New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

# MEMORANDUM

**DATE:** August 15, 2019

**TO:** Scientific and Statistical Committee (SSC)

**CC:** Groundfish Committee

**FROM:** Groundfish Plan Development Team (PDT)

**SUBJECT:** **Georges Bank yellowtail flounder Acceptable Biological Catches for fishing years 2020 and 2021**

The Groundfish Plan Development Team (PDT) met on August 12, 2019 by webinar and discussed **Georges Bank (GB) yellowtail flounder catch advice in support of developing Acceptable Biological Catches (ABCs) for fishing years 2020 and 2021.**

The Groundfish PDT compiled information and analysis for the Scientific and Statistical Committee (SSC) to consider when developing catch advice. The Scallop PDT provides information on the scallop fishery and bycatch of GB yellowtail flounder in Attachment #1. Both PDTs refer the SSC to the 2017 and 2018 memos on the subject for additional background[1].

**Information reviewed included 2019 assessment documents and 2018 PDT and SSC memos**:

- TRAC. 2019. Georges Bank Yellowtail Flounder. TRAC Status Report 2019/XX.
- TRAC. 2019. DRAFT Stock Assessment of Georges Bank Yellowtail Flounder for 2019.
- TRAC. 2019. Presentation: Stock Assessment of Georges Bank Yellowtail Flounder for 2019
- VIMS. 2019. TRAC Working Paper: Georges Bank Yellowtail Flounder Estimates from VIMS Industry-Based Scallop Dredge Surveys of Closed Area II and Surrounds.
- Risk policy matrix for GB yellowtail flounder for 2018.
- PDT to SSC re GB yellowtail flounder ABCs, dated August 9, 2018 including a memo from the Scallop PDT to the Groundfish PDT
- SSC to Council re GB yellowtail flounder ABCs, dated August 23, 2018.

[1] 2018 memo: https://s3.amazonaws.com/nefmc.org/A6_180809-GF-PDT-memo-to-SSC-re-GB-yellowtail-flounder-with-Scallop-PDT-memo-attachment.pdf
2017 memo: http://s3.amazonaws.com/nefmc.org/A6_170804-GF-PDT-memo-to-SSC-re-GB-yellowtail-flounder-with-Scallop-PDT-memo-attached_170807_114738.pdf

***Stock Status***

NOAA Fisheries determined GB yellowtail flounder is overfished and overfishing is occurring.[2] GB yellowtail flounder is in a 26-year rebuilding plan, with a target rebuild by date of 2032.

***Overview of the 2019 Assessment***

- The Transboundary Resource Assessment Committee (TRAC) met July 9-11, 2019 in St. Andrews, New Brunswick, Canada to conduct assessments for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder.
- The 2019 TRAC stock assessment results for GB yellowtail flounder continue to indicate low stock biomass and poor productivity, with low recent recruitment in all three surveys (Northeast Fisheries Science Center, NEFSC, fall and NEFSC spring and Department of Fisheries and Oceans, DFO, winter).
- Recent catches are at historic low amounts, with catches for Canada and USA at 45 mt for 2018.
- To generate catch advice, an empirical approach based on survey catches developed during the 2014 Georges Bank Yellowtail Flounder Diagnostic and Empirical Approach Benchmark and updated during the 2017 intersession conference call was applied.
- The TRAC recommended an upper bound for the exploitation rate of 6% for catch advice, which results in 199 mt for 2020. The TRAC also recommended setting the exploitation rate as low as possible below the upper bound of 6%.

***PDT Analysis and Discussion***

The PDT compiled updated information since its 2018 memo to the SSC on (1) catch performance for GB yellowtail flounder (2) the ratio of discards to landings for GB yellowtail flounder, and also provides new information this year on (3) observed catches of GB yellowtail flounder, and (4) in-season utilization of GB yellowtail flounder by groundfish sectors.

1. *Catch performance of GB yellowtail flounder*

Figure 1 and Table 1 summarize the total catch performance of GB yellowtail flounder in the US and Canadian fisheries.

In the US, three fisheries have sub-annual catch limits (ACLs) for GB yellowtail flounder – the commercial groundfish fishery (sectors and common pool), the scallop fishery, and the small-mesh trawl fisheries. The utilization rate of the US groundfish fishery (i.e., percent groundfish ACL caught) was greater than 85 percent in FY2011, but it has been below 40 percent since FY2012, and below 20 percent since FY2015 (Table 2). At the same time, ACLs for the groundfish fishery have declined to about 7 percent of those in FY2011 (i.e., from 1,142 mt in FY2011 to 84.6 mt in FY2019) (Table 2). Accountability measures (AMs) include in-season GB yellowtail flounder stock area closures and payback provisions under certain conditions. Information on catch performance and management in the US scallop fishery is provided in Attachment 1. The sub-ACL for GB yellowtail flounder in the small-mesh trawl fisheries (primarily for whiting and squid) was implemented in FY2013. AMs for the small-mesh trawl fisheries include gear-restricted areas in the GB yellowtail flounder stock area in a year

[2] See: https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates

following an overage of the sub-ACL. To date, small-mesh fisheries have not exceeded their sub-ACL (Table 3).

**Figure 1 – Total US and Canada catch performance for Georges Bank yellowtail flounder including: catches from CY 2005- CY 2018 and historical ABCs since FY 2010. Overfishing status in the terminal year of the assessment indicated on the x-axis (Yes = overfishing, No= not overfishing, and unknown = unknown overfishing status). Note: "unknown" status presented in this graph is based on the stock assessment, and is not the official stock status determined by NOAA Fisheries.**

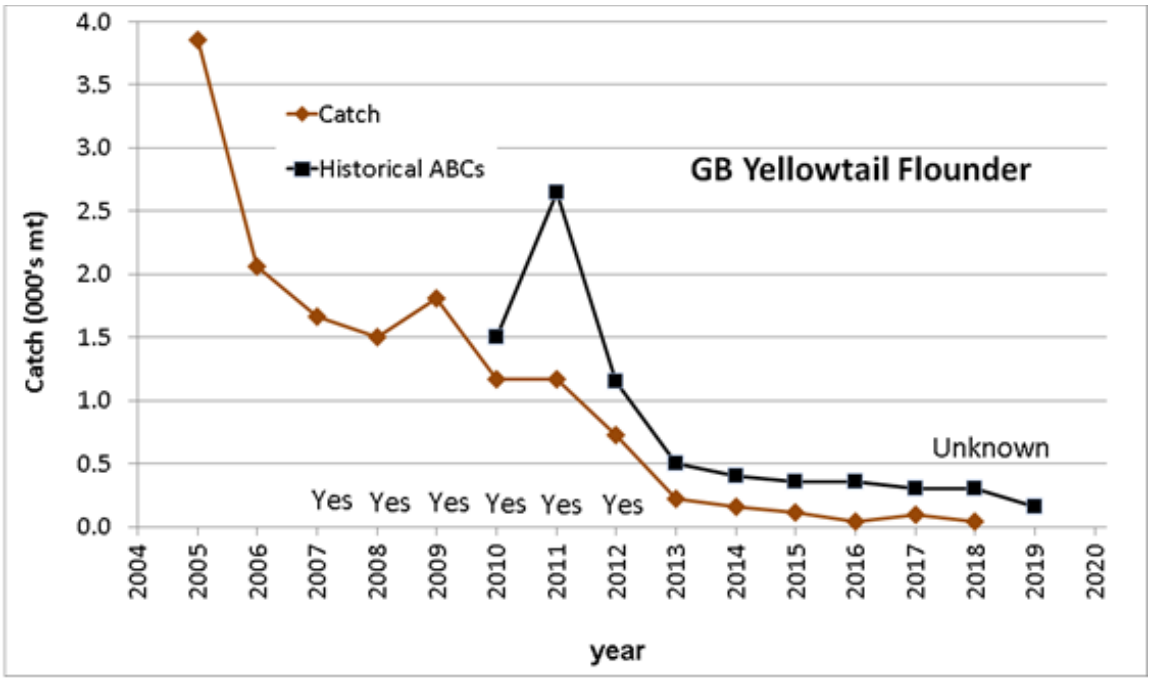



**Table 1- Total US and Canada CY catch (mt) performance of GB yellowtail flounder, including historical OFLs and ABCs.**

| Year | CY Catch | Historical OFLs | Historical ABCs |
|---|---|---|---|
| 2010 | 1,170 | 5,148 | 1,500 |
| 2011 | 1,171 | 3,495 | 2,650 |
| 2012 | 725 | 1,691 | 1,150 |
| 2013 | 218 | 882 | 500 |
| 2014 | 159 | undefined | 400 |
| 2015 | 118 | undefined | 354 |
| 2016 | 44 | undefined | 354 |
| 2017 | 95 | undefined | 300 |
| 2018 | 45 | undefined | 300 |
| 2019 | | undefined | 140 |

**Table 2 - Recent GB yellowtail flounder TACs, groundfish fishery sub-ACLs, and catches for fishing years 2011 through preliminary 2019. Values shown in metric tons (mt). Source: GARFO year-end catch reports.**

| | Total Shared TAC – US & CA (mt) | US % Share | US TAC (mt) | % US TAC Caught | Groundfish sub-ACL (mt) | Groundfish catch (mt) | Percent Groundfish ACL Caught (%) |
|---|---|---|---|---|---|---|---|
| FY2011 | 2,650 | 55% | 1,458 | 76.0% | 1142.0 | 990.0 | 86.7% |
| FY2012 | 1,150 | 49% | 564 | 68.0% | 368.3 | 215.5 | 58.5% |
| FY2013 | 500 | 43% | 215 | 43.0% | 154.5 | 55.8 | 36.1% |
| FY2014 | 400 | 82% | 328 | 37.0% | 254.5 | 62.5 | 24.5% |
| FY2015 | 354 | 70% | 248 | 27.5% | 202.9 | 38.4 | 18.9% |
| FY2016 | 354 | 76% | 269 | 11.4% | 250.8 | 23.9 | 9.5% |
| FY2017 | 300 | 69% | 207 | 40.6% | 162.6 | 31.4 | 19.1% |
| FY2018* | 300 | 71% | 213 | 18.9% | 187.9 | 27.6 | 14.7% |
| FY2019** | 140 | 76% | 106 | | 84.6 | 2.1 | 2.4% |
| *Indicates preliminary year-end catch data.<br>**Preliminary in-season catch estimate as of August 2, 2019, GARFO catch reports. | | | | | | | |

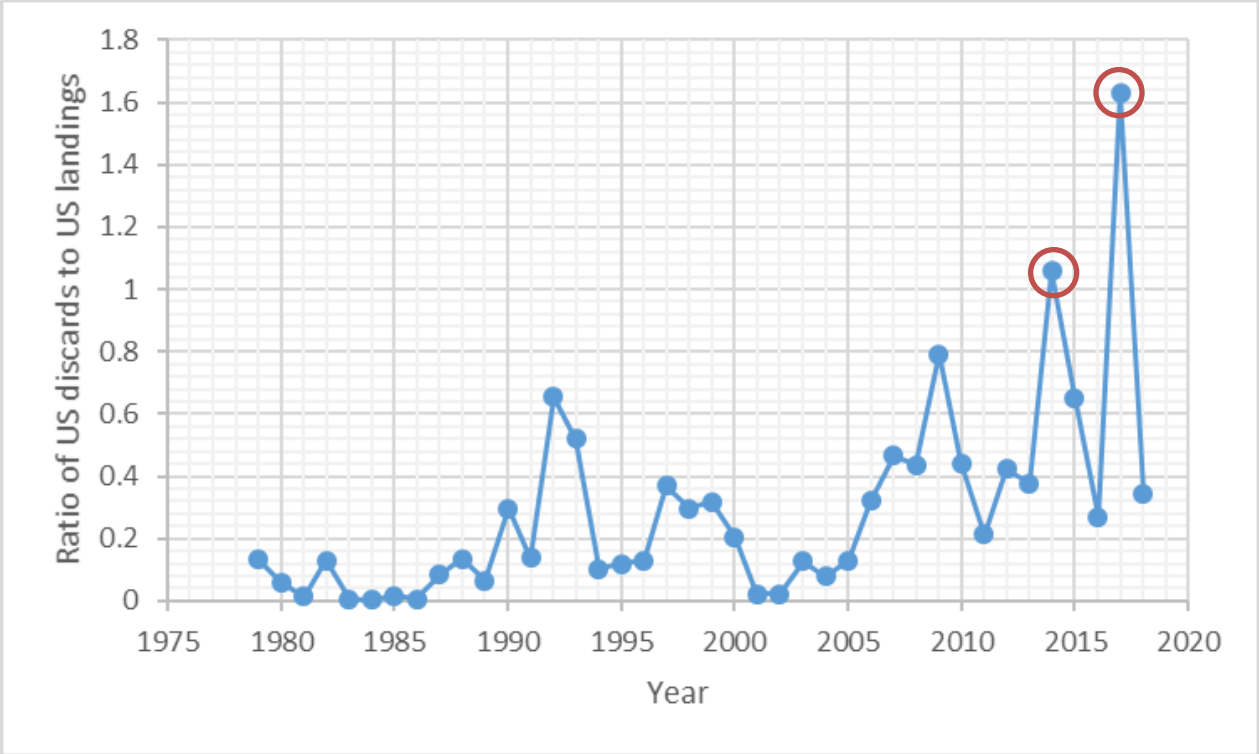
**Table 3- Recent GB yellowtail flounder small-mesh fisheries sub-ACLs and catches (mt) for fishing years 2011 through 2017. Values shown in metric tons (mt). Source: GARFO year-end catch reports. The sub-ACL was implemented in FY2013 and is not evaluated in-season. FY2018 is not available at this time.**

| | Small-mesh fisheries sub-ACL (mt) | Small-mesh fisheries (mt) | Percent small-mesh fisheries Caught (%) |
|---|---|---|---|
| FY2013 | 4 | 2.5 | 63.7% |
| FY2014 | 6.1 | 1.1 | 18.1% |
| FY2015 | 5 | 0.1 | 1.0% |
| FY2016 | 5 | 4.8 | 95.2% |
| FY2017 | 4 | 0.4 | 9.7% |
| FY2018 | 4 | | |
| FY2019 | 2 | | |

2. *Ratio of US discards to US landings of GB yellowtail flounder*

Figure 2 displays the ratio of US discards to US landings of GB yellowtail flounder. In CY2014 and CY2017, US discards are greater than US landings (i.e., ratio >1). The US scallop fishery had access to the Closed Area II rotational management area in both FY 2014 and FY2017, which led to the increase in the magnitude of yellowtail flounder discards.

**Figure 2 – Ratio of US discards to US landings of Georges Bank yellowtail flounder, CY1979-2018. Source: DRAFT Stock Assessment of Georges Bank Yellowtail Flounder for 2019, TRAC, Table 1, pp. 9. Years with Closed Area II access for the US Scallop fishery are circled.**




3. *Information on US observed catches of GB yellowtail flounder*

The following maps (Figure 3 to Figure 11) represent observed US fishing locations between FY2010 and FY2018. The data were aggregated into three-year periods, to depict trends in the distribution and magnitude of fishing effort over time for the large-mesh trawl fishery, the scallop dredge fishery, and small-mesh trawl fisheries (Table 4). The solid blue line is the 100 m isobath, and the polygons with grey borders are the NMFS statistical reporting areas. Tows with zero observed yellowtail catch are shown in red. Positive tows (total yellowtail catch >0) are shown in black, and the magnitude of observed yellowtail catch (kept and discards) in pounds (lb.) is proportional to the size of the bubble (note the changes in the size of the bubbles across time).

