

Action 5: Measures to Reduce Northern Windowpane Bycatch

The projected bycatch of northern windowpane for FY2023 ranges from 106 mt – 126 mt (Table 1), with ~70% of the bycatch expected to come from open areas of Georges Bank (Table 2). The northern windowpane acceptable biological catch (ABC) for 2023 is set at 160 mt. The scallop fishery's sub-ACL for northern windowpane is expected to be 31 mt for FY2023. The stock is currently in a rebuilding plan and will be assessed through a management track assessment in 2023.

The scallop fishery is subject to accountability measures that require the use of a modified gear if the estimated fishery catch exceeds 150% of the sub-ACL or both the scallop fishery's sub-ACL and the overall ACL is exceeded. If the overall ACL for the stock is exceeded, the groundfish fishery is subject to a gear restricted area to the south and east of the Closed Area II groundfish closure.¹

On December 1, 2022, the Scallop Committee moved to include measures in Framework 36 that would require the use of modified gear to reduce bycatch of northern windowpane flounder in open areas on Georges Bank. An alternative and two sub-options have been developed for Council consideration at final action on December 7, 2022.

Background:

During the development of bycatch estimates for Framework 36, the Scallop PDT noted that the forecasts for northern windowpane continue to be well above the sub-ACL for this stock. The PDT discussed the potential utility of requiring the current accountability measure (AM) gear in open areas of Georges Bank as a way to reduce bycatch of this stock during open bottom fishing. Two ideas that the PDT discussed were 1) requiring the AM gear seasonally from April 1 – May 31 and February 1 – March 31, or 2) requiring the AM gear east year-round. The Scallop PDT initially suggested an area east of 70° W, but after input from the Scallop Advisory Panel about the challenges of fishing a shorter apron in the Great South Channel, the Committee developed options for the GRA east of 68° 30' W.

The idea for using a GRA to reduce bycatch stemmed from analysis conducted by the PDT during the development of revised accountability measures for flatfish stocks through Framework 29. As outlined in [Appendix II to Framework 29](#) and shown in Table 3, the northern windowpane bycatch savings that could be gained by using the GRA in open areas of Georges Bank equate to roughly 32% for the February 1 – May 31 option, and roughly 46% for the year-round option. Estimated bycatch reductions for FY2023 using estimates from Framework 29 are shown in Table 2. The PDT feels that the savings is a reasonable approximation of how the gear may perform based on the original research, but given the limited amount of time between the development of measures on December 1, 2022 and final action, the PDT and Council staff did not complete updated analyses for bycatch savings.

¹ See <https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/windowpane-flounder-accountability-measures-information>

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Recent Catch of Northern Windowpane: The scallop fishery has exceeded the sub-ACL for this stock for the last two fishing years (FY2020 and FY2021), and the PDT predicts that the sub-ACL will be exceeded again in FY2022 (i.e., the current fishing year). The scallop fishery is currently subject to a year-round GRA in the Closed Area II region due to the 2020 overage and is expected to be subject to the same GRA in FY2023 due to the 2021 overage.

The most recent year of complete data is 2021. That year, the total ACL for the stock was 150 mt, with the groundfish sub-ACL set at 108 mt, and the scallop fishery sub-ACL set at 31 mt. Northern windowpane is a non-allocated stock to groundfish sectors and the common pool. In 2021, total groundfish catch of northern windowpane was 10.4 mt, or 9.6% of the sub-ACL, with scallop fishery bycatch estimated at 123.5 mt of bycatch. Total bycatch was estimated to be 93% of the total ACL. In past years, the Council has opted to modify scallop fishery accountability measures for northern windowpane and Georges Bank yellowtail flounder so that the AM is only triggered if both the scallop fishery sub-ACL and the overall ACL are exceeded².

