of the stock during the two bridge years within the projections results in the increase in the catch advice from the assessment model assuming 75%Fmsy in 2022. The 2021 catch is assumed to be the 2021 fishing year ACL. Additional sources of uncertainty include cod stock structure, recruitment assumptions in the projections, natural mortality (climate, environmental, or predation), biological reference points for the M-ramp model, and overfishing status resulting from the M=0.2 and M-ramp models. For these reasons, the PDT offers additional information this year for consideration.

² Prior to 2019, the SSC used the catch advice from the PlanBsmooth approach to set the OFL, and the ABC was calculated at 75% of the OFL.

Table 5 and Figure 8 summarize catch performance and changes in overfishing status for GOM cod.

The PDT conducted the following projections $75\%F_{MSY}$, $F_{rebuild}$, $F=0$ for the $M=0.2$ rho adjusted model and $M=ramp$ $M=0.4$ model (Table 5, Table 6, Figure 8, Figure 9, and Figure 10). The PDT also conducted sensitivities on recent recruitment from the last 15 years (Table 8) and projecting off one bridge year instead of two (Table 9 and Figure 11). All of the projections show increases in the stock biomass, but they do not achieve rebuilding targets by the rebuilding end date of 2024.

The PDT offers two approaches for catch advice: the first based on model averaging, based on the approach used at the 2019 SSC review and would consider Options A and B of the control rule and the second offering additional information on bycatch if, under Option C, a further reduction is pursued.

Approach 1 - The PDT took the average of the 2022 catch at $75\%F_{MSY}$ from $M=0.2$ rho adjusted and $M=ramp$ $M=0.4$ (Table 5 and Table 7). This results in possible candidate ABC of 654 mt, which was help constant for three years. Comparison of the model accepted projections to a sensitivity projection that limited the incoming recruitment to the recent 15 years suggests that a constant ABC is supported. That is, most of the increase in the out years is due to the assumed increases in recruitment.

The PDT iteratively ran the projections for F_{MSY} for 2023 and 2024 for each model, assuming the constant ABC estimate in previous years. The PDT then averaged catch at F_{MSY} from each for 2022-2024 to determine possible OFLs for each year (Table 7). Alternatively, the SSC could choose a constant OFL for the three years at 857 mt.

Historically, projections for GOM cod have been overly optimistic, and as mentioned above, the added uncertainty from the use of a second bridge year likely makes these projections even more so.

Possible candidate OFLs and ABCs (mt) for FY2022- FY2024 for Gulf of Maine cod, considers $M=0.2$ rho adjusted and $M=ramp$ $M=0.4$, uses a constant approach for three year on the ABC with two options for OFLs

year	OFL (a)	OFL (b)	ABC
2022	857	857	654
2023	969	857	654
2024	1,230	857	654

Approach 2- Given GOM cod is not projected to rebuild under $F=0$ by 2024, the SSC could consider further reducing the possible candidate ABC under Approach 1, under “Option C” of the default ABC control rule (*For stocks that cannot rebuild to B_{MSY} in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).*

In 2014 at the request of the SSC, the PDT discussed, completed analyses, and reviewed work regarding incidental, non-target catch of GOM cod under the current prevailing/operating conditions of the fishery. The PDT concluded³ 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.

Table 10 and Table 11 display total landings and discards (in all fisheries) for GOM cod. Recreational discards are based on new MRIP data consistent with the updated stock assessment. Table 12 shows discards for all fisheries and non-groundfish and state landings for GOM cod, which in total is 391.2 mt for 2018 and 154.9 mt for 2019. It is important to note that these values do not necessarily represent all incidental, non-target catch under the current prevailing operating conditions of the fishery, as GOM cod can be caught incidentally, but legally landed by vessels in the federal groundfish fishery.

³ From the PDT to the SSC memo re Gulf of Maine cod incidental catch, dated October 16, 2014.

Tables

Table 1- Summary of rebuilding status for cod stocks based on the most recent assessment in 2021.

Groundfish Stock	Rebuilding Plan Start of the Current Plan	Planned Rebuilding Date	Years Remaining in Plan, starting with FY2022	Total ACLs exceeded within past three completed FYs? If yes, identify the FYs.	Has the original rebuilding F been achieved? Or is this unknown? <i>Indicate the current F estimate relative to F rebuild at the start of the plan.</i>	What is current SSB estimate relative to SSBMSY? Or is this unknown?
Georges Bank cod	5/1/2004	2026	5	No	Unknown	Unknown
Gulf of Maine cod	5/1/2014	2024	3	Yes: [129.5% of the total ACL in FY2017]	F rebuild (plan start) = 0.161 (m=0.2 model) and 0.177 (m-ramp model) F2019full = 0.249 (m=0.2 model with retrospective adjustment) and 0.172 (m-ramp model)	SSB2019 = 1,969 mt (m=0.2 model with retrospective adjustment) and 3,223 mt (m-ramp model) 5% and 5%, respectively of SSBMSY proxy 39,912 mt (m=0.2 model) and 60,010 mt (m-ramp model)

Table 2- GB cod stock-level catch and revenue predictions from the Quota Change Model (QCM) for each fishing year between 2011 and 2020 compared to realized catch and revenue (in 2020\$).

	Sector sub-ACL	Catch (mt)		Utilization (%)		Gross Rev (\$mil, 2020)		
		Realized	Predicted	Realized	Predicted	Realized	Predicted	
GB Cod	FY							
	2011	3,878	2,987	3,338	0.77	0.86	13.5	15.1
	2012	4,079	1,437	1,149	0.35	0.28	7.6	5.6
	2013	2,131	1,500	1,657	0.70	0.78	6.4	7.4
	2014	1,584	1,295	1,525	0.82	0.96	5.6	7.7
	2015	1,629	1,522	1,526	0.93	0.94	6.3	6.3
	2016	550	488	547	0.89	0.99	2.7	2.6
	2017	378	389	377	1.03	1.00	2.1	1.6
	2018	1,083	720	616	0.66	0.57	3.2	3.2
	2019	1,351	452	489	0.33	0.36	2.3	2.6
2020	851	352	826	0.41	0.97	1.7	3.6	

Table 3- GOM cod stock-level catch and revenue predictions from the Quota Change Model (QCM) for each fishing year between 2011 and 2020 compared to realized catch and revenue (in 2020\$).

	FY	Sector sub-ACL	Catch (mt)		Utilization (%)		Gross Rev (\$mil, 2020)	
			Realized	Predicted	Realized	Predicted	Realized	Predicted
GOM Cod	2011	4,825	4,268	4,737	0.88	0.98	21.2	25.3
	2012	3,619	2,070	3,572	0.57	0.99	11.2	18
	2013	881	716	871	0.81	0.99	4	4.7
	2014	814	638	803	0.78	0.99	3	4.8
	2015	202	171	201	0.85	1.00	0.9	1.1
	2016	273	255	268	0.93	0.98	1.6	1.3
	2017	271	248	268	0.92	0.99	1.5	1.3
	2018	377	304	354	0.81	0.94	1.7	2.2
	2019	378	271	339	0.72	0.90	1.6	1.9
	2020	267	214	267	0.80	1.00	1.2	1.4

Table 4- GB cod catch performance (CY2010-CY2020) and historical OFLs and ABCs (FY2010-FY2022), compared with the possible candidate ABCs - constant approach (FY2022-FY2024).

Year	Catch	Historical OFLs	Historical ABCs	ABC
2010	3,986	6,272	4,812	
2011	4,404	7,311	5,616	
2012	2,679	7,311	5,616	
2013	1,827	3,279	2,506	
2014	2,253	3,570	2,506	
2015	2,330	4,191	2,506	
2016	2,667	1,665	1,249	
2017	1,765	1,665	1,249	
2018	1,183	3,047	2,285	
2019	1,344	3,047	2,285	
2020	1,053		1,752	
2021			1,752	
2022			1,752	729
2023				729
2024				729

Table 5- GOM cod catch performance (CY2010-CY2019) and historical OFLs and ABCs (FY2010-FY2022). Catch assumptions for the bridge years (CY2020-CY2021) and catch projections for F_{MSY} and $75\%F_{MSY}$ (FY2022-FY2024) for M=0.2 rho adjusted and M-ramp m=0.4 models.

Year	Catch	Historical	Historical	Catch Assumption	M=0.2	M=0.2	Mramp	Mramp
		OFLs	ABCs		<i>Rho adj</i>	<i>Rho adj</i>	M=0.4	M=0.4
					F_{MSY}	$75\%F_{MSY}$	F_{MSY}	$75\%F_{MSY}$
2010	9,100	11,089	8,530					
2011	8,007	11,715	9,012					
2012	4,204		6,700					
2013	2,723	1,635	1,550					
2014	1,806	1,917	1,550					
2015	420	514	386					
2016	850	667	500					
2017	1,171	667	500					
2018	766	938	703					
2019	497	938	703					
2020		724	552	409				
2021		929	552	523				
2022		1,150	552		821	628	892	679
2023					959	756	919	721
2024					1,244	1,001	1,071	853

Table 6 -Projection and terminal year model results from the M=0.2 rho adjusted model and M-ramp m=0.4 model for GOM cod.