Large-mesh trawl tows (gear codes 050 - standard bottom trawl and 057 – haddock separator trawl) were limited to trips where the recorded mesh was greater than or equal to 140cm. Small-mesh trawl tows (gear code 050 – standard bottom trawl) where limited to observations with

codend mesh size less than 140 cm. The maps only include tows that were assigned to the statistical areas that are included in the GB yellowtail management area (522, 525, 551, 552, 561, and 562).

There were not enough observed trips with haddock separator trawls (gear code 057) in the most recent 3-year time period (FY2016-FY2018) to meet confidentiality criteria. Rule trawl trips (gear code 054) were not included because of low sample sizes, especially in the most recent 3 year period. There were not enough gillnet or longline trips in the database to meet confidentiality criteria.

**Table 4- Summary of observed tows plotted for each map in Figures 3-Figure 11, by gear and time block., "n" indicates "number of observed"**

| Scallop Fishery (gear code 132) | | | |
|---|---|---|---|
| | FY 2010-2012 | FY 2013-2015 | FY 2016-2018 |
| n tows | 8304 | 9246 | 8209 |
| n positive tows | 4500 | 4599 | 2150 |
| n tows with zero yellowtail catch | 3804 | 4867 | 6059 |

| Large Mesh Trawl Fishery (gear codes 050 and 057) | | | |
|---|---|---|---|
| | FY 2010-2012 | FY 2013-2015 | FY 2016-2018 |
| n tows | 8904 | 5714 | 1787 |
| n positive tows | 4323 | 1423 | 152 |
| n tows with zero yellowtail catch | 4581 | 4291 | 1498 |

| Small Mesh Trawl Fishery (gear code 050) | | | |
|---|---|---|---|
| | FY 2010-2012 | FY 2013-2015 | FY 2016-2018 |
| n tows | 673 | 846 | 558 |
| n positive tows | 192 | 63 | 16 |
| n tows with zero yellowtail catch | 481 | 783 | 542 |

The maps are not standardized to account for changes in fishing behavior, or any regulatory changes, that would affect the magnitude of yellowtail flounder catch.

- Future efforts to standardize catch rates could consider tow duration, the seasonality of fishing effort, and gear characteristics, among other factors.
- The maps should perhaps be interpreted with caution, given the PDT's recent investigations into observer bias and economic incentives associated with discarding.

Based on visual inspection of the maps, generally if observed trips are an overall reflection of total groundfish spatial effort, there appears to be far less directed groundfish effort on the southern flank of Georges Bank - where historically yellowtail tend to be relatively more abundant. More recently, there also appears to be fewer positive tows of yellowtail caught in bycatch fisheries (scallop and small mesh trawl) on the southern flank of Georges Bank.

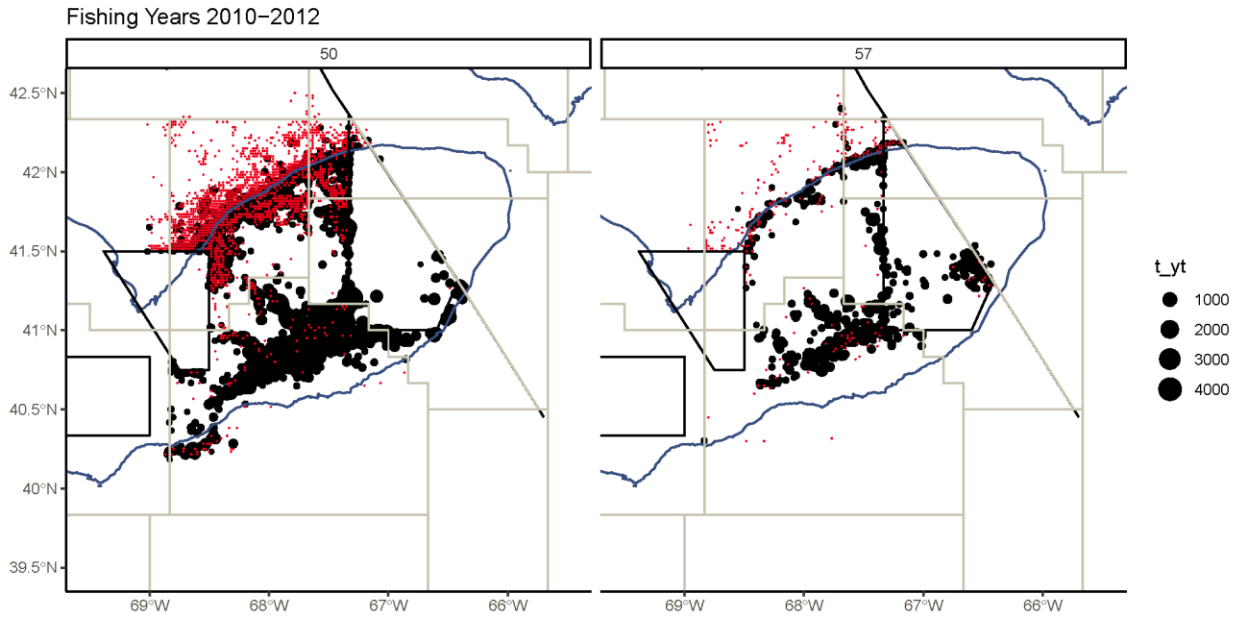



**Figure 3- US large-mesh trawl fishery catches (lb.) of yellowtail flounder, FY2010-FY2012. The left panel includes observed tows made with standard trawl gear (gear code 050), and the right panel displays observed tows made with haddock separator gear (gear code 057).**

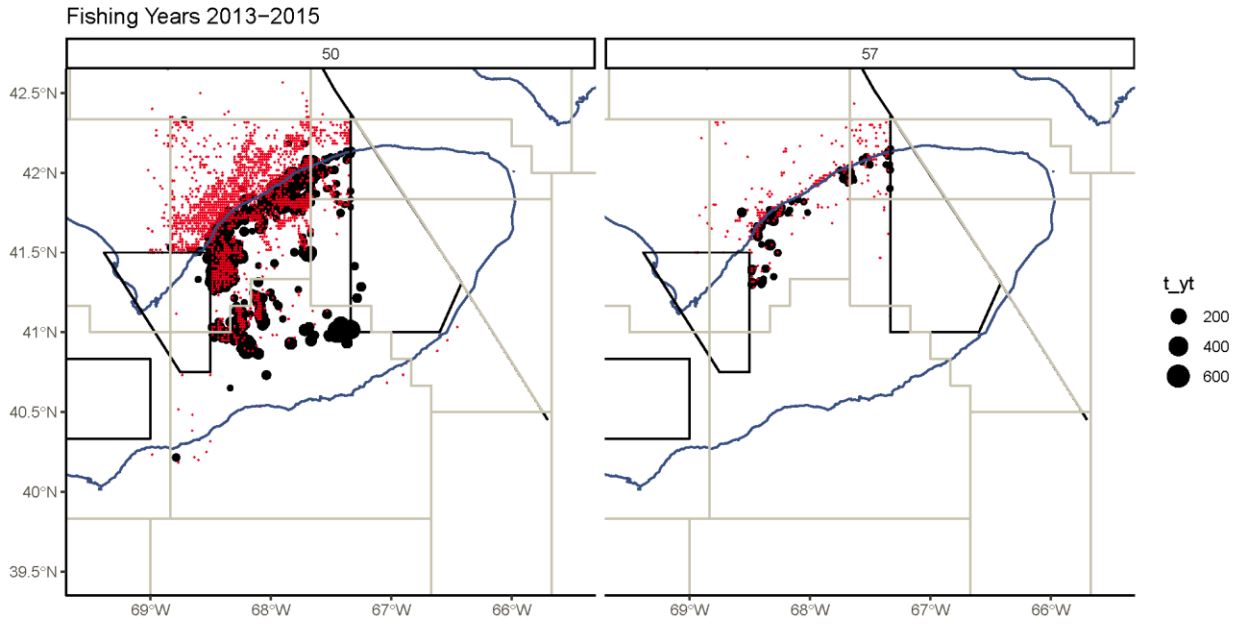



**Figure 4- US large-mesh trawl fishery catches (lb.) of yellowtail flounder, FY2013-FY2015. The left panel includes observed tows made with standard trawl gear (gear code 050), and the right panel displays observed tows made with haddock separator gear (gear code 057).**

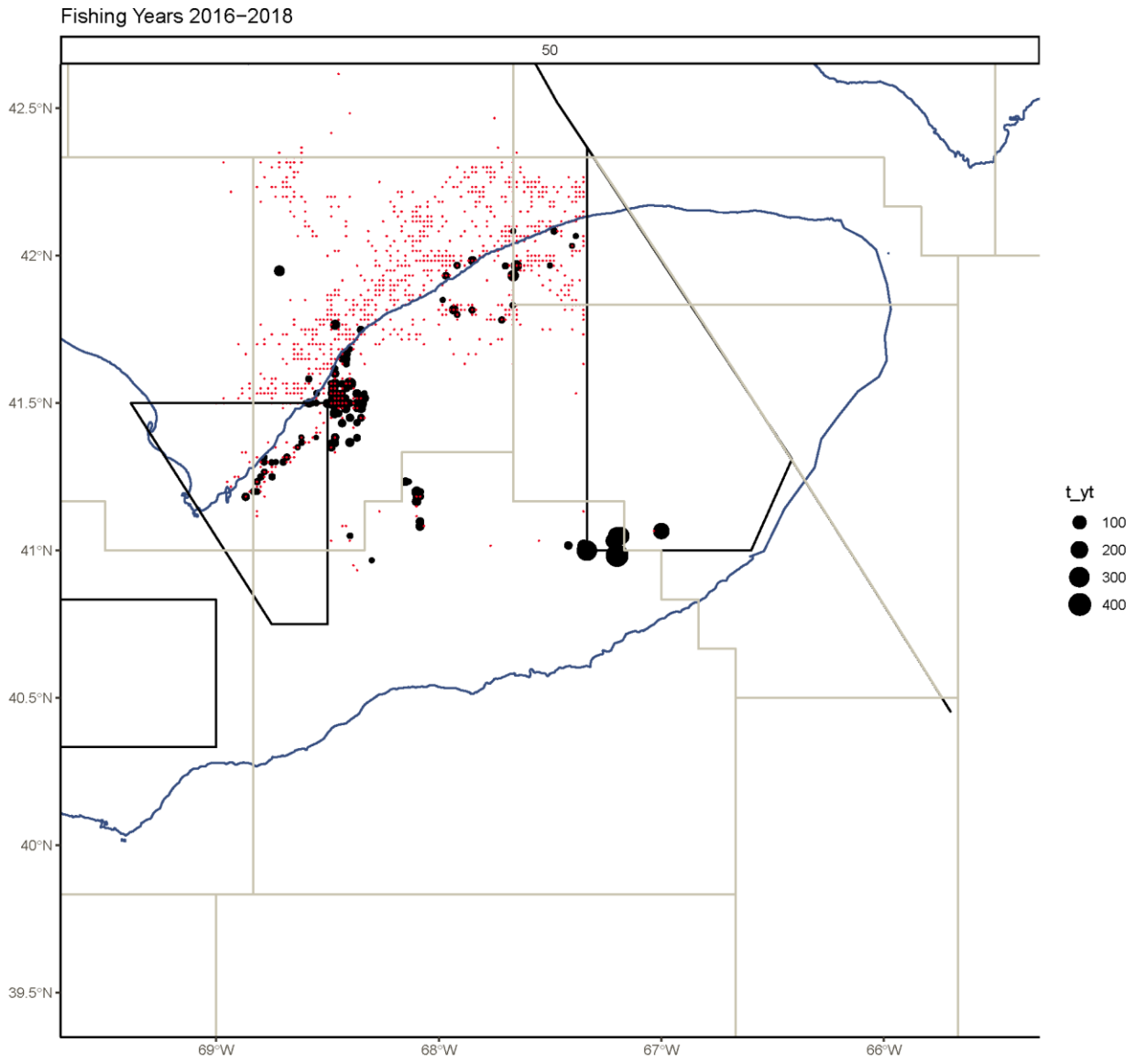



**Figure 5- US large-mesh trawl fishery catches (lb.) of yellowtail flounder, FY2016-FY2018. Only standard trawl gear (050) is displayed, as there was insufficient observed tows using haddock separator gear to meet confidentiality requirements.**