In season catch accounting for northern windowpane flounder for fishing year 2022 is available through November 30, 2022. FY2022 is the first year that the northern windowpane AM has been in place. So far this season, the scallop fishery is estimated to have caught 39.3 mt, or 126.9% of the sub-ACL. The roughly 40 mt of bycatch so far this fishing season is approximately 40% of the 99 mt of bycatch that the PDT forecast would be caught in 2022 in its Framework 34 analysis. According to the GARFO quota monitoring site³, around 80% of 2022 DAS have been used, and 75% of the Closed Area II allocation has been harvested. At this juncture of the fishing year, and considering fishing that has already occurred, the PDT believes that the 2022 forecast could be overestimated.

2023 Bycatch Projections: The projected bycatch of this stock for FY2023 ranges from 106 mt – 126 mt, which is similar to the bycatch estimates prepared for FY2022 (86 mt – 115 mt). The Committee's preferred specifications option is expected to result in 119 mt of bycatch. The PDT notes that rotational fishing allocations in the northern windowpane stock area would decline under all options in Framework 36, and that DAS would either remain constant or decline in FY2023.

Estimates at the lower end of the bycatch range are generally associated with 22 DAS and lower trip limits to Area II, while higher estimates are associated with 24 DAS and the higher trip limits to Area II. A description of the bycatch methodology and uncertainty around these estimates can be found in the [November 28, 2022 memo to the Groundfish PDT](#) regarding FY2023 scallop fishery bycatch.

² See Framework 56 to Groundfish FMP, Section 4.2.1.1.1.2 https://s3.us-east-1.amazonaws.com/nefmc.org/170629_Groundfish_FW56_EA_resubmit.pdf

³ See quote monitoring page at https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/ScallopProgram/CURRENT_REPORTS/atlanticseasca1lop.html

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Table 1 - Northern windowpane bycatch estimates for each alternative in FW36.

Measure	4.3.1	4.3.2.1	4.3.2.2	4.3.3.1	4.3.3.2 (CTE Pref)	4.3.4.1	4.3.4.2	4.3.5
Description	No Action	22 DAS, 10k	24 DAS, 10k	22 DAS, 12k	24 DAS, 12k	22 DAS, 14k	24 DAS, 14k	Status Quo
Bycatch Estimate (mt)	86	106	112	112	119	119	126	138

The majority of northern windowpane bycatch is expected to come from open bottom fishing (~70%)(Table 2). Increasing DAS from 22 to 24 results in a 6 mt -7 mt increase in bycatch from open areas. Similarly, increasing the Area II trip limit by 2,000 pound per trip is also expected to result in a 6 mt – 7 mt increase in northern windowpane bycatch (see Table 2).

Table 2 - Northern windowpane bycatch estimates by GB SAMS areas for 2023 for the 24 DAS option with 12,000 pound trips to Area II (Alternative 4.3.3.2 – Committee Preferred). Values in mt.

	CA2-SE	CA2-SW	CA2-Ext	GSC	NF	SF	Total
2023 Northern windowpane ABC							160 mt
2023 PDT Bycatch Estimate	12	10	15	25	26	31	119 mt
With AM gear (46% reduction in Area II)	7	5	8	25	26	31	102 mt
With AM gear required seasonally (Feb. – May) (32% reduction in open areas, and 46% reduction in Area II)	7	5	8	25	18	21	84 mt
With AM gear all GB areas year round (46% in all areas)	7	5	8	25	14	17	75 mt
Scallop sub-ACL for NWP							31 mt

Northern Windowpane AM - Gear Restricted Area: The Council modified the scallop fishery’s accountability measures (AM) for northern windowpane and Georges Bank yellowtail flounder in Framework 29⁴. The current AM requires vessels to fish in Closed Area II with a maximum 5-row apron and 1.5 to 1 maximum average hanging ratio. The conservation engineering work underpinning the efficacy of this AM suggests that applying this gear modification reduces northern windowpane bycatch by 46% and reduces yellowtail bycatch by 34%.

The Scallop PDT feels that this gear modification represents an “off the shelf” short-term approach to mitigate bycatch impacts if necessary.