Harvest strategy	Year	Input	Model					
			M=0.2 Retro adjust			M-Ramp M=0.4		
			Catch (mt)	Spawning stock biomass (mt)	F _{full}	Catch (mt)	Spawning stock biomass (mt)	F _{full}
F _{MSY}	2019	Model result	497	3,083	0.16	497	3,223	0.17
	2020	Assumed catch	409	2,635	0.162	409	3,925	0.119
	2021	Assumed catch (ACL)	523	3,599	0.137	523	4,759	0.113
	2022	F Projection	821	4,508	0.173	892	5,254	0.175
	2023	F Projection	959	5,488	0.173	919	5,707	0.175
	2024	F Projection	1,244	7,279	0.173	1071	6,802	0.175
75% F _{MSY}	2019	Model result	497	3,083	0.16	497	3,223	0.17
	2020	Assumed catch	409	2,635	0.162	409	3,925	0.119
	2021	Assumed catch (ACL)	523	3,599	0.137	523	4,759	0.113
	2022	F Projection	628	4,549	0.13	679	5,299	0.131
	2023	F Projection	756	5,691	0.13	721	5,897	0.131
	2024	F Projection	1001	7,685	0.13	853	7,124	0.131

Table 7- GOM cod - calculation of possible candidate OFLs and ABCs for GOM cod using the M=0.2 rho adjusted model and M-ramp m=0.4 model. A constant OFL candidate of 857 (box in table) could be considered.

year	M=0.2	Mramp	Avg OFL	ABC
	Rho adj OFL	M=0.4 OFL		
2022	821	892	857	654
2023	986	951	969	654
2024	1326	1134	1230	654

Table 8- GOM cod sensitivity projection runs for the M=0.2 rho adjusted model and M-ramp m=0.4 model at 75%F_{MSY} using one bridge year (CY2020). The average of the two results is also provided. This sensitivity suggests that the increase in the ABC (~100 mt) is calculated from the additional bridge year catch assumption within the projection.

year	M=0.2 <i>Rho adj</i> 75%F _{MSY}	Mramp M=0.4 75%F _{MSY}	avg
2021	497	605	551

Table 9- GOM cod - comparison of projections with different recruitment assumptions. 2020 and 2021 are bridge years. See Figure 10.

	M=0.2 Update 2021	mramp Update 2021	M=0.2 last 15 yrs recruitment sensitivity	mramp last 15 yrs recruitment sensitivity
2020	409	409	409	409
2021	523	523	523	523
2022	628	679	623	672
2023	756	721	701	674
2024	1001	853	790	686
2025	1393	1052	918	731
2026	1931	1258	1086	783
2027	2503	1466	1234	812
2028	3161	1691	1404	851

Table 10- Summary of total landings (in all fisheries) for GOM cod. Source: FY2018 –FY2019 year-end catch reports and 2021 Gulf of Maine cod stock assessment.

	2018 Landings (mt)				2019 Landings (mt)			
	Groundfish Fishery	Non- Groundfish Fishery	State	2018 Total	Groundfish Fishery	Non- Groundfish Fishery	State	2019 Total
<i>Commercial</i>	306.4	3.7	37.7	347.8	273.1	0.6	28.5	302.2
<i>Recreational</i>	11	-	-	11	43	-		43
Total	317.4	3.7	37.7	358.8	316.1	0.6	28.5	345.2

Sources:

Commercial landings from FY2018 and FY2019 fishing year-end reports

Recreational landings (note on a calendar-year basis, which includes the new MRIP values) from the 2021 Management Track Assessment

Table 11- Summary of total discards (in all fisheries) for GOM cod. Source: FY2018 – FY2019 year-end catch reports and 2021 Gulf of Maine cod stock assessment.

	2018 Discards (mt)				2019 Discards (mt)			
	Groundfish Fishery	Non-Groundfish Fishery	State	2018 Total	Groundfish Fishery	Non-Groundfish Fishery	State	2019 Total
<i>Commercial</i>	8.6	1	0.2	9.8	13.6	0.9	0.3	14.8
<i>Recreational</i>	340	-	-	340	111	-		111
Total	348.6	1	0.2	349.8	124.6	0.9	0.3	125.8

Sources:

Commercial discards from FY2018 and FY2019 fishing year-end reports

Recreational discards (note on a calendar-year basis, which includes the new MRIP values) from the 2021 Management Track Assessment

Table 12- Summary of total discards (in all fisheries) plus non-groundfish and state landings for GOM cod. Source: FY2018 –FY2019 year-end catch reports and 2021 Gulf of Maine cod stock assessment.

	2018 (mt)				2019 (mt)			
	Total Discards	Non-Groundfish Fishery Landings	State Landings	2018 Total	Total Discards	Non-Groundfish Fishery Landings	State Landings	2019 Total
<i>Commercial</i>	9.8	3.7	37.7	51.2	14.8	0.6	28.5	43.9
<i>Recreational</i>	340	-	-	340	111	-		111
Total	349.8	3.7	37.7	391.2	125.8	0.6	28.5	154.9

Sources:

Commercial landings from FY2018 and FY2019 fishing year-end reports

Recreational discards (note on a calendar-year basis, which includes the new MRIP values) from the 2021 Management Track Assessment

Figures

Figure 1 - Stock Structure for Atlantic cod proposed by the Atlantic Cod Stock Structure Working Group.

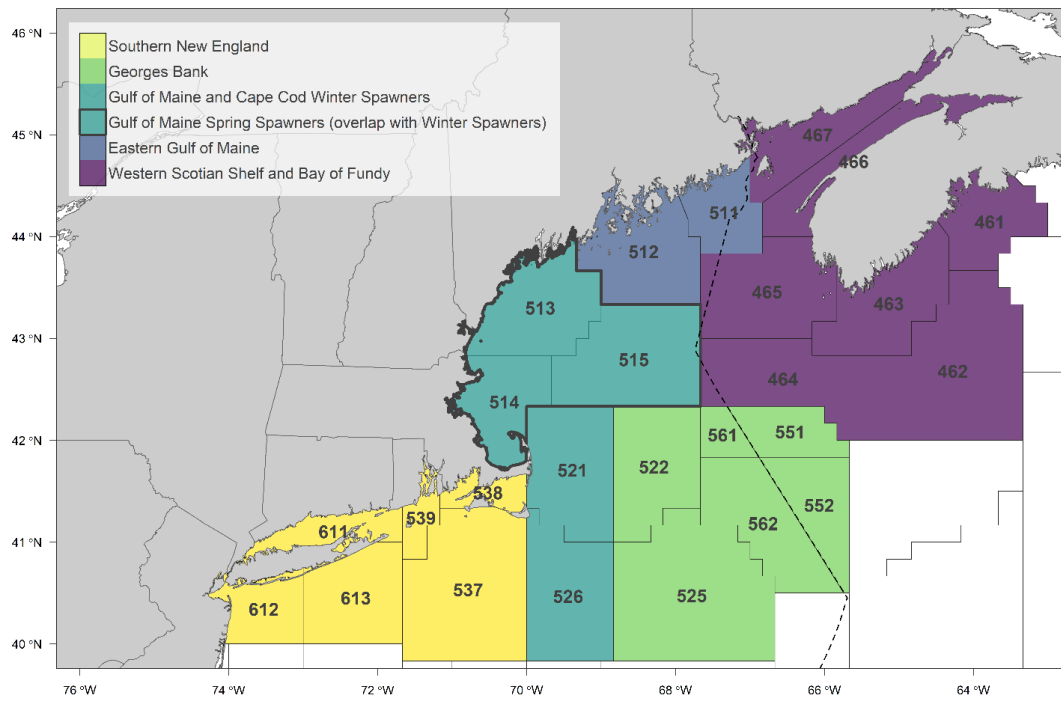


Figure 2- In-season utilization of GB cod by the commercial (sectors and common pool) groundfish fishery.

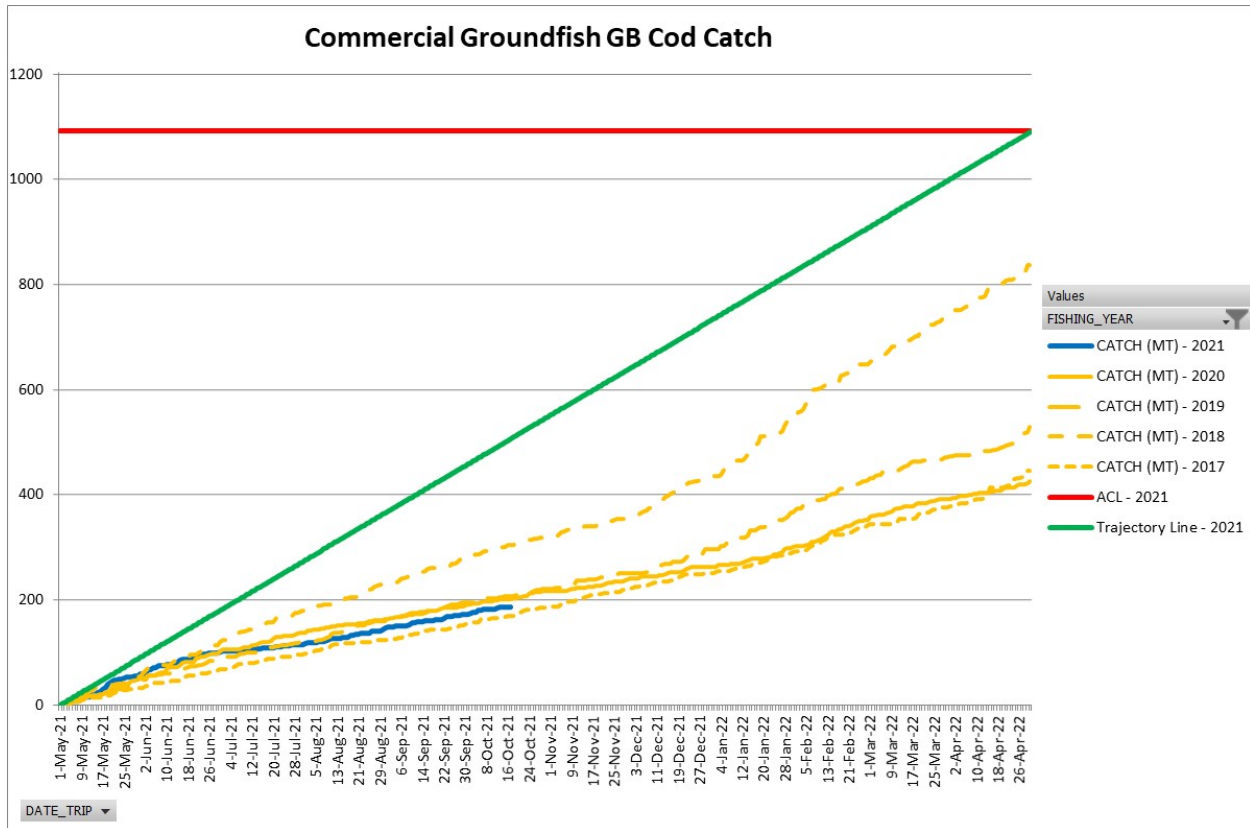


Figure 3- In-season utilization of GOM cod by the commercial (sectors and common pool) groundfish fishery.