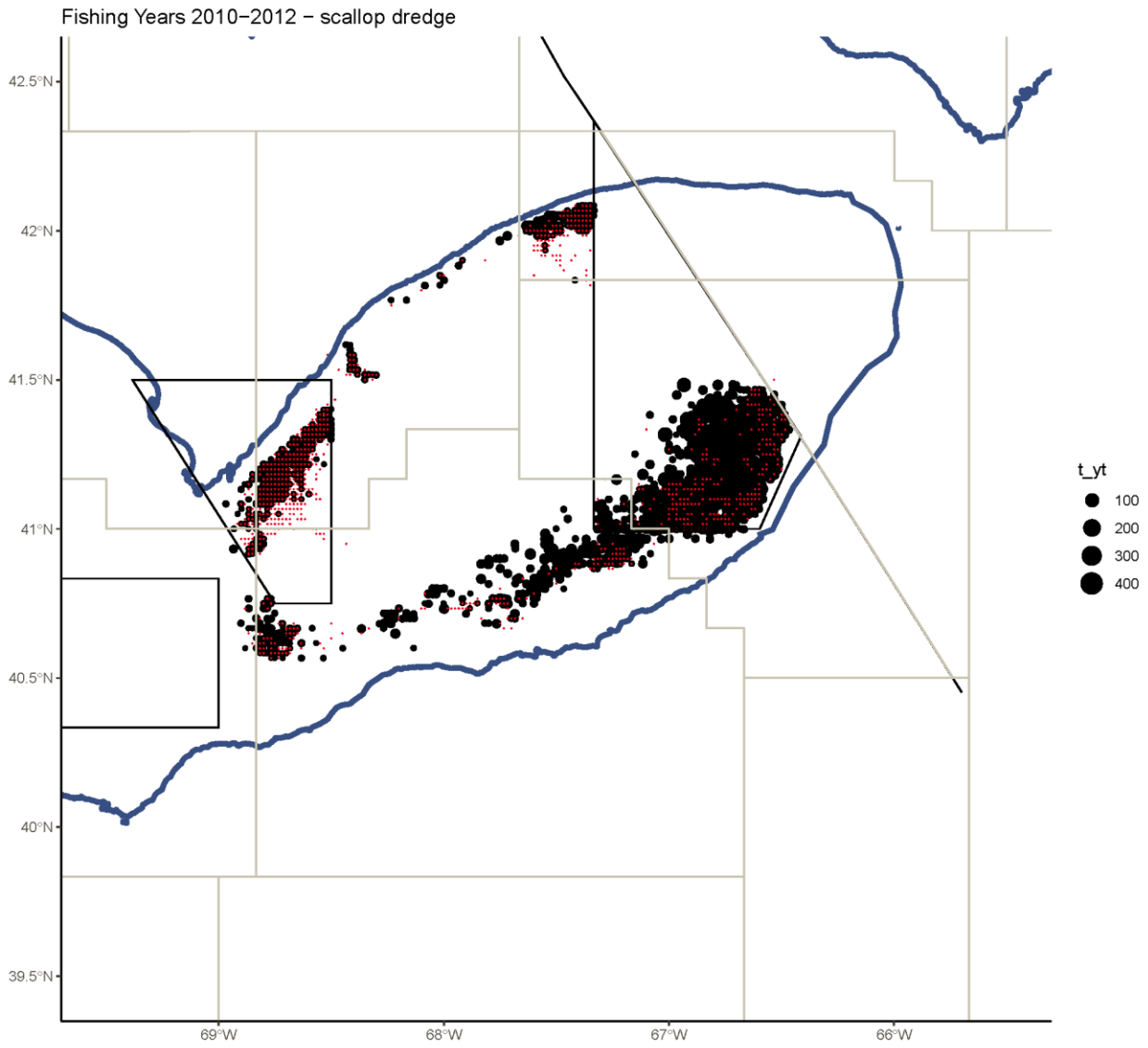



**Figure 6- US scallop dredge fishery catches (lb.) of yellowtail flounder, FY2010-FY2012.**

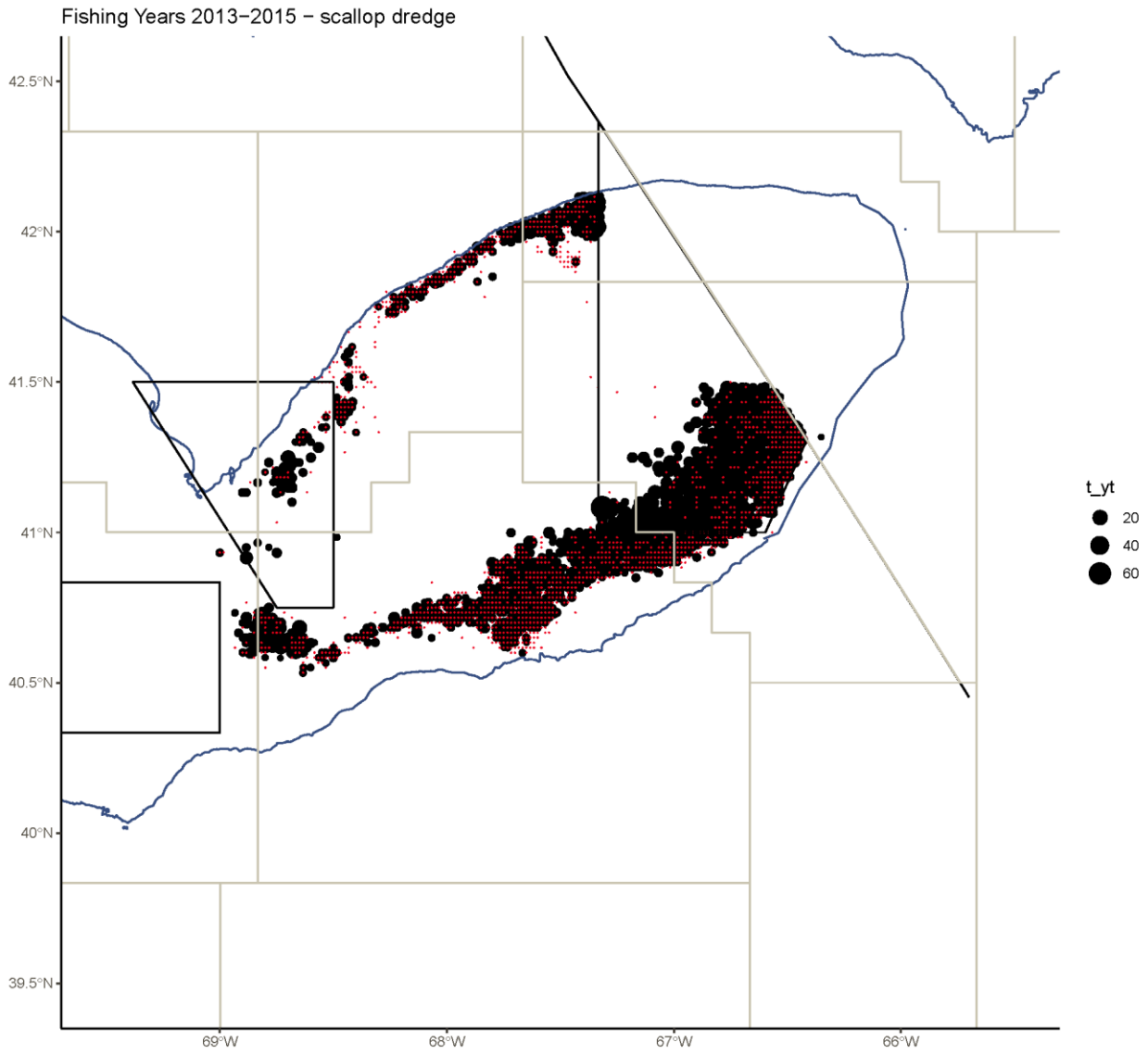



**Figure 7- US scallop dredge fishery catches (lb.) of yellowtail flounder, FY2013-FY2015.**

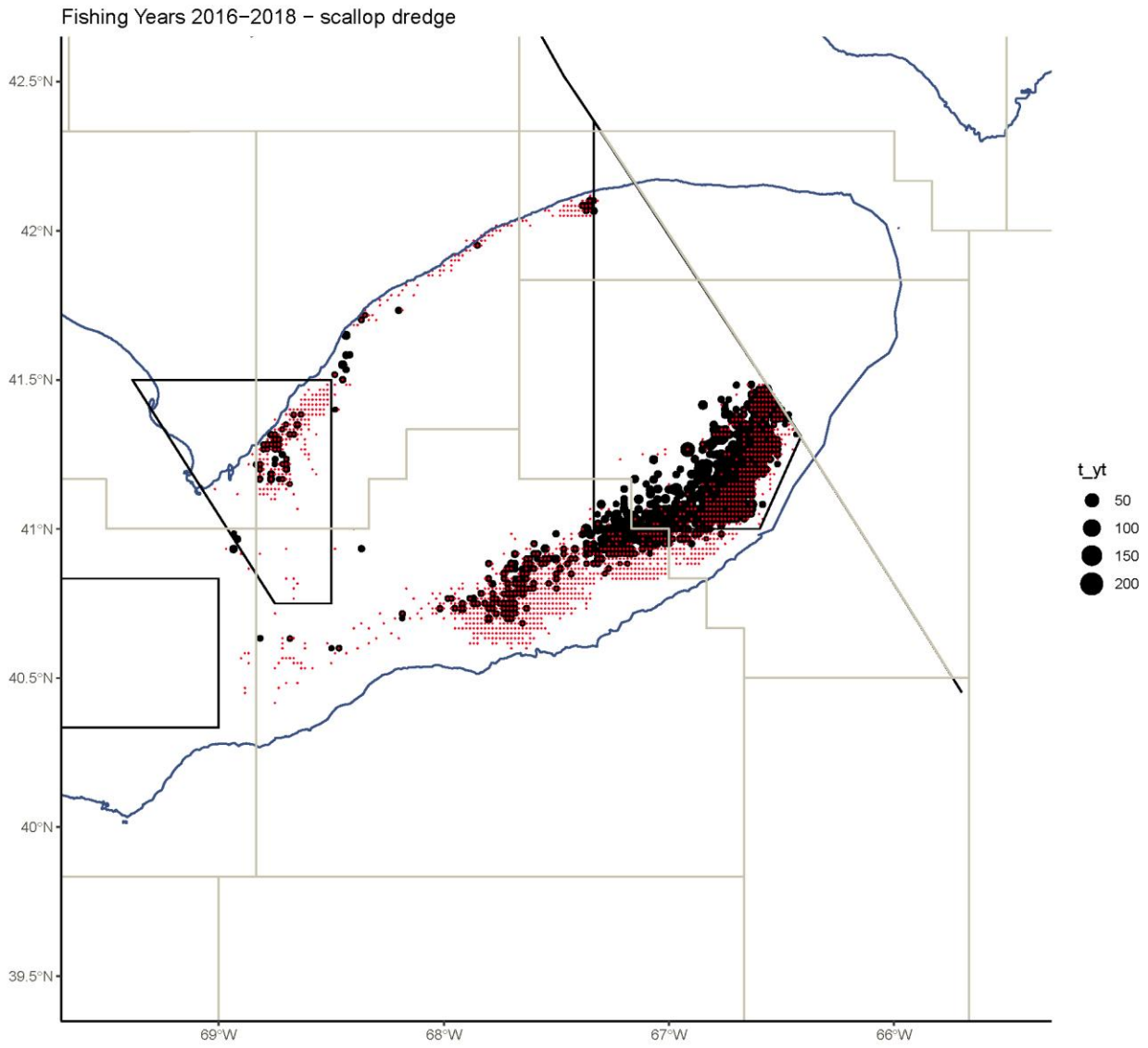



**Figure 8- US scallop dredge fishery catches (lb.) of yellowtail flounder, FY2016-FY2018.**

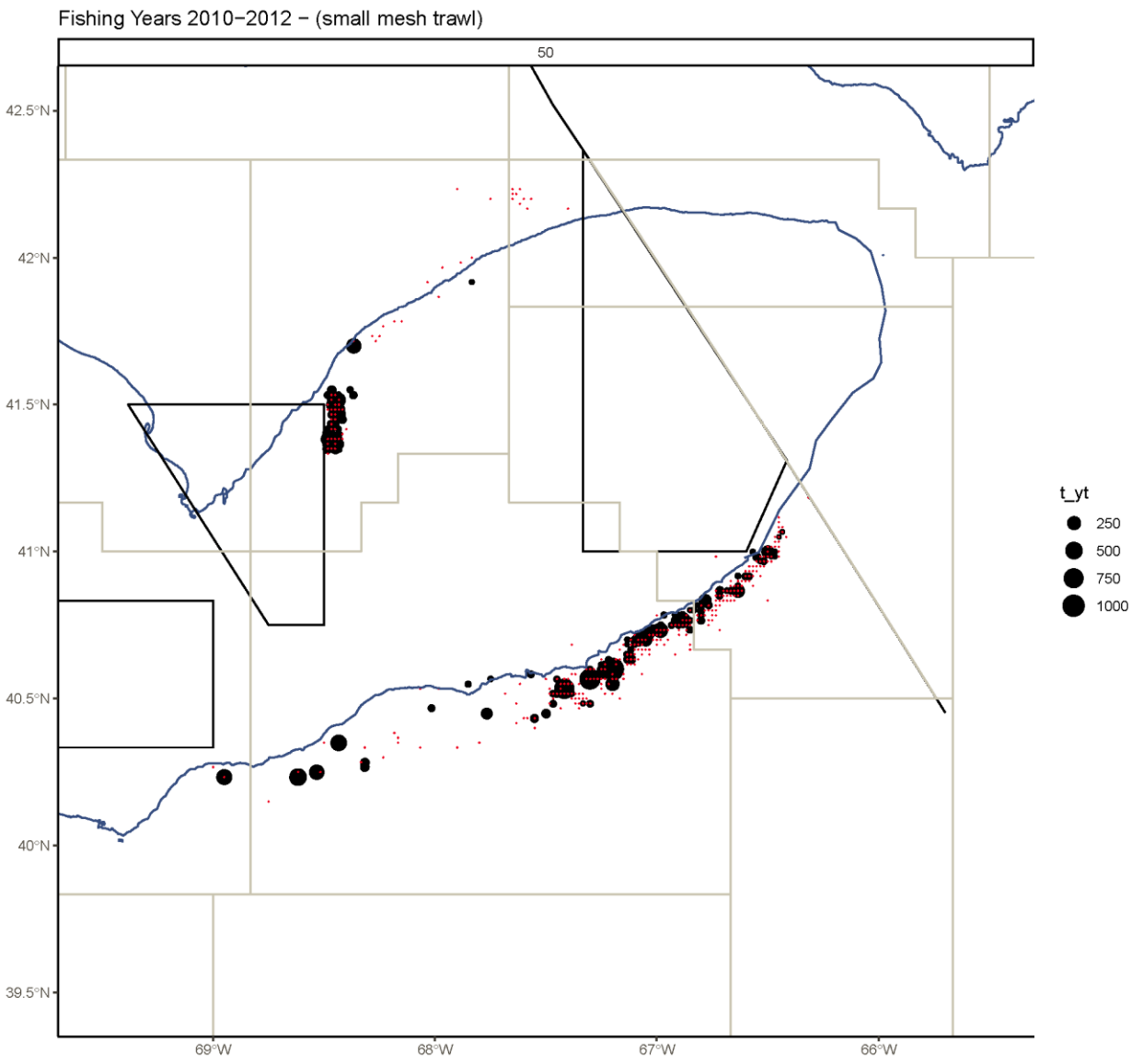



**Figure 9 - US small-mesh fisheries catches (lb.) of yellowtail flounder, FY2010-FY2012.**

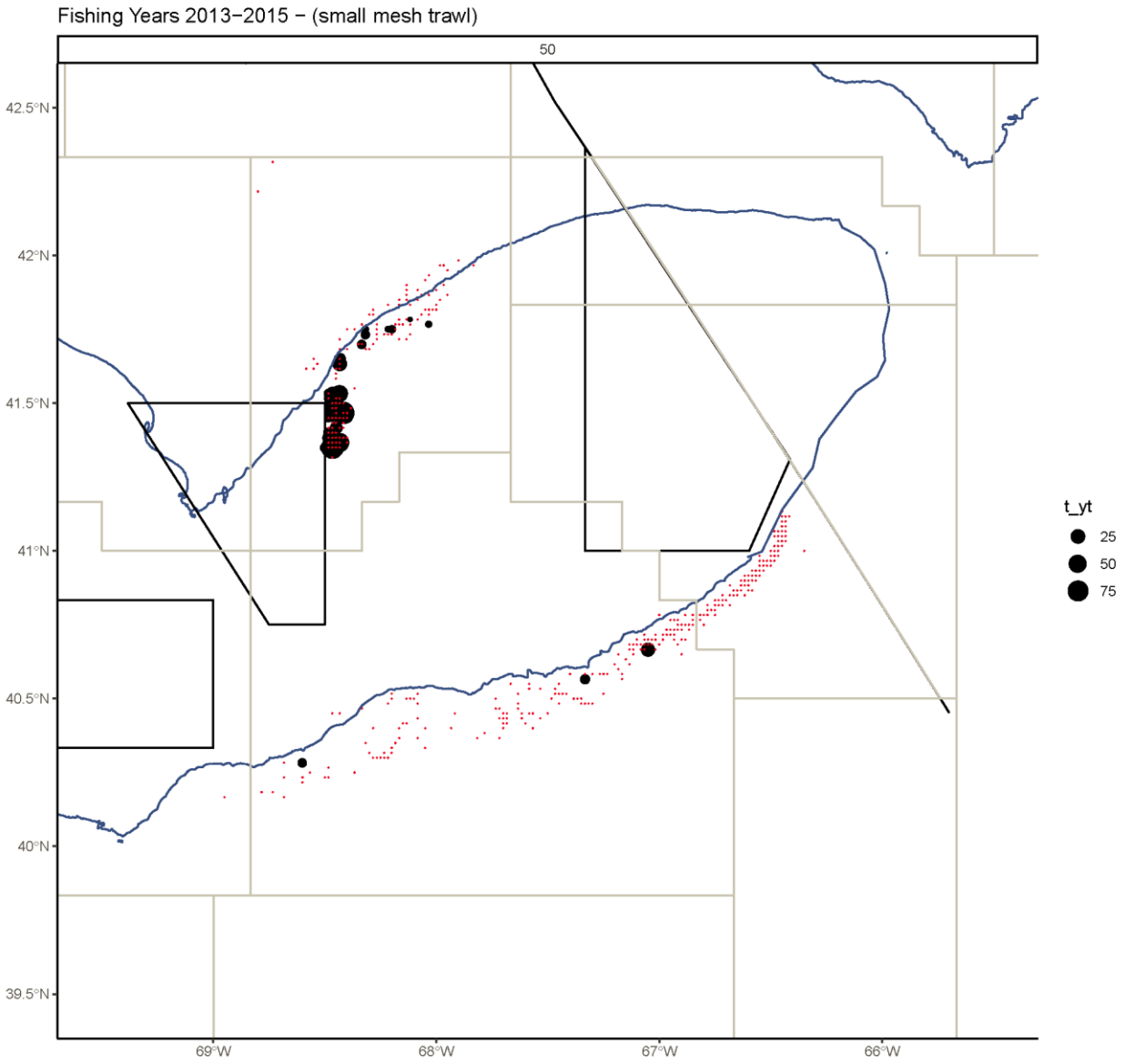



**Figure 10- US small-mesh fisheries catches (lb.) of yellowtail flounder, FY2013- FY2015.**

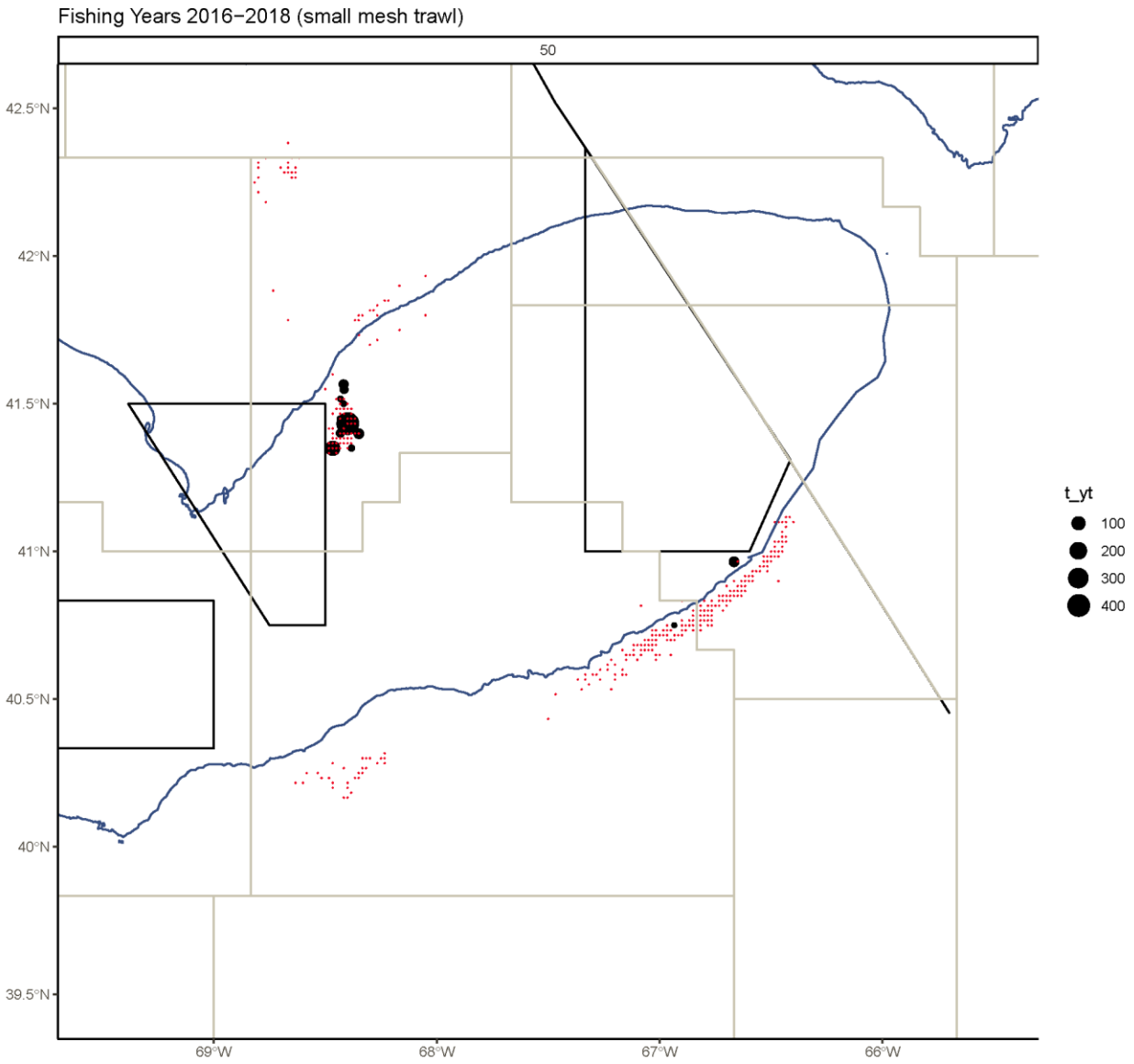



**Figure 11- US small-mesh fisheries catches (lb.) of yellowtail flounder, FY2016-FY2018.**

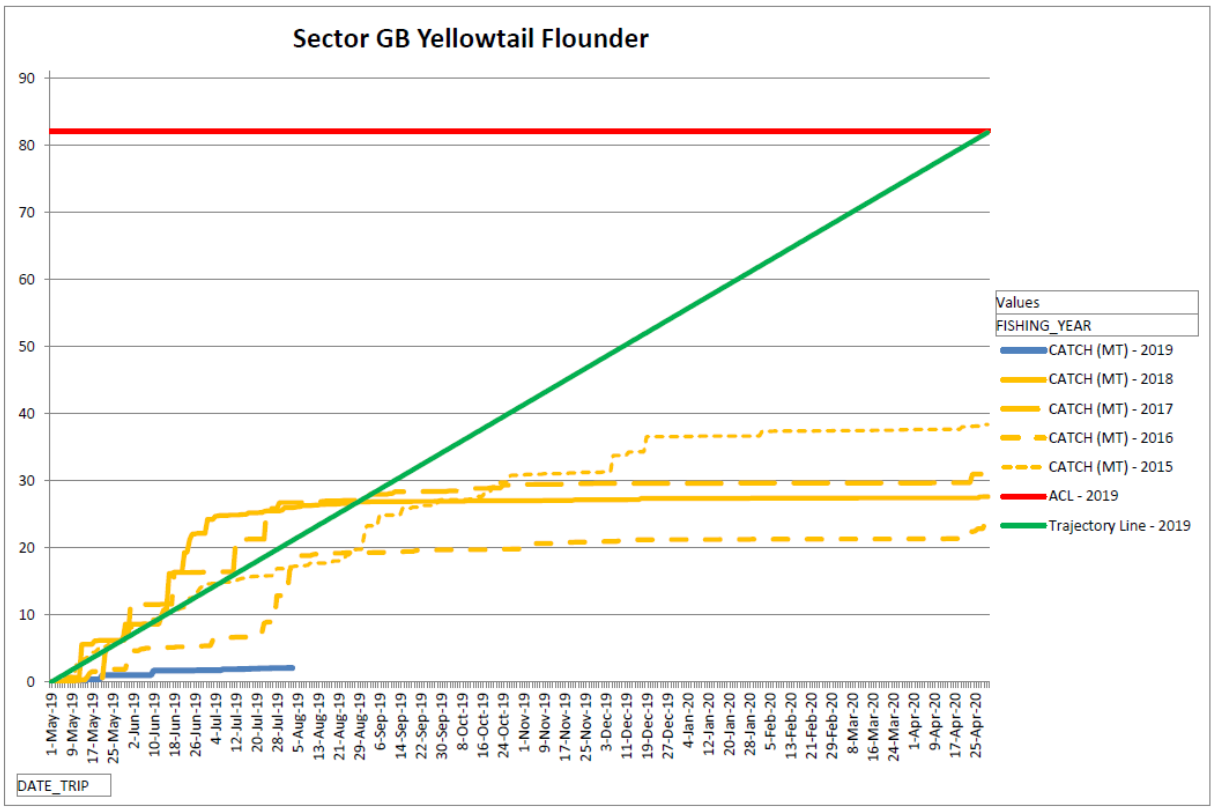
4. *In-season utilization by groundfish sectors.*

Figure 12 shows groundfish sector GB yellowtail flounder catches since FY2015 along with the FY2019 sector sub-ACL. GB yellowtail catch has been substantially below the sector sub-ACL from FY2015 to FY2018, and has not exceeded 20% of the sector sub-ACL.

GB yellowtail catches in the groundfish sector fishery show a strong seasonal component with the majority of the catch occurring from late April into August and catch mostly flat for the reminder of the fishing year. FY2019 has seen substantially lower catch than other years with an estimated 2.1 mt catch through August 3, 2019 based on preliminary data. Furthermore, the FY2019 catch trajectory is far below past catch trajectories during the beginning of the fishing year when catch rates of GB yellowtail tend to be higher (Figure 12). Past years' catch ranged from 15 to approaching 30 mt at this time of the fishing year.

In addition, the patterns represented in Figure 3 through Figure 5 suggest that there has been a substantial decline in targeted fishing effort for GB yellowtail flounder. Absent any large increases in the quota, it appears that directed fishing effort for GB yellowtail flounder is unlikely to increase in the near future.

**Figure 12-In-season utilization of GB yellowtail flounder by the sector portion of the groundfish fishery.**



### *PDT Discussion and Recommendations*

The TRAC recommended an upper bound for the exploitation rate of 6% for catch advice, which results in 199 mt for 2020. The TRAC also recommends setting the exploitation rate as low as possible below the upper bound of 6%.

Considering the findings of the 2019 TRAC assessment and additional information evaluated, the PDT discussed recommendations for a possible 2020 OFL and ABC for GB yellowtail flounder. To summarize:

- The PDT considers that the OFL remains unknown since an $F_{MSY}$ proxy was not developed in the benchmark assessment. The PDT discussed the need at some point to develop new status determination criteria (SDC) to evaluate stock status, possibly with existing information. The PDT made no additional recommendations with respect to SDC. The PDT also discussed that such an evaluation of new SDCs may be most appropriate during a stock assessment process.
- The PDT confirms the TRAC recommendation (above) as an approach to determine ABC. Such an approach would take into the consideration the poor stock status of GB yellowtail flounder and allow for fisheries with GB yellowtail flounder catch to operate while limiting catches comparable to recent years with low quotas.