⁴ See <https://www.nefmc.org/library/framework-29-1>

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The following suite of alternatives (Section 4.5) were added to Framework 36 at the December 1, 2022 Scallop Committee meeting.

4.5 Action 5 – Additional Measures to Reduce Fishery Impacts, Measures to Reduce Northern Windowpane Bycatch on Georges Bank

4.5.1 Alternative 1 – No Action

Under No Action, there would be no change to the gear requirements to fish on Georges Bank. Scallop vessels would continue to be able to fish a maximum 7 row apron when open bottom fishing.

With respect to other measures designed to reduce northern windowpane bycatch, the scallop fishery is expected to be subject to the reactive AM for the duration of FY2023 based on an overage of the northern windowpane sub-ACL in FY2021, which would require vessels to use a maximum 5 row apron with 1.5 to 1 average maximum hanging ratio when fishing in Area II Access Area year-round. Vessels could choose to use the 5 row apron and 1.5:1 average maximum hanging ratio when fishing in open areas of Georges Bank but would not be required to do so.

4.5.2 Alternative 2 – Create a gear restricted area in open areas of Georges Bank east of 68° 30' W longitude for FY2023

Alternative 2 would implement a gear restricted area (GRA) for a specified period of FY2023 in open areas of Georges Bank east of 68° 30' W longitude, not to exceed one (1) year.

Vessels would be required to use a dredge configuration of a maximum 5 row apron and 1.5 to 1 maximum average hanging ratio for the duration of time specified in Option 1 (4.5.2.1) and Option 2 (4.5.2.2), below. The gear restricted area would apply to all scallop vessels fishing open area trips during this time period, within the boundary shown in Map 1.

Description of the required gear: First, the maximum number of rows allowed in the apron of the topside of the dredge would be five (5) rows. A vessel could fish with fewer rows of rings, but the maximum number of rows would be restricted to five. Second, the maximum hanging ratio for the dredge would be 1.5:1 overall; that is an average of 1.5 meshes per ring for the width of the twine top. The twine top is usually connected to the topside of the dredge frame by several rows of rings called the skirt. Individual meshes of the twine top are connected to each ring across the skirt of the dredge. Some vessels use a hanging ratio of 2:1, which means 2 meshes per ring. Some vessels fish with a lower hanging ratio, and some with a greater ratio of 3:1 or even 5:1. An overall hanging ratio of 1.5:1 means that the twine top is hung alternating 2 meshes per ring and 1 mesh per ring, for an overall average of 1.5 meshes per ring for the entire width of the twine top.

A dredge would be in compliance if the ratio did not exceed 1.5 based on the total number meshes in the twine top (counted at the bottom where the twine top connects to the apron) divided by the total number of rings that the twine top is connected to in the apron. For example, an apron that is 40 rings wide (not including any ring in the side pieces) would only be able to use a twine top with 60 or fewer meshes so that the overall ratio of meshes to rings did not exceed 1.5 (60 meshes/40 rings = 1.5). The regulation would not be based on the number of meshes across the top of the twine top connected to the skirt of the dredge, because some vessels connect the twine top to the frame with chain instead of rings.

Rationale: Projections of scallop fishery bycatch of northern windowpane in FY2023 exceed the sub-ACL for this stock. The majority of bycatch is expected to occur in open areas of Georges Bank.

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Implementing a gear restricted area for open area fishing east of 68° 30' W longitude is expected to reduce bycatch of northern windowpane flounder by the scallop fishery in FY2023. The spatial extent of the GRA excludes the Great South Channel based on input from scallop industry members who noted the challenges of using the modified gear in areas with rocky substrate.

4.5.2.1 Option 1 – Year-Round Gear Restricted Area in Georges Bank Open Areas east of 68° 30' W longitude

Alternative 2 Option 1 would require all scallop vessels fishing open area trips east of 68° 30' W longitude to use a dredge configuration of a maximum 5 row apron and 1.5 to 1 maximum average hanging ratio for the duration of FY2023 (i.e., April 1, 2023 – March 31, 2024).