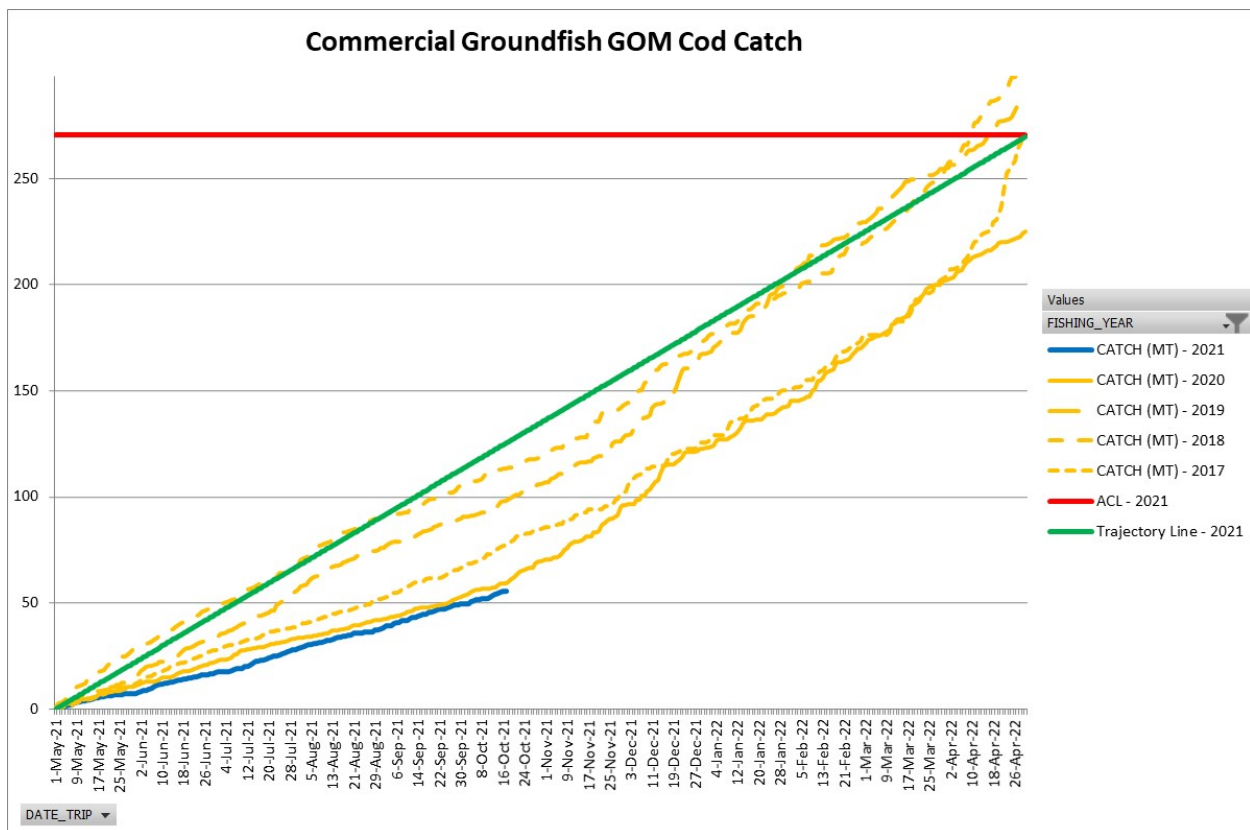


Figure 4- ACE lease prices estimated for GB cod east (top), GB cod west (middle), and GOM cod (bottom) for fishing years 2015-2019 using a hedonic price model. First quarter (May-July) lease prices are indicated by the vertical gray bars in the figures.

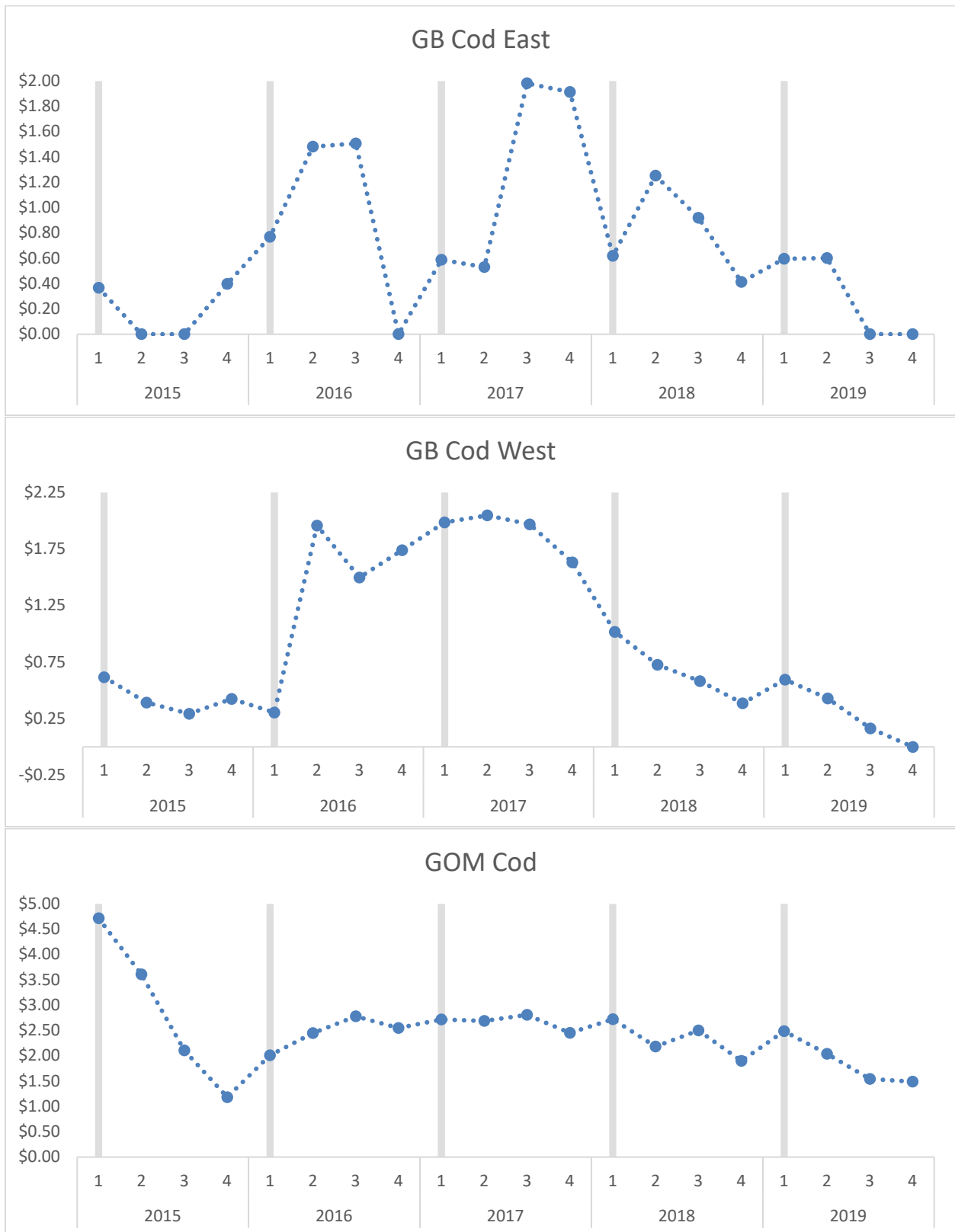


Figure 5- Catch performance for Georges Bank cod including: catches from CY2005- CY2020, historical OFLs and ABCs since FY 2010, and constant ABC approach (FY2022-FY2024). Overfishing status in the terminal year of the assessment indicated on the x-axis (“Yes” = overfishing, “No” = not overfishing, and “unk” = unknown overfishing status).