    - The PDT discussed other proposals to set quotas below 199 mt (TRAC upper bound), including: 162 mt (SSC's 2018 recommendation), 140 mt (US/CA 2019 TAC and Council's 2019 ABC), and averages of recent catch (e.g., up to 100 mt).
    - The PDT did not reach consensus with an actual value to recommend for the ABC (quota).
- Given the past catch trajectories under ACLs from FY2015 to FY2018, it does not appear that an increase in the potential ABC from 140 mt to 199 mt (TRAC upper bound) will result in increased targeting of GB yellowtail flounder within the groundfish fishery.
- Generally, the PDT agreed a lower quota would reduce the risk of overfishing and promote stock rebuilding. However, a lower quota could increase negative economic risk to non-groundfish fisheries with GB yellowtail flounder bycatch if the accountability measures lead to lost revenues, conditional on the timing of measures with respect to the management of each fishery (i.e., scallop and small-mesh trawl fisheries). See Attachment 1 for more information from the Scallop PDT on the scallop fishery, in particular Closed Area 2 access.
- In addition, the PDT recognizes that from its own analysis for Amendment 23/Groundfish Monitoring that observed trips in the groundfish fishery are not representative of unobserved trips, which is a source of uncertainty. The bias could be in either direction, and it is possible that estimated discards of GB yellowtail flounder may be underestimates for the groundfish fishery.

Attachment #1

New England Fishery Management Council
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John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

**MEMORANDUM**

**DATE:** August 13, 2019

**TO:** Groundfish PDT

**FROM:** Scallop PDT

**SUBJECT:** **Scallop Fishery Activity in Georges Bank Yellowtail Flounder Stock Area**

## Preface

On August 1st, 2016, August 2nd, 2017, and July 27th, 2018, the Scallop Plan Development Team (PDT) provided memos to the Groundfish PDT outlining recent management measures within the Georges Bank yellowtail flounder (GB yellowtail) stock area, catch estimates of GB yellowtail, and scallop fishing effort within the GB yellowtail stock boundary. The Scallop PDT revisited discussion on these topics at their July 24th, 2019 meeting and through correspondence. This document updates the information provided in the 2016-2018 memos to reflect recent Council actions, as well as PDT input related to catch of scallops and GB yellowtail within the GB yellowtail stock area.

## Key Points – Scallop Activity in Closed Area II Access Area

- Rotational harvest in Closed Area II Access Area (CAII AA) is important to the scallop fishery for several reasons:
    - The total value of scallops landed from CAII AA in fishing year 2017 was $63,843,745. Over 80% of scallop harvest from CAII AA was landed in New Bedford, Massachusetts (Table 3 and Table 4, pp. 7-8).
    - The Council has closed this area for two years (i.e., FY2018 and FY2019) in an effort to optimize scallop yield-per-recruit. The oldest year class in CAII AA is expected to yield 10-12 meats per pound (i.e., U-10s and U-12s) in FY2020, which are the largest market grades in the fishery and can be expected to command a price premium (Figure 2, p.7).
    - Overall, CAII AA is a highly valuable fishing region with respect to meat quality, fishing conditions, and overall economic impact.
- Following 2018 scallop surveys of Closed Area II, the PDT projected that this area could likely support a 6 million pound access area trip in FY 2020. Last year, the Council considered a projection run with access to Closed Area II for the 2019 FY.

**Key Points – Georges Bank Yellowtail Flounder**

- The scallop fishery is allocated a sub-Annual Catch Limit (sub-ACL) of Georges Bank yellowtail flounder based on 16% of the US TAC, the maximum proportion of US catch from the scallop fleet from 2002 to 2011. Since 2012, the scallop fleet has caught an average of 30% of the US catch and 80% of its sub-ACL.
- The scallop fishery's estimated catch of GB yellowtail has fluctuated in recent years. This is attributed to changes in rotational management, specifically access to CAII AA and open areas directly south and west (i.e., Southeast Parts).
- In 2018, the Scallop PDT projected that if CAII AA were open in FY2019, the scallop fishery would likely catch around 10.5 mt of GB yellowtail during the harvest of about 5 million pounds of scallops from CAII AA in FY2019.
- If the reactive accountability measure (AM) is triggered for either GB yellowtail or Northern windowpane, the fishery would be required to use a gear modification while fishing on eastern Georges Bank. The scallop fishery AM is structured such that the fishery would be able to continue to harvest scallops even if the AM is triggered. The Council has temporarily modified its scallop fishery AM policy for GB yellowtail so that an AM for the scallop fishery would only be implemented if the overall ACL is exceeded. This provision provided relief from AMs for the scallop fishery based on the 2017 estimated catch.
- The Council is considering additional proactive measures to reduce impacts on GB yellowtail for the 2019 fishing year, through Scallop Framework 32. These measures will include options for time/area closures and gear modifications.
  Through the process of considering measures to reduce impacts on GB yellowtail flounder, the Scallop PDT has observed that here has been uncertainty in the Acceptable Biological Catch (ABC) for GB yellowtail. The technical basis of Transboundary Resource Assessment Committee (TRAC) recommendations for target exploitation rate and Total Allowable Catch (TAC) have changed several times since the 2014 benchmark stock assessment, and the SSC's ABC recommendations have deviated from the TRAC recommendations.

**Scallop Fishery Allocations of GB Yellowtail and In-Season Transfers**

The scallop fishery is currently allocated 16% of the US share of the GB yellowtail ABC (see Groundfish Framework 57 for current allocations). Groundfish Framework 48 (2013) set a fixed percentage of the total US ABC as the basis for annual scallop fishery allocation. The preferred alternative of 16% (range of 1-16%, mean of 7%) of the US ABC was based on historic catch from 2002-2011 (Table 1). Recently, the scallop fishery's catch of GB yellowtail has been a higher percentage of the overall US catch, ranging from 6-57% with a mean of 30% of the US ABC between 2012 and 2018 (Table 1; Figure 1).

The scallop fishery's sub-ACL includes a reduction for management uncertainty, and both the allocation and in-season catch accounting of the scallop fishery GB yellowtail sub-ACL are based on the scallop fishing year. In years when NMFS projects that less than 90% of the scallop fishery GB yellowtail sub-ACL will be caught, the agency may initiate an allocation transfer from the scallop fishery to the groundfish fishery. The in-season transfer of yellowtail to the groundfish fishery has occurred several times in recent years. Since 2015, NMFS has transferred 66.23 mt from the scallop fishery to the groundfish fishery. In 2017 when the Closed Area II access area was open, the scallop fishery exceeded the 32 mt sub-ACL by 20.6 mt (see Table 2), and no transfer was initiated.

- In FY2015, NMFS transferred 7.9 mt of GB yellowtail from the scallop fishery to the groundfish fishery (21% of the FY2015 scallop fishery GB yellowtail sub-ACL).
- NMFS initiated a transfer again in FY2016, where 39.8 mt of GB yellowtail from the scallop fishery sub-ACL was shifted to the groundfish fishery (~95% of the FY2016 scallop fishery GB yellowtail sub-ACL).
- No transfer was initiated in FY2017; however, in FY2018, NMFS transferred 18.53 mt of GB yellowtail from the scallop fishery to the groundfish fishery (56% of the FY2018 scallop fishery GB yellowtail sub-ACL).
- The scallop fishery did not have access to CAII AA in FY2015, FY2016, or FY2018

*Table 1. GB yellowtail landings and discards (metric tons) from 2002-2018 based on TRAC 2019 assessment of GB yellowtail (updated from Groundfish Framework 48). Light gray shading indicates years considered in Framework 48; dark gray shading indicates years since Framework 48.*

| Calendar Year | US Landings | US Discards | US Catch | Scallop Landings of GBYT | Scallop Discards of GBYT | Total Scallop Catch of GBYT | Scallop Catch as % of US Catch |
|---|---|---|---|---|---|---|---|
| 2002 | 2476 | 53 | 2529 | 0.2 | 29 | 29.2 | 1% |
| 2003 | 3236 | 410 | 3646 | 0.1 | 293 | 293.1 | 8% |
| 2004 | 5837 | 460 | 6297 | 3 | 81 | 84 | 1% |
| 2005 | 3161 | 414 | 3575 | 8.1 | 186 | 194.1 | 5% |
| 2006 | 1196 | 384 | 1580 | 2.6 | 251 | 253.6 | 16% |
| 2007 | 1058 | 493 | 1551 | 1.5 | 120 | 121.5 | 8% |
| 2008 | 937 | 409 | 1346 | 0.3 | 128 | 128.3 | 10% |
| 2009 | 959 | 759 | 1718 | 1.9 | 170 | 171.9 | 10% |
| 2010 | 654 | 289 | 943 | 0.2 | 8 | 8.2 | 1% |
| 2011 | 904 | 192 | 1096 | 8.6 | 104 | 112.6 | 10% |
| 2012 | 443 | 188 | 631 | 25 | 139 | 164 | 26% |
| 2013 | 130 | 49 | 179 | 3.5 | 34 | 37.5 | 21% |
| 2014 | 70 | 74 | 144 | 0 | 59 | 59 | 41% |
| 2015 | 63 | 41 | 104 | 0 | 29.7 | 29.7 | 29% |
| 2016 | 26 | 7 | 33 | 0 | 2.1 | 2.1 | 6% |
| 2017 | 35 | 57 | 92 | 0 | 52.6 | 52.6 | 57% |
| 2018 | 32 | 11 | 43 | 0 | 12.7 | 12.7 | 30% |
| Retention of GB yellowtail prohibited in scallop fishery 2014 to present | | | | | | | |
| Mean scallop catch of total US GB yellowtail catch 2002-2011 was 7% | | | | | | | |
| Mean scallop catch of total US GB yellowtail catch 2012-2018 was 30% | | | | | | | |

*Figure 1. GB yellowtail catch from the scallop fishery as a percentage of total US GB yellowtail catch from 2002-2018. Solid line indicates annual percentage; dashed grey lines indicate the average between 2002-2011 and 2012-2018.*

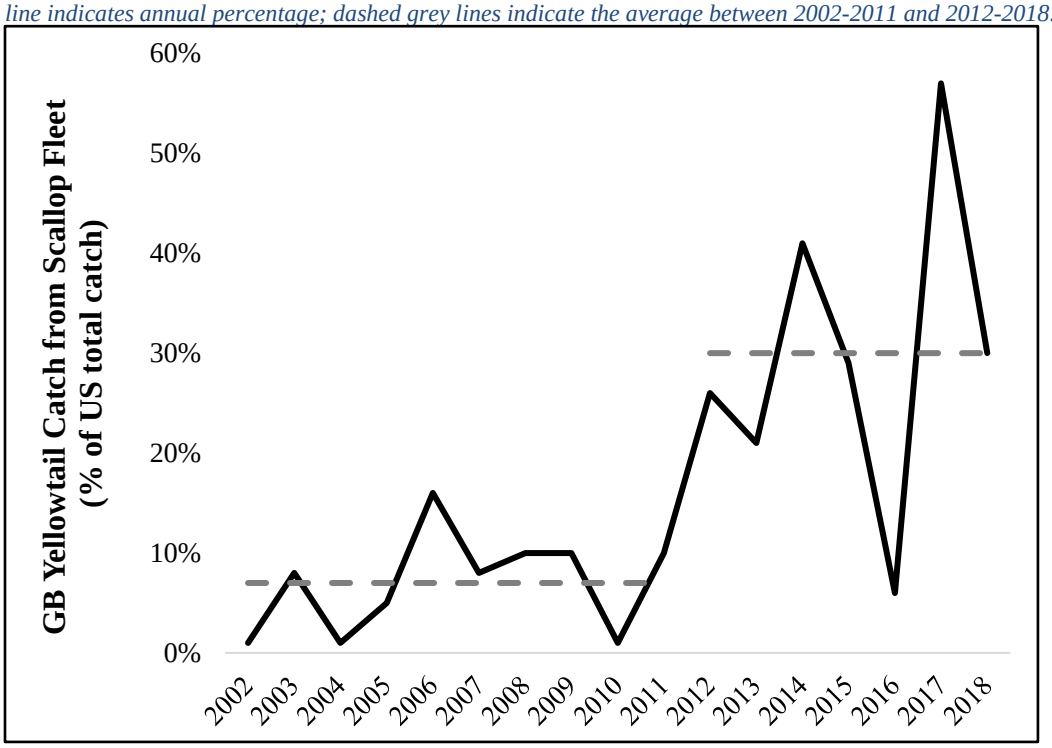



*Table 2. Recent GB yellowtail TACs and scallop fishery sub-ACLs and catches. Values are shown in metric tons (mt).*

| FY | Total Shared TAC | US % Share | US TAC | % US TAC Caught | Scallop sub-ACL | Scallop catch | % Scallop sub-ACL Caught |
|---|---|---|---|---|---|---|---|
| FY2010 | 1,500 | 64% | 1,200 | 68% | 146 | 17.6 | 12% |
| FY2011 | 2,650 | 55% | 1,458 | 76% | 200.8 | 83.9 | 42% |
| FY2012 | 1,150 | 49% | 564 | 68% | 156.9 | 164.0 | 105% |
| FY2013 | 500 | 43% | 215 | 43% | 41.5 | 37.5 | 90% |
| FY2014* | 400 | 82% | 328 | 37% | 50.9 | 59.0 | 116% |
| FY2015* | 354 | 70% | 248 | 28% | 38 | 29.7 | 78% |
| FY2016* | 354 | 76% | 269 | 12% | 42 | 2.1 | 5% |
| FY2017* | 300 | 69% | 207 | 44% | 32 | 52.6 | 164% |
| FY2018* | 300 | 71% | 213 | n/a | 33 | 12.7 | 38% |
| FY2019* | 140 | 76% | 106 | n/a | 17 | n/a | n/a |
| FY2020[1] | 199 | 74% | 147 | n/a | 22.4 | n/a | n/a |

* retention of GB yellowtail prohibited for scallop fishery
n/a = data not yet finalized.
[1] Hypothetical based on preliminary recommendations from 2019 TRAC.

**2018 Scallop Survey Information**

During the 2018 scallop surveys, multiple year classes of scallops were detected along the southern flank of Georges Bank, extending into CAII AA to the Canadian border (Figure 3). The mean length of scallops from the commercial dredge survey in the CAII AA was just under 113 mm, suggesting that the majority of scallops in the area were exploitable to the fishery (Figure 2). Despite the positive outlook from the 2018 surveys, the scallop fishery was not allocated access to CAII AA in FY2019; however, the 2018 surveys and preliminary 2019 survey observations suggest that these scallops have continued to grow in the absence of fishing effort and could be expected to support a viable scallop fishing opportunity in FY2020.

*Figure 2. Scallop length frequencies from 2018 VIMS surveys of CAII AA from survey and commercial dredge.*

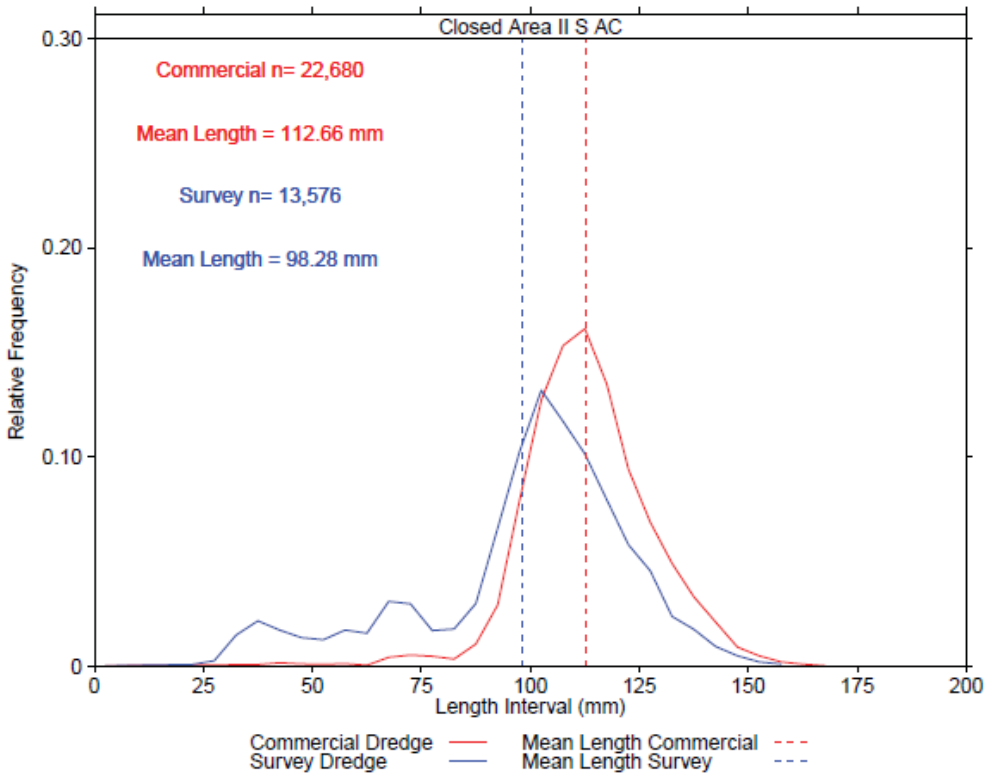
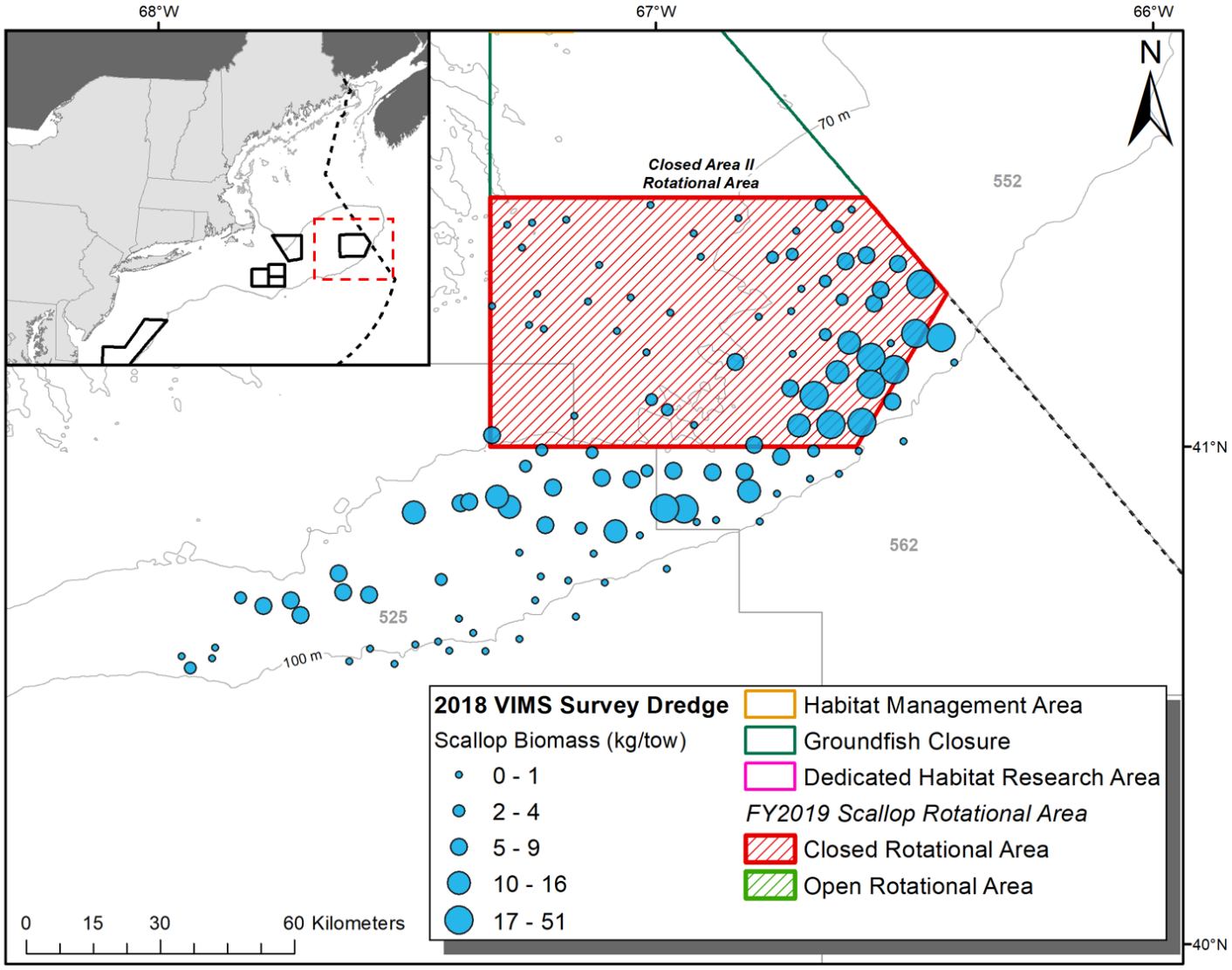