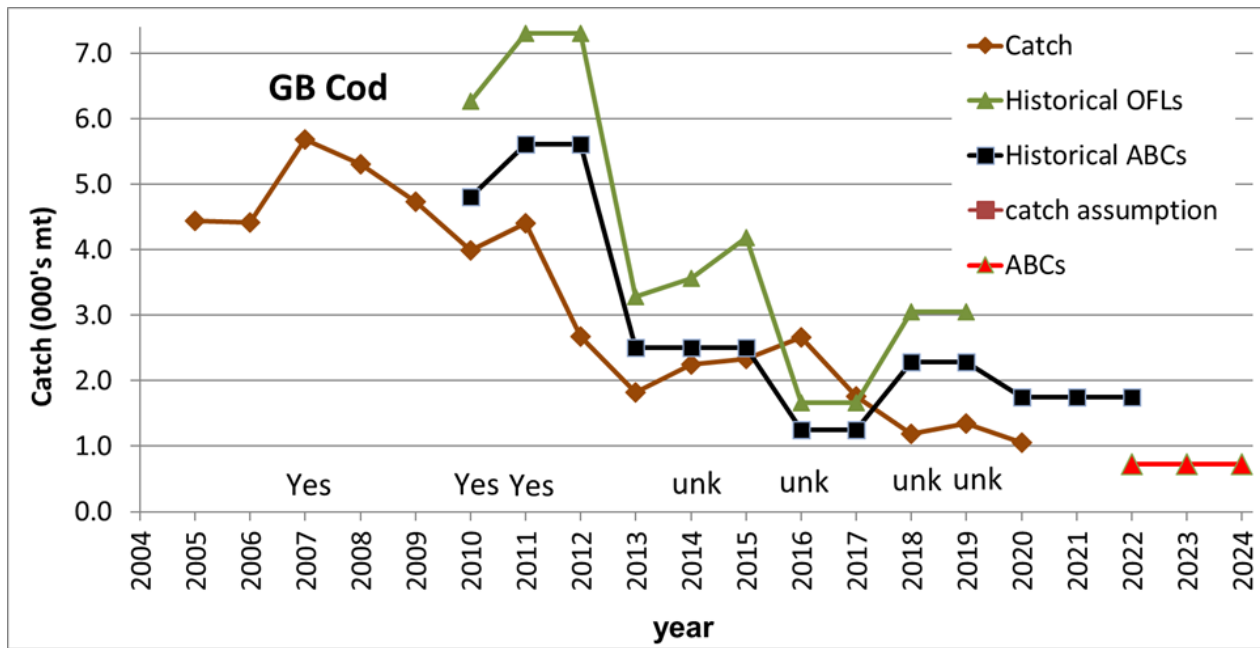


Figure 6- GOM cod abundance (numbers/tow) and biomass (kg/tow) trends in the MA DMF spring bottom-trawl survey (top panels), NMFS fall bottom-trawl survey (middle panels), and NMFS spring bottom-trawl survey (bottom panels).

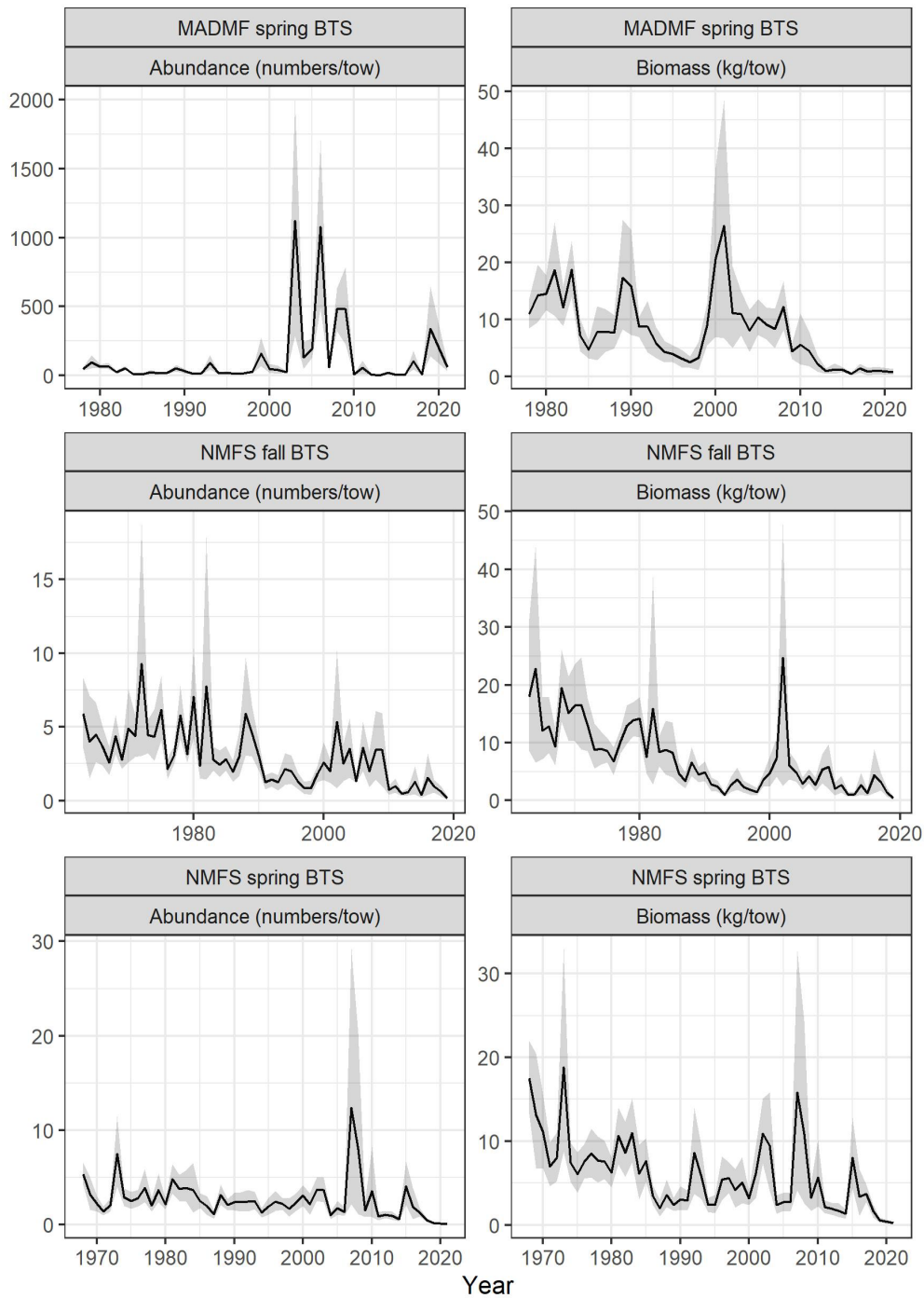


Figure 7- Normalized indices for GOM cod abundance (numbers/tow) and biomass (kg/tow) for the three surveys MA DMF spring bottom-trawl survey, NMFS fall bottom-trawl survey, and NMFS spring bottom-trawl survey.

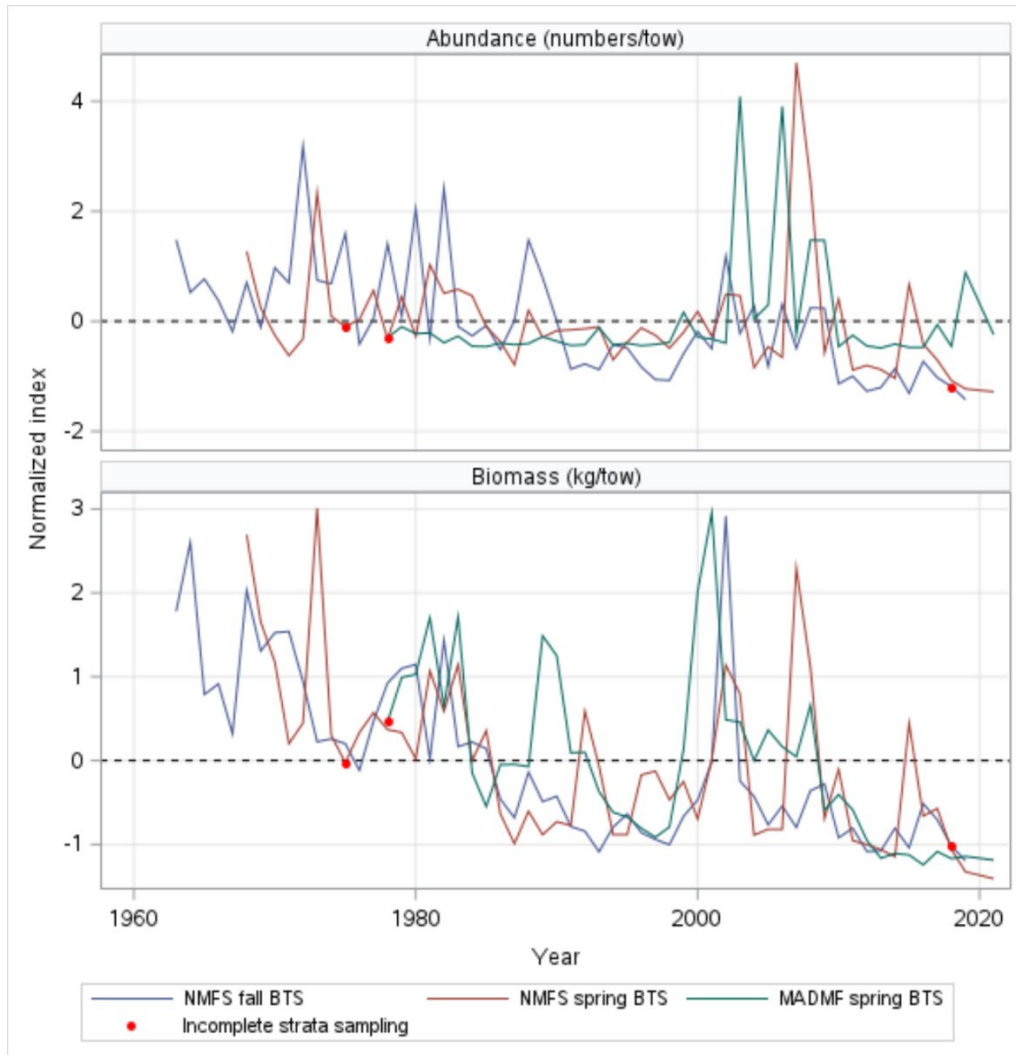


Figure 8- Catch performance for GOM cod including: catches from CY2005- CY2019, historical OFLs and ABCs since FY 2010, CY2020 and CY2021 “bridge year” catch assumptions, and projections for FY2022- FY2024 (using the M=0.2 model with retro adjustment) F_{MSY} , $75\%F_{MSY}$. Overfishing status in the terminal year of the assessment indicated on the x-axis (“Yes” = overfishing, “No” = not overfishing, and “?” = undetermined overfishing status).