*Figure 3. Scallop catch (kg/tow) from the 2018 VIMS dredge survey of CAII AA and surrounds relative to FY2019 rotational management areas, statistical reporting areas, and groundfish/habitat closures. Rotational areas within the GB yellowtail stock area are labeled in italics.*



**FY2017 CAII AA Fishery Performance**

The scallop fishery was last allocated access to CAII AA in FY2017. Full-time LA vessels were allocated one, 18,000-pound trip, which amounted to ~6 million pounds of scallop removals. Vessel trip report and dealer data were used to summarize the performance of CAII AA in FY2017 in terms of the number of active permits, landings, and value by state landed (Table 3) and by vessel principle port (Table 4). The total value of scallops landed from CAII AA in FY2017 was estimated to be ~$63.8 million USD. The majority of CAII AA scallop landings and revenue were attributed to the state of Massachusetts, amounting to ~4.6 million pounds and $53.1 million USD, respectively. In terms of vessel principle port, CAII AA landings and revenue were distributed across the range of the fishery, from Massachusetts to as far south as North Carolina (Table 4).

*Table 3. Summary of scallops landed from CAII AA in Fishing Year 2017 (source: GARFO, APSD).*

| State (VTR) | Permits (n) | Scallop Meats (lbs) | Value | % Landed | % Value |
|---|---|---|---|---|---|
| CT | 4 | 89,567 | $972,573 | 2% | 2% |
| MA | 195 | 4,632,726 | $53,084,834 | 83% | 84% |
| NJ | 19 | 358,911 | $3,704,074 | 6% | 6% |
| RI | 16 | 384,521 | $4,051,421 | 7% | 6% |
| VA | 7 | 120,957 | $1,457,049 | 2% | 2% |
| **Total** | | **5,586,682** | **$63,269,951** | **100%** | **100%** |

*Table 4. Summary of active permits, scallop landings, and value from CAII AA in Fishing Year 2017 by vessel principle port. Principle ports with less than 3 active permits are not shown.*

| Principle Port | Permits (n) | Scallop Meats (lbs) | Value |
|---|---|---|---|
| NEW BEDFORD, MA | 106 | 2,660,719 | $30,891,682 |
| CAPE MAY, NJ | 43 | 1,084,836 | $11,596,289 |
| NEWPORT NEWS, VA | 24 | 542,240 | $6,080,141 |
| HAMPTON, VA | 11 | 199,571 | $2,203,944 |
| NEW BERN, NC | 5 | 152,108 | $1,882,213 |
| BARNEGAT LIGHT, NJ | 10 | 175,466 | $1,452,347 |
| SEAFORD, VA | 7 | 127,769 | $1,448,972 |
| FAIRHAVEN, MA | 5 | 89,784 | $1,105,970 |
| STONINGTON, CT | 4 | 89,567 | $972,573 |

**Recent Scallop Fishery VMS Effort**

VMS data were used to estimate scallop fishery effort in FY2018 (Figure 4), FY2017 (Figure 5), and FY2016 (Figure 6). The VMS data represent combined scallop fishery activity in terms of hours fished, aggregated at a resolution of 3 nautical mile squares with a minimum of 20 hours recorded per square. Then, a speed filter of 2 to 5 kts was applied to remove vessel activity that was likely a result of transiting to and from fishing grounds.

In FY2018, scallop effort in the GB yellowtail stock area was focused almost entirely in open area directly south and southwest of CAII AA, referred to as the Southeast Parts (Figure 4). The Southeast Parts encompass CAII extension, which became accessible to the scallop fishery as part of Georges Bank open area following two years of closure. FY2018 VMS hours fished

inside and directly west of CAII extension represented ~18% of total FY2018 fishery effort, and ~43% of FY2018 open area effort. Despite the significant scallop fishery effort in the Southeast Parts and considering this area is known to have typically higher GB yellowtail bycatch relative the rest of Georges Bank open areas, the scallop fishery caught only 38% of its sub-ACL in FY2018 (Table 2).

Overall scallop fishery effort (i.e., both in access areas and open areas) was noticeably more concentrated in 2017 (Figure 5) compared to FY2016 (Figure 6). This was especially true within the GB yellowtail stock area, where wide-spread open area effort along the 50-fathom contour on both the north and south sides of Georges Bank in FY2016 shifted to highly concentrated fishing in CAII AA (with the opening of the access area) and a small area of open bottom directly west of CAII extension in FY2017.

*Figure 4. Scallop fishery VMS hours fished on Georges Bank in FY2018. Scallop Area Management Simulator (SAMS) model area boundaries are in red.*

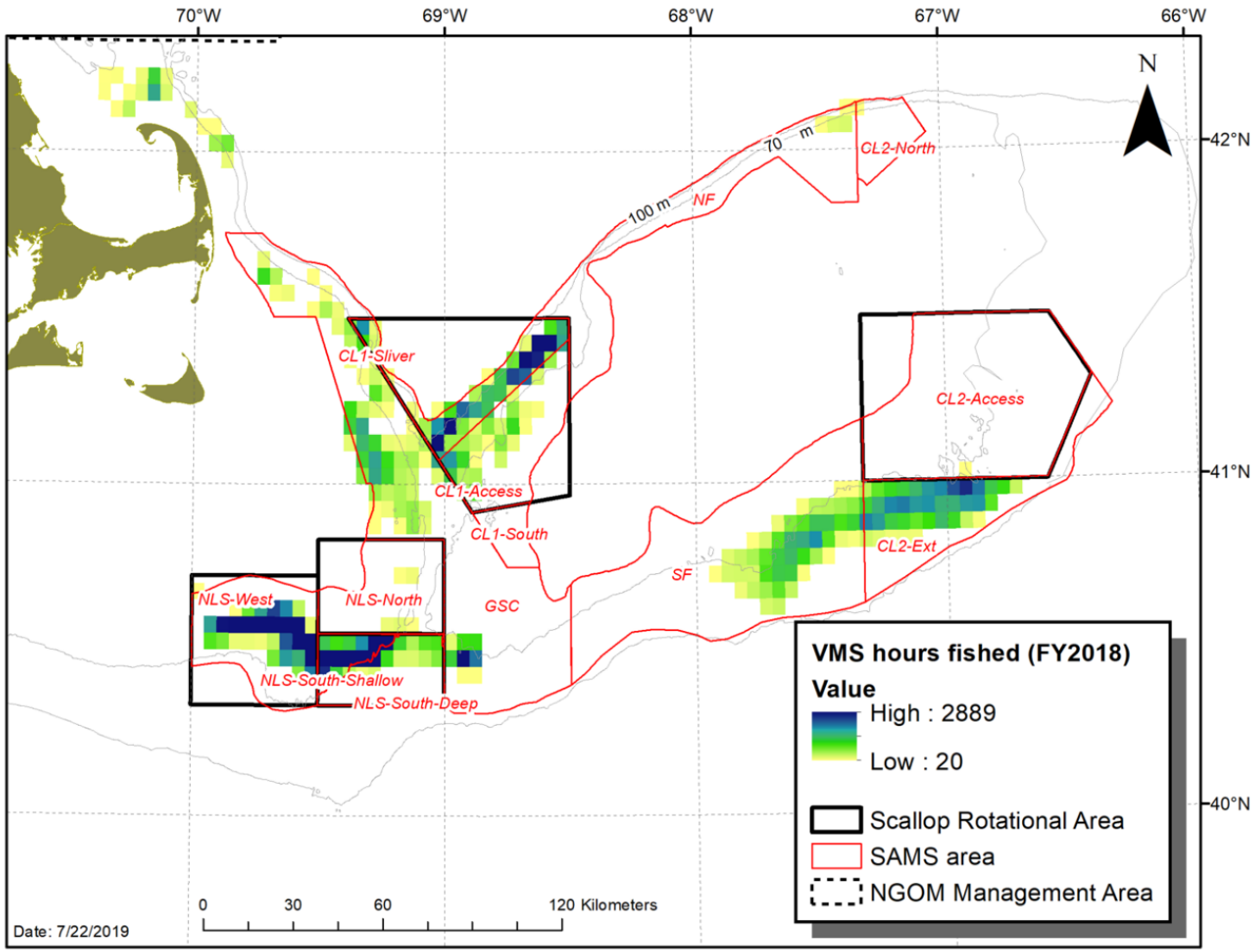


*Figure 5. Scallop fishery VMS hours fished on Georges Bank in FY2017. Scallop Area Management Simulator (SAMS) model area boundaries are in red.*

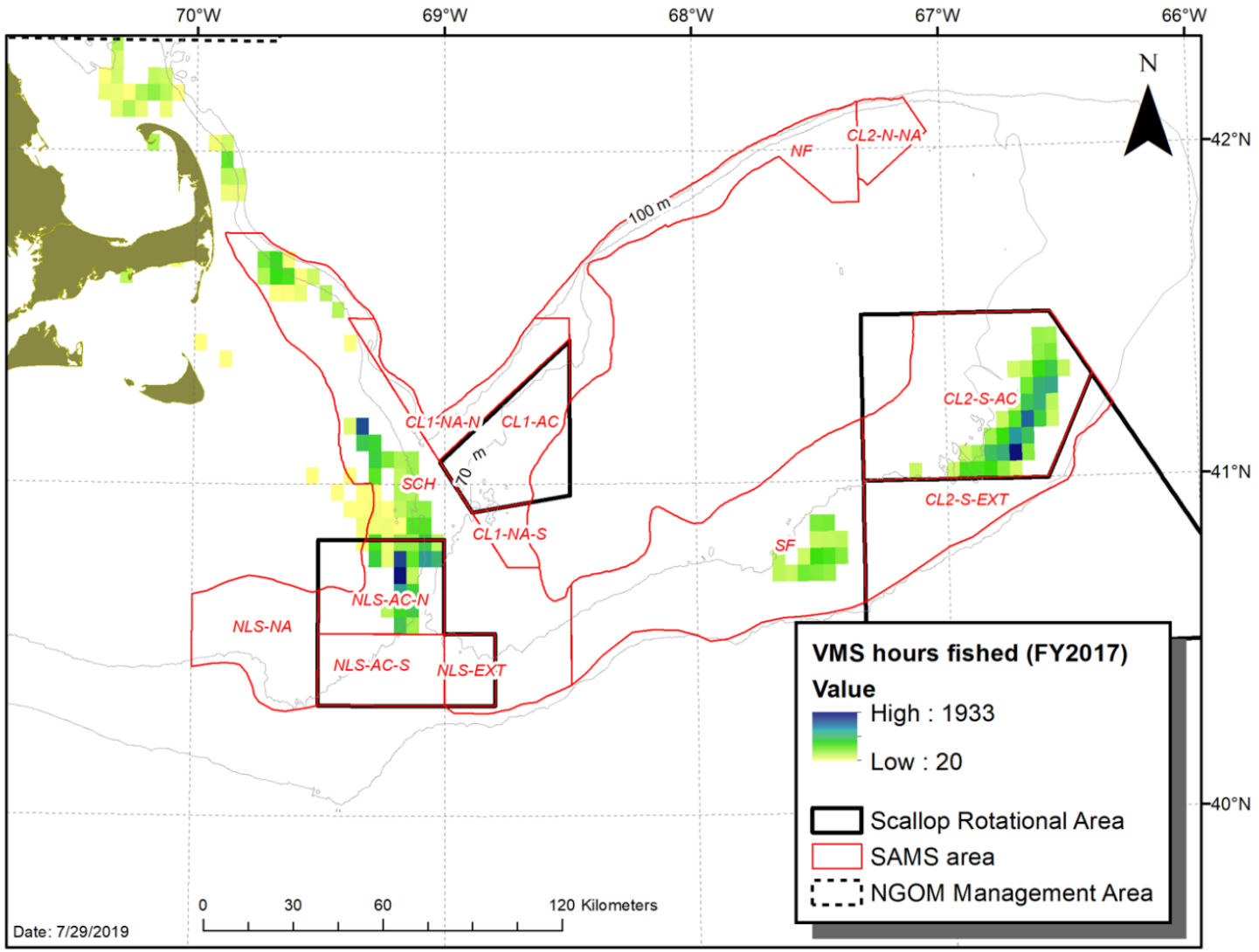
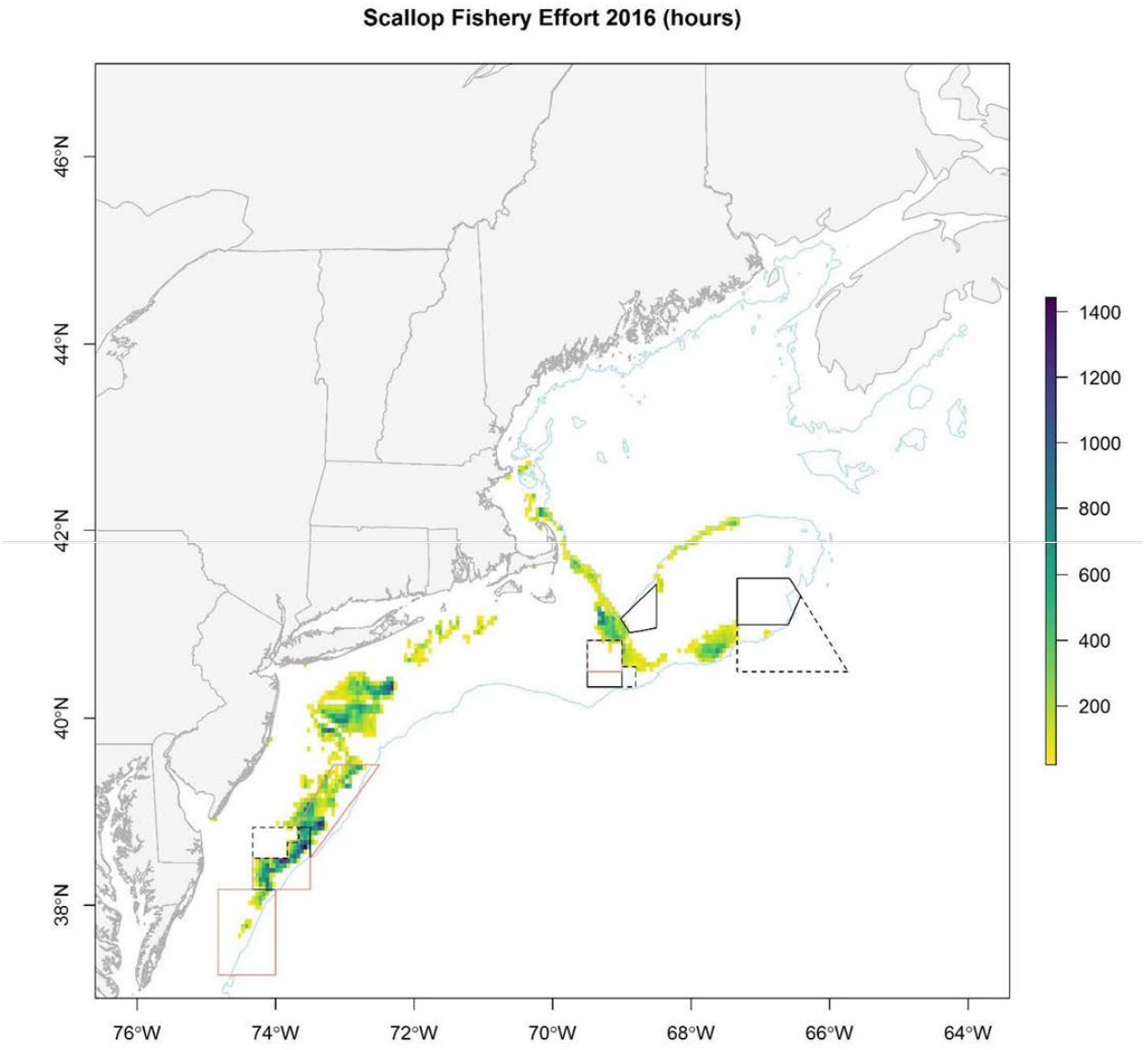