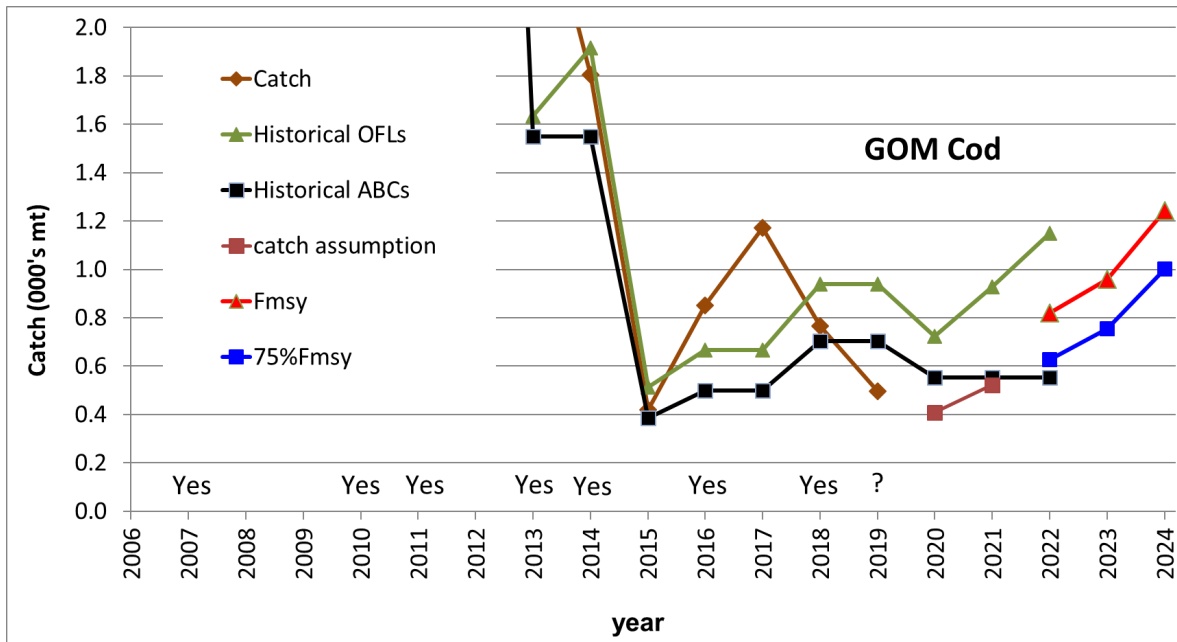
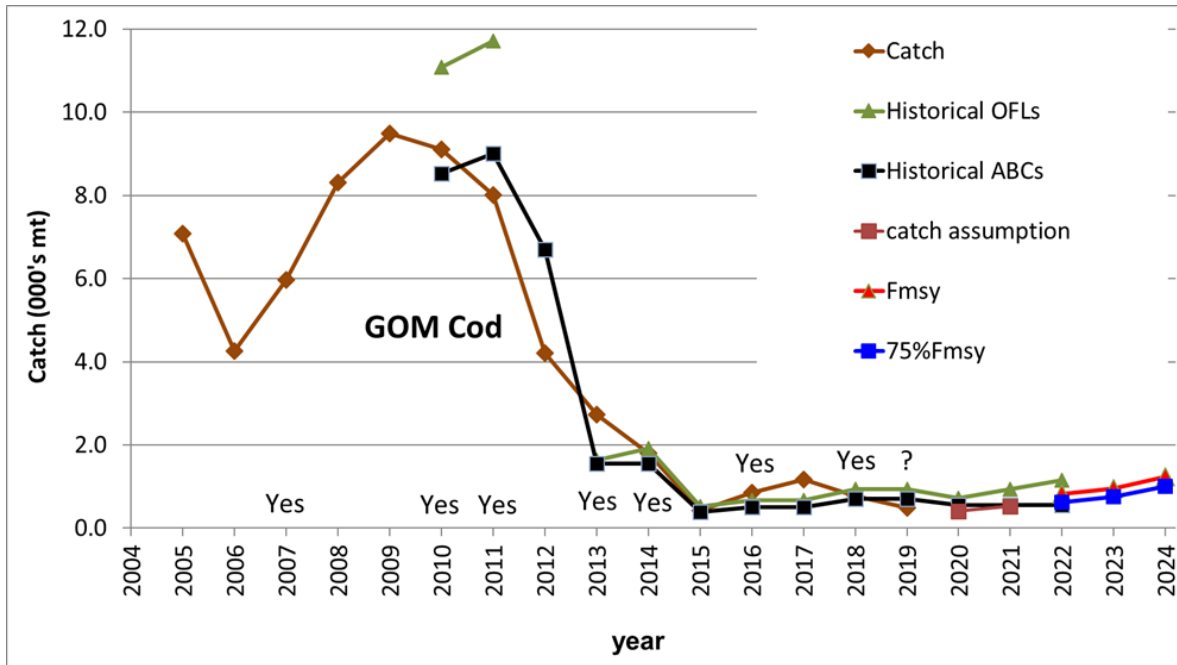


Figure 9- GOM cod projections using the M=0.2 model with rho adjustment for F_{MSY} , $F_{rebuild}$, 75% F_{MSY} , and $F=0$, fishing mortality (top), catch (middle), and SSB (bottom).

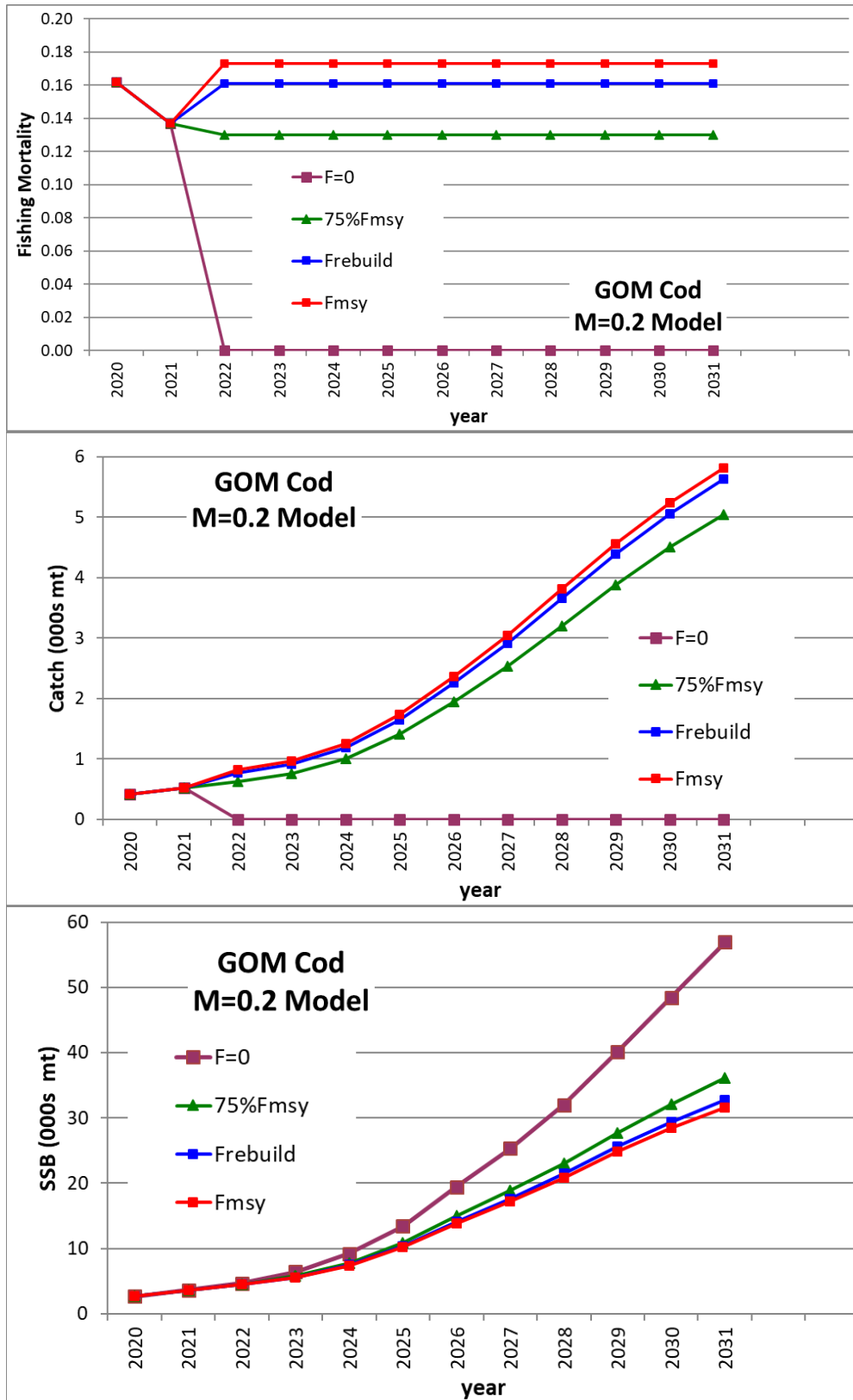


Figure 10- GOM cod projections using the M-ramp $M=0.4$ model for F_{MSY} , $F_{rebuild}$, $75\%F_{MSY}$, and $F=0$, fishing mortality (top), catch (middle), and SSB (bottom).