*Figure 6. Scallop fishery VMS hours fished for FY2016.*




**Rotational Management within the GB Yellowtail Stock Area and Recent Catch**

The scallop fishery is managed through a rotational area management system. This system directs effort throughout the resource at varying levels using the following types of spatial management areas: 1) "open area", where scallop vessels may operate using Days-At-Sea (limited access vessels) or IFQ (limited access general category vessels); 2) permanent closures, where scallop fishing is prohibited to reduce impacts on essential fish habitat and(or) groundfish mortality; and 3) scallop rotational areas, where scallop fishing is either temporarily prohibited or periodically allowed at controlled levels of access, depending on the condition of the resource inside their boundaries. Generally, scallop rotational areas (also known as "access areas") will 'close' to protect small scallops, and 'open' when scallops are large enough to be harvested by a commercial dredge (i.e., 4" ring). The duration of a closure depends on many factors, but for access areas in the Georges Bank region, closures typically have ranged from two to three years. Area closures are also utilized on a seasonal basis to mitigate impacts on non-target stocks.

CAII AA is a scallop rotational area located within the GB yellowtail stock boundary (Figure 3). Along with being productive scallop grounds, CAII AA and areas directly south and west have also historically supported yellowtail flounder. In light of this overlap, bycatch of GB yellowtail in the scallop fishery is highly variable and dependent on access to CAII AA. Table 5 describes allocations to the limited access fishery and the level of effort directed to CAII AA from FY2011 to FY2019.

Since FY2013, CAII AA has been seasonally closed from August 15th to November 15th to reduce bycatch of GB yellowtail by the scallop fishery. In FY2017, RSA compensation fishing was prohibited in CAII AA to further reduce bycatch of GB yellowtail by the scallop fishery. The open-area directly south of CAII AA (known as 'CAII extension') was closed from FY2015 to FY2017 to protect a set of small scallops and was opened in FY2018 and FY2019. CAII extension has historically had relatively higher bycatch than other Georges Bank open areas, so the three years of closure likely reduced overall bycatch of GB yellowtail by the scallop fishery.

The Scallop PDT projects GB yellowtail bycatch associated with the preferred scallop allocation alternatives for each Framework. Since FY2011, scallop fishery catch of GB yellowtail has ranged from a high of 164 mt in FY2012 to a low of 2.1 mt in FY2016 (note that there was no access to CAII or CAII extension for FY2016; Table 2, Table 5).

Framework 28 to the Scallop FMP directed limited access trips to CAII AA in FY2017. The projection of GB yellowtail bycatch for FY2017 was 63.2 mt (~50 mt was projected for CAII AA and ~13 mt was projected for the remaining open areas of Georges Bank), while the scallop fishery's sub-ACL was only 32 mt. The actual catch was 52.6 mt, meaning the GB yellowtail sub-ACL allocated to the scallop fishery for FY2017 was exceeded. Table 6 summarizes monthly GB yellowtail catch by the scallop fishery in FY2017 (source: GARFO data monitoring). FY2017 GB yellowtail catch was highest in June and July because overall effort in CAII AA increased relative to other months, partly due to the seasonal closure from August 15th to November 15th for yellowtail bycatch reduction. Table 6 illustrates the correlation between scallop fishery effort in CAII AA and GB yellowtail bycatch, in that about 98.5% of FY2017 yellowtail catch came from CAII AA and less than 2% came from Georges Bank open areas.

Under Framework 29, FY2018 spatial management turned CAII extension into open area and did not allocate access to CAII AA. The Scallop PDT projected catch of GB yellowtail by the scallop fishery would be approximately 11.7 mt in FY2018, which is approximately 78% less than realized yellowtail catch in FY2017. The scallop fishery's sub-ACL was 33 mt, and actual GB yellowtail bycatch by the scallop fishery in FY2018 was estimated at 12.7 mt (i.e., 38% of the FY2018 GB yellowtail sub-ACL).

During the development of FY2019 specifications through Framework 30, the PDT analyzed an alternative that considered one, 15,000-pound full-time LA trip for CAII AA (equating to approximately 5 million pounds of scallop removals from CAII AA). The PDT projected that the scallop fishery would likely catch 10.5 mt of GB yellowtail under this alternative, which would have been approximately 62% of the GB yellowtail sub-ACL allocated to the scallop fishery for FY2019.

*Table 5. Full-time limited access scallop fishery allocations by FY and recent schedule of CAII AA.*

| FY | Action | LA DAS (Full Time) | FT LA AA (trips) | CA II AA | Notes re: CA II AA and other management |
|---|---|---|---|---|---|
| 2011 | FW22 | 32 | 4 (2 MA) | 0.5 trips (157 vessels; 18K lbs/trip) | 10% access area bycatch cap; GB stock-wide monitoring of YT sub- ACL; Bycatch Avoidance Program CAI and CAII |
| 2012 | FW22 | 34 | 4 | 1 trip (313 vessels; 18K lbs/trip) | GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAI and CAII |
| 2013 | FW24 | 33 | 2 | 182 trips (13K lbs/trip) | Seasonal closure of CAII Aug 15 – Nov 15; GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAII |
| 2014 | FW25 | 31 | 2 | 197 trips (12K lbs/trip) | 16% GB YT sub-ACL; YT landings prohibited; Seasonal closure of CAII Aug 15 – Nov 15; GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAII |
| 2015 | FW26 | 30.86 | 51K lbs to MAAA | Closed | In-season transfer to groundfish fishery (7.9 mt). |
| 2016 | FW27 | 34.55 | 3 (51K lbs to MAAA) | Closed | 'CAII Extension' closure of open areas to protect small scallops; In- season transfer to groundfish fishery (39.8 mt) |
| 2017 | FW28 | 30.41 | 4 (18K each) | 1 trip (313 vessels; 18k lbs trip) | 'CAII Extension' closure of open areas to protect small scallops; no RSA compensation fishing in CAII; seasonal closure of CAII Aug 15—Nov 15; Bycatch Avoidance Program CAII |
| 2018 | FW29 | 24 | 6 (18K each) | Closed | 'CAII extension' reverted back to open area. Reactive AM for GB yellowtail changed from time-area closure to gear modification in CAII. In-season transfer to groundfish fishery (18.53 mt) |
| 2019 | FW30 | 24 | 7 (18K each) | Closed | CAII extension continues as part of GB open area. |

The interannual variability of GB yellowtail bycatch by the scallop fishery suggests that the fixed percentage allocation management scheme may be constraining to both the scallop and groundfish fisheries. In years when CAII AA is closed, the scallop fishery has not caught their full allocation of GB yellowtail (Table 7) and the groundfish fishery does not have access to the additional quota until January or later, based on agency action to transfer a portion of the scallop fishery's allocation. However, in years when CAII AA is open, the scallop fishery has exceeded the GB yellowtail sub-ACL and concentrated fishing effort in a short seasonal window. The Council uses projected catch, rather than a fixed percentage, to determine the scallop fishery's sub-ACL for Southern New England/Mid-Atlantic Yellowtail Flounder.

*Table 6. Estimated scallop fishery catch of GB yellowtail by area, component, and month for FY2017 (source: GARFO quota monitoring page, https://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/atlanticseascallop.html).*

| Date | Limited Access Fleet* | | LAGC IFQ Fleet | Monthly total catch (lb) | Cumulative catch (lb) | Percent of sub-ACL (70,584 lb) |
|---|---|---|---|---|---|---|
| | Open Areas | Closed Area II | Open Areas | | | |
| 17-Mar | 68 | - | 2 | 69 | 69 | 0.1 |
| 17-Apr | | 2,251 | | 2,251 | 2,320 | 3.3 |
| 17-May | | 15,196 | | 15,196 | 17,517 | 24.8 |
| 17-Jun | | 35,740 | | 35,740 | 53,257 | 75.5 |
| 17-Jul | 159 | 31,382 | | 31,541 | 84,798 | 120.2 |
| 17-Aug | 888 | 13,590 | | 14,477 | 99,275 | 140.7 |
| 17-Sep | 356 | - | | 356 | 99,630 | 141.2 |
| 17-Oct | 182 | - | | 182 | 99,813 | 141.5 |
| 17-Nov | | 2,045 | | 2,045 | 101,858 | 144.4 |
| 17-Dec | | 9,834 | | 9,834 | 111,692 | 158.3 |
| 18-Jan | | 2,349 | | 2,349 | 114,042 | 161.7 |
| 18-Feb | | 1,864 | | 1,864 | 115,906 | 164.3 |
| 18-Mar | | | - | 0 | 115,906 | 164.3 |
| **Total** | **1,652** | **114,252** | **2** | **115,906** | | |

*Table 7. Estimated scallop fishery catch of GB yellowtail by fishing area (i.e. open area, CAII AA, CAI AA) from fishing year 2011 to 2018. Total GB yellowtail catch by the scallop fishery is shown in pounds and as a percentage of the sub-ACL for that year (source: GARFO).*

| FY | Open | CAII | CAI | Total | sub-ACL | % sub-ACL |
|---|---|---|---|---|---|---|
| 2011* | 94,737 | 81,495 | 8,755 | 184,987 | 442,688 | 42% |
| 2012* | 46,759 | 297,866 | 16,932 | 361,557 | 345,905 | 105% |
| 2013* | 35,239 | 35,219 | 12,172 | 82,630 | 91,492 | 90% |
| 2014* | 50,184 | 80,450 | - | 130,634 | 112,215 | 116% |
| 2015 | 62,373 | 3,223 | - | 65,596 | 83,776 | 78% |
| 2016 | 4,548 | - | - | 4,548 | 92,594 | 5% |
| 2017* | 1,652 | 114,252 | - | 115,904 | 70,548 | 164% |
| 2018 | 25,329 | 1,457 | 1,153 | 27,939 | 72,973 | 38% |
| * Scallop fishery access to CAII AA | | | | | | |

**Accountability Measures**

*Proactive AMs.* The Scallop FMP has several measures in place to proactively mitigate bycatch of GB yellowtail and other non-target flatfish species. Framework 24 (2013) established a seasonal closure of CAII AA from August 15th to November 15th to reduce bycatch of GB yellowtail; this seasonal closure has been in effect since 2013 and is applied when CAII AA is open to the scallop fishery. Through scallop Framework 26 (2015), the Council approved measures that restrict the maximum number of rows in the dredge apron to seven in all areas, as shorter aprons have been shown to reduce flatfish bycatch and improve fish escapement (see Scallop FW 24, Appendix IV). Part of the rationale for this 7-row restriction was to reduce flatfish bycatch and prevent sub-ACLs from being exceeded and triggering reactive AMs. The 7-row apron restriction has been in effect since FY2015. The PDT also notes that the fishery-wide requirement of a minimum 10" twine top (Amendment 10, 2004) improved the escapement of yellowtail flounder. RSA compensation fishing, which sets aside 1.25 million pounds of scallops annually to support research, was restricted in CAII AA under Framework 28 (2017) for the specific reason of reducing GB yellowtail bycatch.

Mitigating impacts to GB yellowtail has been identified as a 2019 priority for the Scallop FMP, and proactive measures, including options for time/area closures and gear modifications, are currently being developed through Framework 32. Concern about the scallop fishery exceeding their FY2020 allocation of GB yellowtail prompted the Council to prioritize analysis of additional measures to reduce bycatch if necessary. Based on scallop surveys conducted in 2018, it is likely that CAII AA will be open to the scallop fishery in FY2020. If selected by the Council in Framework 32, proactive measures would be in place for scallop fishing year 2020.

*Reactive AMs.* Through Framework 29 (FY2018), the Council modified the reactive AM for GB yellowtail. Prior to FY2018, this AM was a time-area closure of statistical reporting area 562 (i.e., CAII AA and surrounds), with the duration of the time-area closure being dependent on the percent of the sub-ACL overage. As of FY2018, the AM was changed to a reactive gear restricted area (GRA), with the duration of the GRA being dependent on the magnitude of the sub-ACL overage. When the AM is in place, vessels fishing in CAII AA and CAII extension are required to fish a dredge with: 1) a dredge bag with a maximum of 5-rows in the apron; and 2) a 1.5:1 maximum hanging ratio. This gear-modification was based on a study conducted by the Coonamessett Farm Foundation (2012 final report here), which suggested the 5-row apron modified dredge bag reduces bycatch of yellowtail and other species of flatfish compared to a standard dredge bag configuration used by industry.