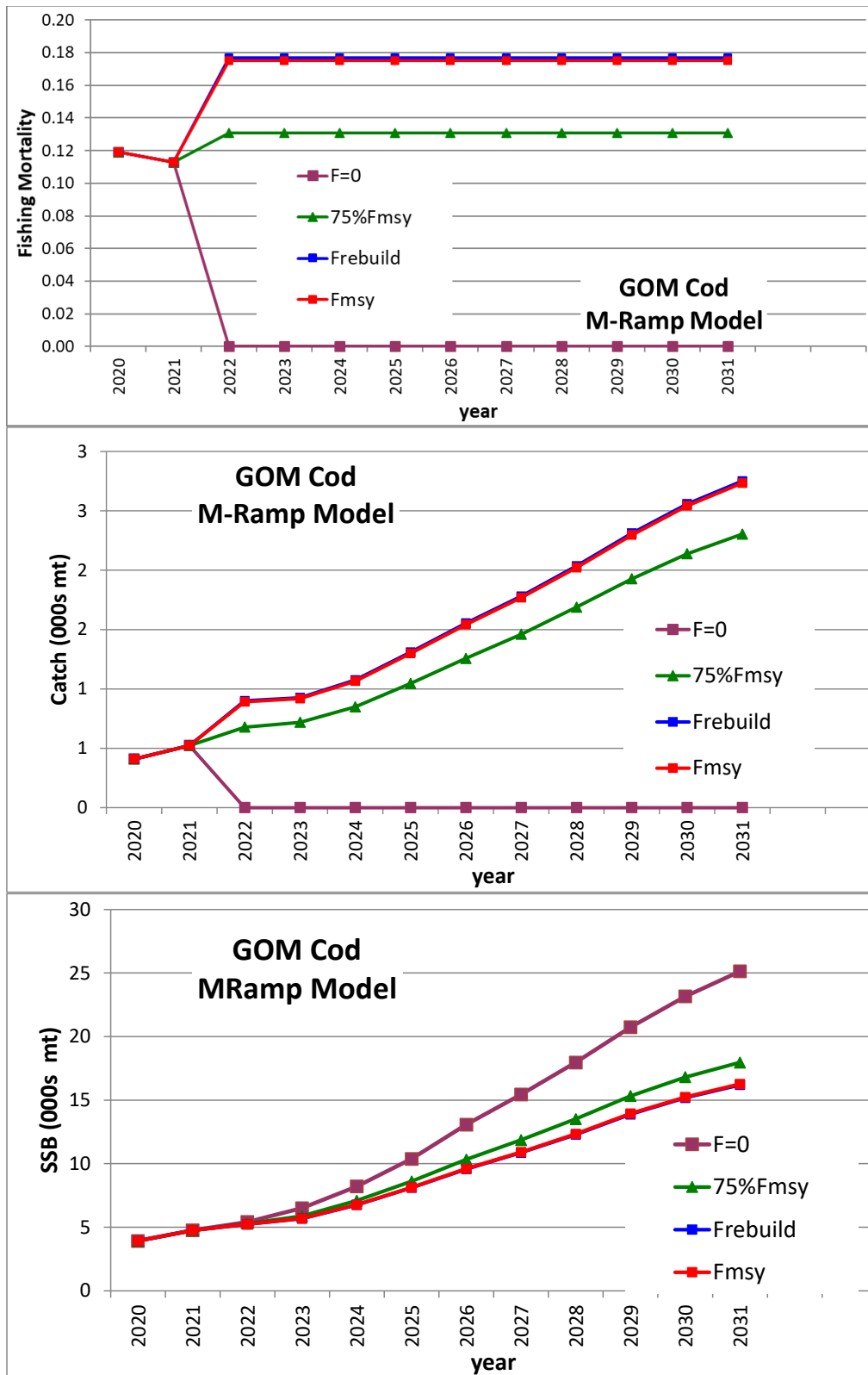
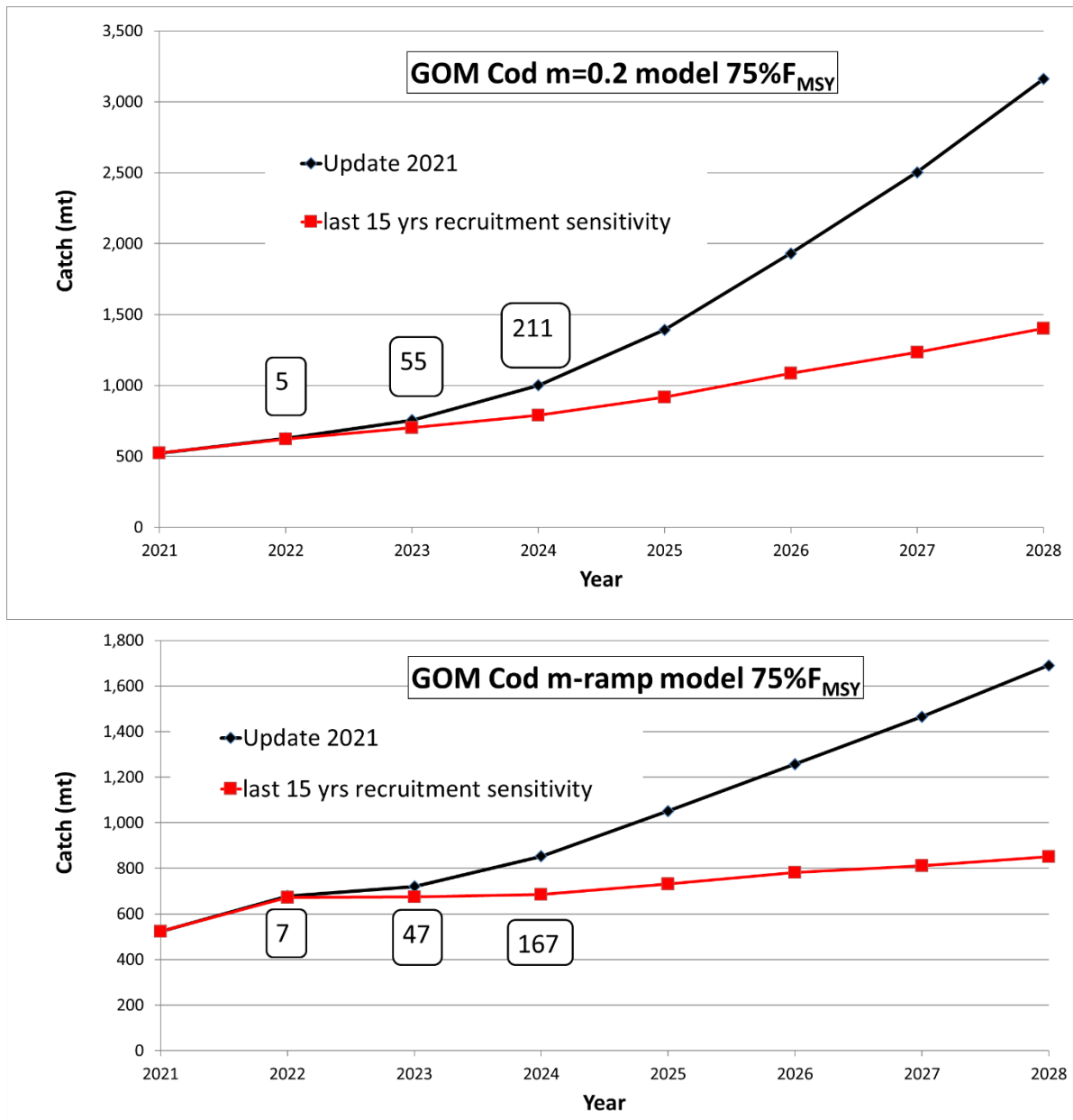


Figure 11- GOM cod -comparison of 75%F_{MSY} projections with different recruitment assumptions for the M=0.2 model with rho adjustment (top) and M-ramp M=0.4 model (bottom). Differences in catch (mt) due to the recruitment assumption from 2022 through 2024 is given in the boxes.



Estimated CY2020 GB Cod and GOM Cod Total Catch (mt)

Stock	Total Catch	Groundfish Fishery	Sector	Common Pool	Recreational	Midwater Trawl Herring Fishery	Scallop Fishery	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	676.2	497.9	494.7	3.2					6.0	172.3
GOM Cod	409.2	392.3	238.6	3.3	150.5				15.1	1.7

Sector and common pool catch estimates used FY19 and FY20 year-end DMIS data

Recreational catch estimates based on "new" MRIP data

State water landings based on CY20 landings from CFDBS database as of August 2, 2021

State water discard estimates based on FY19 estimated total discards of 0.8 mt for the three stocks.

Other sub-component catch estimates used FY19 and FY20 year-end DMIS data

Values in metric tons of live weight

Sector and common pool include estimate of missing dealer reports

Any value for a non-allocated species may include landings of that stock or misreporting of species and/or stock area. These are northern windowpane, southern windowpane, ocean pout, halibut, and wolffish.

Source: NMFS Greater Atlantic Regional Fisheries Office

August 4, 2021, run date of July 2, 2021

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; (4) Observers and at-sea monitors via the Northeast Fisheries Observer Program. Differences with previous reports are due to corrections made to the database.