In November 2016, the Council voted to allow a "temporary exception with a two-year sunset provision, to the scallop fishery AM implementation policy for the GB yellowtail flounder stock" under Groundfish Framework 56. NMFS approved this measure in the final rule to Framework 56 in July of 2017, retroactive to the start of the groundfish fishing year (May 1, 2017). Under this temporary exception, the only criteria used to determine if an AM would be implemented for GB yellowtail is if the scallop fishery exceeds their sub-ACL and the overall ACL for the stock is also exceeded in fishing years 2017 and 2018. This exception removes the AM trigger criteria of the scallop fishery exceeding the GB yellowtail sub-ACL by 150% or more. In December 2018, the Council voted to extend this temporary exception to apply for FY2019 and FY2020. The Council specifically noted that recent utilization of GB yellowtail by the groundfish fishery has been low due to low quotas.

**Basis for Yellowtail Catch Advice**

On an annual basis the Scallop PDT develops bycatch projections of GB yellowtail associated with scallop rotational management. The Scallop PDT has been tasked by the Council during the past three framework cycles to develop proactive measures to mitigate impacts on GB yellowtail. Information presented during the TAC decision making process (i.e., at TRAC, by the SSC) informs how the Scallop PDT approaches ways to mitigate impacts on this stock. The following discussion is intended to illustrate the Scallop PDT's understanding of how the TAC setting process for GBYT has evolved since 2014.

In 2014, both the stock assessment method for GB yellowtail and the basis for the scallop fishery allocation of GB yellowtail significantly changed. Prior to 2014, total yellowtail catch advice was derived from a Virtual Population Analysis (VPA) stock assessment model with annual updates from the TRAC. After several years of poor model performance, including a retrospective pattern, the TRAC conducted a benchmark assessment for GB yellowtail in 2014 and rejected the VPA model as the basis for advice (TRAC 2014). The 2014 benchmark recommended setting catch advice based on a constant quota approach or by applying an exploitation rate to the annual average of the three surveys used in the GB yellowtail assessment (NEFSC spring and fall and Canada DFO winter bottom trawl surveys). The 2014 benchmark concluded that catch advice should be based on the current average biomass, the target exploitation rate, and qualitative criteria. The 2014 TRAC assessment found an error in the initial calculations and reported target exploitation rates of 20-24% associated with the reference F (Table 8). The 2014 TRAC update assessment concluded that the benchmark method produced a target exploitation rate that was too high because 1) target fishing mortality should not increase when natural mortality increases, 2) catch advice would exceed area-swept survey estimates of stock biomass, and 3) survey indices continued to decline. The exploitation rates considered by

the 2014 TRAC ranged from 2-16%, based on several combinations of assumed natural and fishing mortalities and expected lifetime spawning (Table 8). The SSC recommended applying a constant exploitation rate of 16% to the average survey biomass as the basis for catch advice for 2015, resulting in a total ABC of 354 mt.

*Table 8. TRAC recommendations of target exploitation rate and associated technical basis.*

| Stock Assessment | Target Exploitation Rate | Technical Basis |
|---|---|---|
| 2014 benchmark | 20-24%* | reference F in transboundary agreement |
| 2014 update | 2-16% | expected spawnings over a range of mortalities |
| 2017 update | 2-6% | recent quota/survey biomass |

* initially reported as 22-27% based on an incorrect calculation, corrected by the 2014 update

In 2015, the TRAC applied a 2-16% exploitation rate to the updated average survey biomass with resulting catch advice ranging from 45 to 359 mt (TRAC 2015). The SSC recommended status quo catch from 2014 (354 mt) due to concerns about uncertainty in the empirical approach, specifically, disparities in swept-area biomass estimates between the three surveys and the potential for large inter-annual changes (SSC 2015). The SSC report to the Council (SSC 2015) stated that "annual adjustments to the ABC are not warranted in the absence of evidence of substantial changes in biomass, and therefore recommend[ed] retaining the ABC resulting from the initial application of the empirical approach." (SSC 2015, p.2) The SSC stated that, "although the ABC is, of course, an important determinant of the realized catch, the dynamics of the stock are affected directly by the catch and not the ABC. The implications of catch that is closer to the ABC represent an important uncertainty and potential risk. Therefore, the SSC recommends developing more detailed understanding of the interacting management, market and biological factors that determine realized catch of the stock." (SSC 2015, p.2) The SSC also emphasized that neither the TRAC nor the SSC's deliberations considered catch as an indication of biomass.

During the 2016 TRAC meeting, information was presented that suggested survey catchability was lower than the assumed value of 0.37, which was based on whole-net catchability of groundfish from other surveys in other regions (TRAC 2016). The TRAC did not change the catchability estimate, but conducted a sensitivity analysis that explored the impact of different values of survey catchability. The TRAC examined the 'relative exploitation rate' calculated as quota/survey biomass, rather than catch/survey biomass. The mean of this relative rate for 2010-2015 was 17%, slightly greater than the upper bound of the 2-16% exploitation rate from the yield per recruit analysis, regardless of what survey catchability estimate is applied. The TRAC recommended application of the 2-16% exploitation rate applied to survey biomass, resulting in advice ranging from 31 to 245 mt. The SSC again recommended status quo catch (354 mt) for 2017 under a similar rationale that was used in 2016. They stated, "The considerable uncertainties in survey-based estimates, especially high variability and inconsistencies among surveys, suggest that a one-year change might not reflect a meaningful change in the stock to which management needs to respond" (SSC 2016, p.2). The SSC considered several factors that suggested the risks associated with status quo ABC might be low, including: 1) relative exploitation rates (catch divided by survey index) associated with recent catches were the lowest on record, suggesting that the fishing mortality rate is also the lowest on record; and 2) despite the drastic reduction in catch and very low relative exploitation rates, biomass has not shown a positive response, as indicated by the surveys, suggesting that environmental factors are having a strong effect delaying recovery (SSC 2016). The SSC recommended that a sub-group should be

formed to develop alternatives for quantitative metrics that would trigger an upward or downward adjustment to the GB yellowtail ABC, which came to be known as the Substantial Change Working Group (SCWG). The Council considered the TRAC advice and SSC recommendation and ultimately preferred a compromise for catch advice of 300 mt for 2017.

Information about survey catchability was considered by the TRAC again in 2017 (TRAC 2017). Based on empirical experimentation, the TRAC changed the survey catchability assumption from 0.37 to 0.31 and calculated area swept as a wing spread rather than door spread, resulting in survey biomass being three times higher throughout the time series, but with the same declining trend. This prompted questions about the appropriateness of the 2-16% exploitation rate determined in the 2014 benchmark. The TRAC stated, "The 2% to 16% range of exploitation rates used previously was based on a number of per-recruit calculations that considered trade-offs in spawning potential and yield over a range of possible natural and fishing mortality conditions. While these calculations did not include any information about the survey catchability or other variables used to estimate the average survey biomass, the average survey biomass from the benchmark empirical approach was known during the deliberations. It is not known how influential this knowledge was when the decision was made to set the range of 2% to 16% for exploitation rate. The strong decline of the stock since 2010, despite both quotas and catches being well below the upper end of this exploitation range (16%) under the new value of survey catchability (0.31) and use of wing width, is the reason for the reconsideration of the exploitation rate range this year" (TRAC 2017, pp.5-6). During an intersessional conference call, the TRAC changed their method of determining exploitation rate from the per-recruit calculations to a relative exploitation rate calculated as quota/average survey biomass, resulting in a range of rates for 2010-2017 of 3% to 11%, with a mean of 6%. The TRAC recommended using target exploitation rates of 2% to 6% and recommended catch advice of 62 to 187 mt for 2018.

*Table 9. Relative exploitation rates of TRAC advice, actual quota allocated, and actual catch compared to average survey biomass (B) estimates using 0.37 and 0.31 catchability assumptions. The highlighted 6% has served as the basis for TRAC catch advice since 2017. Values are shown in metric tons.*

| Year | TRAC Advice | Advice/ Biomass (0.37) | Advice/ Biomass (0.31) | Actual Quota | Quota/ Biomass (0.37) | Quota/ Biomass (0.31) | US/CA Catch | Catch/ Biomass (0.37) | Catch/ Biomass (0.31) |
|---|---|---|---|---|---|---|---|---|---|
| 2010 | n/a | n/a | n/a | 1956 | 10% | 3% | 1,170 | 6% | 2% |
| 2011 | 3400 | 18% | 6% | 2650 | 36% | 11% | 1,171 | 16% | 5% |
| 2012 | 1400 | 19% | 6% | 1150 | 12% | 4% | 725 | 7% | 2% |
| 2013 | 500 | 5% | 2% | 500 | 10% | 3% | 218 | 4% | 1% |
| 2014 | 500 | 10% | 3% | 400 | 18% | 6% | 159 | 7% | 2% |
| 2015 | 354 | 16% | 5% | 354 | 16% | 5% | 118 | 5% | 2% |
| 2016 | 359 | 16% | 5% | 354 | 23% | 7% | 44 | 3% | 1% |
| 2017 | 245 | 16% | 5% | 300 | - | 10% | 95 | - | 3% |
| 2018 | 187 | - | 6% | 300 | - | 27% | 45 | - | 4% |
| 2019* | 68 | - | 6% | 140 | - | 4% | n/a | - | n/a |
| **AVG 2010-2017** | | 14% | 4% | | 18% | 6% | | 7% | 2% |
| **AVG 2010-2019** | | | 5% | | | 8% | | | |

* note that the SSC concluded that the spring 2018 NEFSC survey was not considered to be a reliable basis for catch advice for FY2019.

The SSC deliberated on the risks associated with exceeding the ABC and again recommended status quo catch advice of 300 mt (quota set by Council in 2017). In their recommendations to the Council, the SSC stated, "It is apparent to the SSC that the current ABC level discourages targeting on this stock, therefore this is another reason why catch should remain at low levels if a status quo ABC level is sustained for 2018 and 2019. An exploitation rate of 10% results from an ABC of 300 mt. This resulting exploitation rate is within the range suggested by the Broader TRAC (range recommended for investigation was exploitation levels of 2 – 16%)" (SSC 2017, p.3). They again emphasized that environmental factors were having a strong effect on recovery.

The SCWG that was formed in 2016 in response to the SSC's uncertainty in setting GB yellowtail ABC offered a strawman, including setting a constant and appropriate exploitation rate and setting a threshold minimum level ABC (accounting for bycatch). The SSC recommended that the Council prioritize continuation of the SCWG to develop a control rule for GB yellowtail for use by the SSC as a method to consider in specification setting in 2018 for FY2019. The Council approved the SSC recommendation for a 300 mt ABC; however they did not include continuation of the SCWG as a priority for 2018.

The 2018 TRAC recommended catch advice of 68 mt for fishing year 2019 (TRAC 2018). This advice resulted from applying a 6% exploitation rate to the 2018 average survey biomass. Although the TRAC changed the method for determining the exploitation rate in 2017 (from a per-recruit analysis to a relative rate calculated as quota/average survey biomass), they did not recommend updating the exploitation rate to include the 2018 TAC. The 2018 TAC of 300 mt represented a relative exploitation rate of 27% and increased the average exploitation rate between 2010-2018 to 8%. The TRAC did not consider including 2018 as appropriate under the rationale that catch advice was set higher than the TRAC recommendation. A review of TRAC advice and negotiated TACs between 2010 and 2017 shows that managers agreed to TACs that were both above and below TRAC advice over that time period (Table 9). The SSC noted that the 2018 NEFSC spring survey results for GB yellowtail were extremely low with fewer successful tows than usual and few tows in one of the key areas where GB yellowtail are known to occur. The SSC recommended a modified approach to the standard catch advice calculation by excluding the 2018 NEFSC spring survey data from the averaging of the survey information. Additionally, they considered a larger range of exploitation rates based on risk policy and economic impacts and acknowledged possible negative impacts of GB yellowtail as a constraining stock to the groundfish fishery and bycatch stock to the scallop fishery (SSC 2018, p.3). The SSC recommended an exploitation rate of 10%, which was within the range of the relative exploitation rates from 2010-2017, to strike a balance between the uncertainties in the approach being used and recommended by the TRAC, while mitigating potential negative economic and social risks (SSC 2018, p.4). The resulting ABC recommended by the SSC was 168 mt. Additionally, the SSC made a formal request that more quantified economic information be provided in the future, even if it is historical in nature (SSC 2018, p.4). The Council approved an ABC of 140 mt for fishing year 2019.

The TRAC applied the same approach and rationale for recommending catch advice in 2019. The draft TRAC Status Report recommended applying a 6% exploitation rate to updated survey biomass, resulting in advice of 199 mt. The rate of 6% was maintained from the 2017 intersessional conference call, which averaged the relative exploitation rate (quota/survey biomass) between 2010 and 2017 (TRAC 2019). Inclusion of the final years in the time series increases the average relative exploitation rate to 8%. The TRAC noted that two of the surveys

increased between 2018 and 2019, and one decreased to the lowest value in the time series. Also noted was that total mortality (Z) from two of the surveys has been declining in recent years, but there is a high level of uncertainty with the estimates.

**Impacts of Allocation**

Under the 2006 Annual Catch Limit and Accountability Measures requirements, yellowtail flounder bycatch in the scallop fishery was monitored in the open scallop fishing areas as well as the access areas. Groundfish Framework 47 (2011) changed the access area yellowtail bycatch provisions. The 10% access area yellowtail bycatch cap was removed, and yellowtail allocations to the scallop fleet were applied at the stock level. The allocation was based on the projected catch of GB yellowtail in relation to the allocated scallop harvest, the estimated biomass of the yellowtail stock, and the observed bycatch rate from the previous fishing year. In 2014, due to reduced yellowtail quotas for the groundfish fishery, Groundfish Framework 48 reviewed the allocation of GB yellowtail to the scallop fishery and changed to a fixed percentage of the overall US GB yellowtail ABC. Fishing years 2002 to 2011 were included in analyses to determine the fixed percentage of GB yellowtail for allocation to the scallop fishery (Table 1). The Council approved 16% as the basis for future GB yellowtail allocations and this fixed percentage is the basis for the sub-ACL to the scallop fishery.

Scallop rotational management and access to CAII AA is the main factor in determining how much GB yellowtail flounder will be caught by the scallop fishery annually. As shown in Table 2, GB yellowtail bycatch fluctuates depending on when the fishery is operating in CAII AA and surrounding areas on the southern flank of Georges Bank. In fishing year 2017, the most recent year that CAII AA was open to fishing, the scallop fishery caught 25% of the overall US TAC of GB yellowtail, equal to 57% of the total US catch. The scallop fishery catch was 53 mt out of a total US/Canada TAC of 300 mt. This level of catch by the scallop fishery was similar to fishing year 2014 when the fishery caught 59 mt of GB yellowtail. In contrast, the scallop fishery caught only 1% of the US TAC in 2016 because there was no access to CAII AA and the region south of the access area was also closed.

As noted by the SSC last year, CAII AA is a key area where GB yellowtail are known to occur. Considering the variability in scallop bycatch of GB yellowtail during years when CAII AA is open versus closed may be useful for understanding when catch is expected to be higher or lower. This information may be useful in determining annual TACs since averaging exploitation rates over several years may not capture the nuance of rotational management. Based on survey information provided to the Scallop PDT in 2018, it is likely that CAII AA will open for scallop harvest in 2020.

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