For GB cod

For **CY2020** ---- Groundfish PDT's catch estimate of 676mt US catch + 377mt Canada (Table 2 in the Appendix of the draft TSR 2021) for total combined catch of **1,053 mt**

For GOM cod

For **CY2020** ---- Groundfish PDT's catch estimate of **409mt**

For **CY2021** ---- Total ACL in FY2021 of **523mt**

5.7.9.3.3 Recreational Fishery Georges Bank Cod Catch Target

Table 65 and Table 66 summarize recent catches of GB cod by the US commercial fishery and the recreational fishery. In FY2014 through FY2017, recreational fisheries accounted for greater than 5% of US fisheries catches of GB cod. For FY2018-FY2020, a recreational fishery GB cod catch target was established to use to develop management measures for the recreational fishery that would not exceed the target of 138mt. An overview of the calculation is provided in Table 67. The Council updated the calculation using data from the 2019 stock assessment, which included the new MRIP data (Table 68). A comparison using pre and post MRIP recalibration data for catch target ideas is summarized in Table 69. Under the new MRIP data, the catch target could have been greater than 138mt.

In FY2018 and FY2019, the Regional Administrator had the authority to adjust recreational fishery measures for GB cod in order to stay under the recreational catch target (Table 70). Table 71 shows the new MRIP estimates as well for comparison purposes. Figure 13 summarizes cod catch frequencies for FY2018, Figure 14 summarizes cod catch size frequencies, and Figure 15 summaries MRIP intercept data. This information suggests that if fishery conditions continue, the recreational fishery may exceed the 138mt recreational GB cod catch target of 138mt in FY2020.

Table 65- Summary of recent catches (mt) of Georges Bank cod by the US commercial groundfish fishery, FY2015-FY2018 and preliminary in-season FY2019. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO, and FY2019 in-season catch report, GARFO, Feb. 11, 2020.

		<u><i>Commercial Groundfish Fishery- Georges Bank Cod</i></u>				
Fishing Year		Sub-ACL	Landings	Discards	Catch	Percentage of sub-ACL
	2015	1,787	1,608.5	28.3	1,636.8	92%
	2016	608	571.9	24.6	596.6	98%
	2017	531	432.8	13.1	446	78%
	2018	1,519	833.2	4.7	837.9	62%
	<i>In-season 2019</i>	1,568.2	379.2	6.0	385.3	25%

Table 66- Georges Bank cod recreational catch (mt), FY2011-FY2018. Sources: FY2011 – FY2018 final year-end multispecies catch reports, GARFO.

Fishing Year	<i>Recreational Fishery – Georges Bank Cod</i>				
	Federal Waters Recreational Catch	State Waters Recreational Catch	All Recreational Catch	Total US Catch	Recreational Portion of Total US Catch (Percent)
2011	54.6	0.0	54.6	3,405.9	1.6%
2012	62.7	4.4	67.1	1,724.1	3.9%
2013	8.0	0.0	8.0	1,616.3	0.5%
2014	75.9	15.5	91.4	1,514.4	6.0%
2015	132.1	33.0	165.1	1,835.4	9.0%
2016	419.7	57.8	477.5	1,125.5	42.4%
2017	50.1	2.8	52.9	522.5	10.1%
2018	31.6	5.5	37.1	887.3	4.2%

Table 67- Calculation of the GB cod catch target for the recreational fishery. Data source: Recreational catches in 2017 groundfish operational assessment of GB cod, NEFSC.

Catch (mt)	Calendar Year					Recreational Average 12-16
	2012	2013	2014	2015	2016	
Commercial landings	2,007	1,312	1,514	1,300	1,109	
Commercial discards	120	83	19	31	33	
Recreational landings	56	6	88	124	369	sum = 643
Recreational discards	1	1	2	15	30	sum = 49
Canadian landings	395	384	430	472	428	
Canadian discards	75	39	28	20	12	+ _____
Catch for Assessment	2,653	1,824	2,081	1,962	1,982	692
						5-yr avg 138.4

Table 68- Recalculating the catch target for GB cod using new MRIP landings and discards, and updated commercial landings and discards (2019 assessment update).

Georges Bank Cod 2019 Assessment Results	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		
<i>Calendar Year</i>												
Commercial landings	2,999	2,688	3,387	2,007	1,312	1,514	1,300	1,109	464	574		
Commercial discards	385	253	122	120	83	19	31	33	20	13		
Recreational landings	142	195	142	81	7	257	486	1,075	786	77		
Recreational discards	3	8	8	1	1	5	21	10	8	2		
CA landings	1,003	748	702	395	384	430	472	428	474	510		
CA discards	206	94	43	75	39	28	20	12	14	7		
Catch for Assessment	4,738	3,986	4,404	2,679	1,827	2,253	2,330	2,667	1,765	1,183		
											Averages	
Evaluation of recreational fishery catches												
Recreational catch total (landings and discards)	145	203	150	82	8	262	507	1,085	794	79	3-Year: 2016-2018	545.4
US catch total (commercial and recreational catches)	3,529	3,144	3,659	2,209	1,403	1,795	1,838	2,227	1,278	666	5-Year: 2014-2018	1,561
Percentage of catches Rec total: US total	4.11%	6.46%	4.10%	3.71%	0.57%	14.60%	27.58%	48.72%	62.13%	11.86%		33.0%
Percentage of catches Rec total: Total catches	3.06%	5.09%	3.41%	3.06%	0.44%	11.63%	21.76%	40.68%	44.99%	6.68%		25.1%

Table 69- Comparison of the catch target for GB cod with pre- and post-calibration MRIP data using different time periods for the evaluation.

Data Source and Date Range	Catch Target
Pre-calibration MRIP Data Average 2012-2016	138 mt <i>(current catch target for FY2020)</i>
Post-calibration MRIP Data Average 2012-2016	389 mt
Post-calibration MRIP Data Average 2014-2018 (5-Year)	545 mt
Post-calibration MRIP Data Average 2016-2018 (3-Year)	653 mt

Table 70- Recreational Catch Estimates for Georges Bank Cod under previous (old) MRIP methods¹. Source: NOAA Fisheries/NEFSC, January 2020.

	FY2018	FY2019 ²	
Cod Angler Trips ³	21,372	20,258	-5%
Cod Catch (numbers, a+b1+b2)	19,371	47,178	144%
Cod Kept/Released Dead (numbers, a+b1)	12,499	25,875	107%
Cod Released Alive (numbers, b2)	6,872	21,303	210%
Cod Removals (numbers, a+b1+(0.30*b2))	14,561	32,266	122%
Cod Removals (weight⁴, mt)	37	116	214%
Cod Avg. Catch Per Trip (numbers)	0.9	2.3	157%

¹Source: Available MRIP data as of Jan 6, 2020

²Wave 6, 2018 and Wave 2, 2019 used as a proxies for FY 2019

³Number of angler trips that targeted and/or caught cod

⁴All weights are based on round weights calculated from MRIP length frequencies and length to weight equations used in the assessment

Table 71- Recreational Catch Estimates for Georges Bank Cod under recalibrated (new) MRIP methods¹. Source: NOAA Fisheries/NEFSC, January 2020.

	FY2018	FY2019 ²	
Cod Angler Trips ³	47,343	46,719	-1%
Cod Catch (numbers, a+b1+b2)	41,073	113,117	175%
Cod Kept/Released Dead (numbers, a+b1)	25,277	54,347	115%
Cod Released Alive (numbers, b2)	15,796	58,770	272%
Cod Removals (numbers, a+b1+(0.30*b2))	30,016	71,978	140%
Cod Removals (weight⁴, mt)	76	233	207%
Cod Avg. Catch Per Trip (numbers)	0.9	2.4	179%

¹Source: Available MRIP data as of Jan 6, 2020

²Wave 6, 2018 and Wave 2, 2019 used as a proxies for FY 2019

³Number of angler trips that targeted and/or caught cod

⁴All weights are based on round weights calculated from MRIP length frequencies and length to weight equations used in the assessment

Figure 13- FY 2018 Georges Bank Recreational Cod Catch Frequencies. Source: NEFSC.

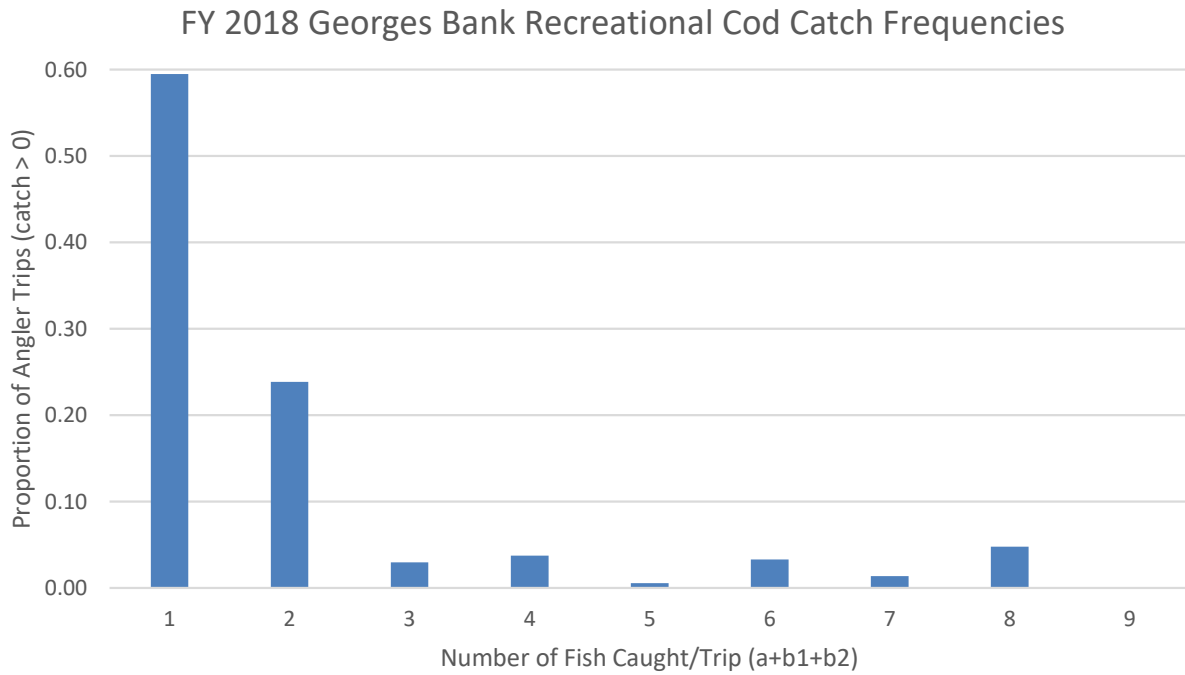


Figure 14- FY 2018 GB Recreational Cod Catch Size Frequencies. Source: NEFSC.

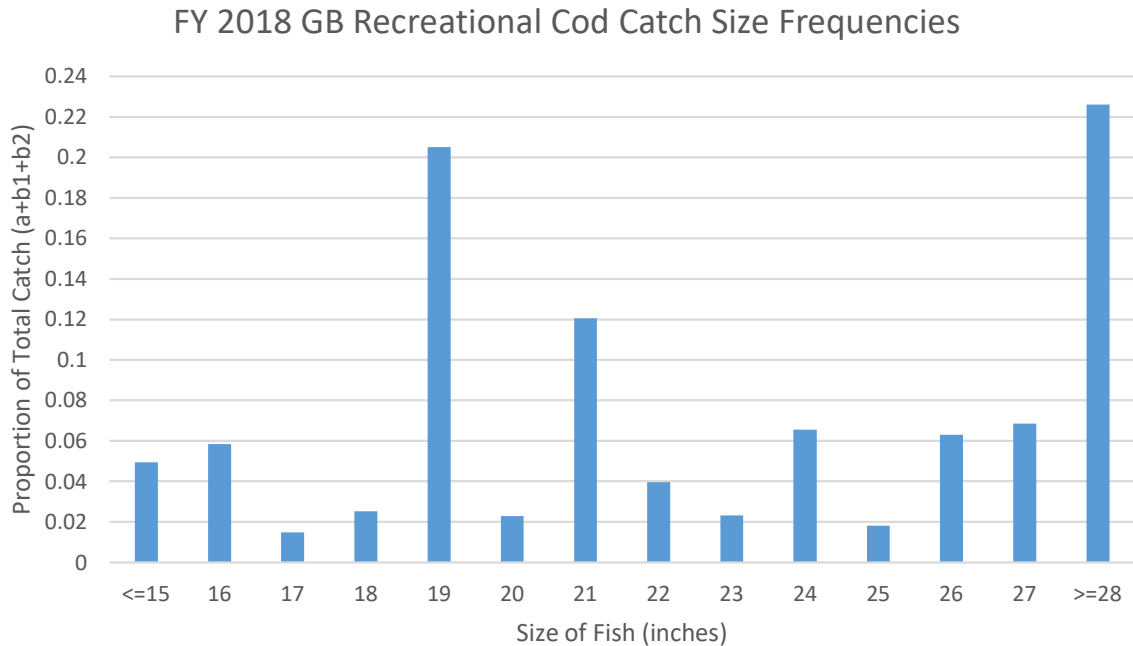


Figure 15- MRIP Georges Bank Cod Intercept Data (FY 2018). Source: NEFSC.

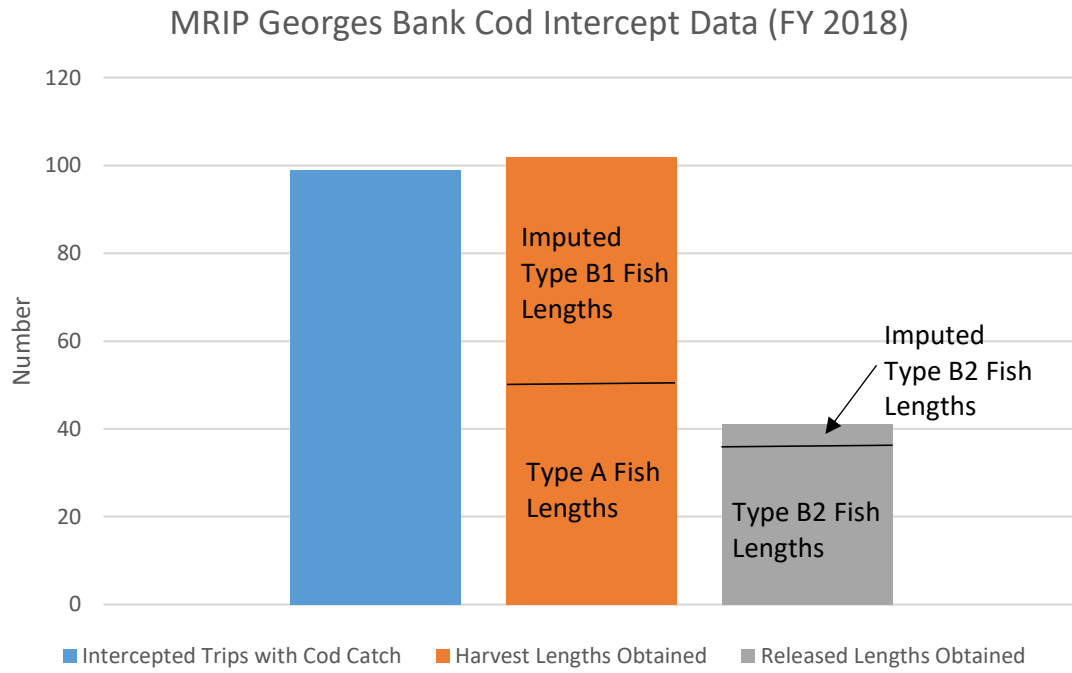


Table 59- Summary of Gulf of Maine cod recreational catch performance and federal management (fishing years 2010–2020).

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2010	2,673	1506.9	56.4	24	10	5/1/10 to 10/31/10 and 4/16/11 to 4/30/11	11/1/10 to 4/15/11	<p>First year of sub-ACL 33.7% of ACL</p> <p>Groundfish Regulations:</p> <p>Only one line per angler, and</p> <p>Filletts landed by private recreational and charter/party vessels must have at least 2 sq. inches (5.08 sq. cm) of contiguous skin that allows for the ready identification of the fish species. Such filletts are required to be from legal-sized fish, but the filletts themselves would not need to meet the minimum size requirements in the regulations.</p>
2011	2,824	1640.3	58.1	24	10	5/1/11 to 10/31/11 and 4/16/12 to 4/30/12	11/1/11 to 4/15/12	<p>First Year: Gulf of Maine (Whaleback) Cod Spawning Protection Area:</p> <p>From April 1 through June 30 of each year, all recreational vessels, including private recreational and charter/party vessels, may only use pelagic hook-and-line gear, as defined below, when fishing in the Whaleback Cod Spawning Protection Area.³⁰</p>

³⁰ **Pelagic hook-and-line gear** is defined as handline or rod and reel gear that is designed to fish for, or that is being used to fish for, pelagic species. No portion of this gear may be operated in contact with the bottom at any time.

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2012	2,215	937.4	42.3	19	9	5/1/12 to 10/31/12 and 4/16/13 to 4/30/13	11/1/12 to 4/15/13	
2013	486	639.3	131.5	19	9	5/1/13 to 10/31/13 and 4/16/14 to 4/30/14	11/1/13 to 4/15/14	
2014	486			21	9	5/1/14 to 8/31/14 and 4/15/14 to 4/30/14	9/1/14 to 4/14/15	Replaced by interim action on 11/15/14
		623.3	128.3	n/a	0	closed	11/15/14 to 4/30/15	2014 interim action: Seasonal 30-minute block closures, no recreational gear capable of catching groundfish in closures
2015	121	84.5	69.8	n/a	0	Closed year-round		Interim action Seasonal closures removed on 5/1/16
2016	157	280.9	178.9	24	1	8/1/16 to 9/30/16	5/1/16 to 7/31/16	

Possession Restrictions: Any vessel fishing in the Gulf of Maine Whaleback Cod Spawning Protection Area, or the Winter Massachusetts Bay Spawning Protection Area, including pelagic hook-and-line gear by recreational vessels, is prohibited from possessing or retaining regulated species or ocean pout from April 1 through June 30 of each year.

Transiting: Recreational vessels are allowed to transit the Gulf of Maine Cod Spawning Protection Area, and Winter Massachusetts Bay Spawning Protection Area provided all gear is stowed in accordance with the regulations.

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2017	157			24	1	8/1/17 to 9/30/17	and 10/1/16 to 4/30/17	Replaced by final rule effective on 7/27/17
		245.4	156.3	n/a	0	Closed year-round		
2018	220	146.9	66.8	n/a	0	Closed year-round		First Year: Winter Massachusetts Bay Spawning Protection Area: From November 1 through January 31 of each year, all recreational vessels, including private recreational and charter/party vessels, may only use pelagic hook-and-line gear, as defined below, when fishing in the Winter Massachusetts Bay Spawning Protection Area. ¹
2019	220	79.8	36.3	21	1	9/15/19 to 9/30/19	5/1/19 to 9/14/19 and 10/1/19 to 4/30/20	Previous year's regulations were in effect until July 5, 2019, when these measures were implemented. Based on comments received on the proposed rule there will not be an open season in April 2020.
2020	193			21	1	9/15/20-9/30/20 and		

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
						4/1/21-4/14/21 (Private) 9/8/20-10/7/20 and 4/1/21- 4/14/21 (Charter/Party)		