Rationale: Projections of scallop fishery bycatch of northern windowpane in FY2023 exceed the sub-ACL for this stock. The majority of bycatch is expected to occur in open areas of Georges Bank. Implementing a year-round gear restricted area for open area fishing east of 68° 30' W longitude is expected to reduce bycatch of northern windowpane flounder by the scallop fishery during the entirety of FY2023. Requiring the modified gear year round is anticipated to maximize bycatch savings for northern windowpane flounder.

4.5.2.2 Option 2 – Seasonal Gear Restricted Area (February 1 – May 31) in Georges Bank Open Areas

Alternative 2 Option 2 would require all scallop vessels fishing open area trips east of 68° 30' W longitude to use a dredge configuration of a maximum 5 row apron and 1.5 to 1 maximum average hanging ratio from April 1, 2023 – May 31, 2023 and February 1, 2024 – March 31, 2024. The gear restricted area would apply to all LA and LAGC IFQ vessels fishing open trips during this time, within the boundary shown in Map 1.

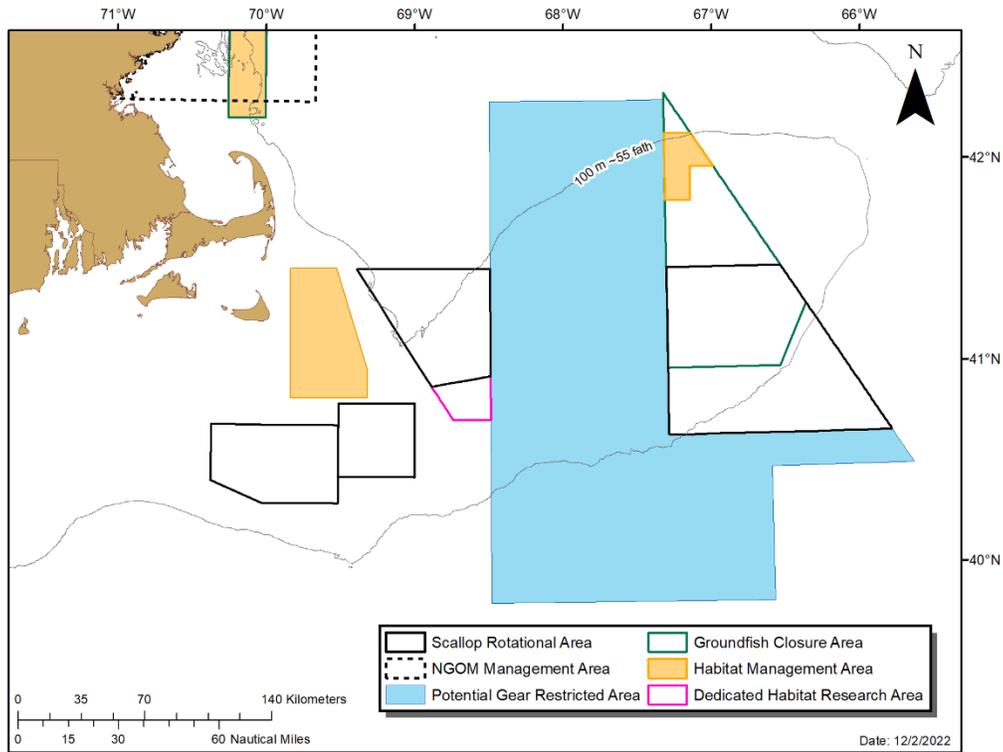
Rationale: Projections of scallop fishery bycatch of northern windowpane in FY2023 exceed the sub-ACL for this stock. The majority of bycatch is expected to occur in open areas of Georges Bank. Implementing a seasonal gear restricted area for open area fishing east of 68° 30' W longitude is expected to reduce bycatch of northern windowpane flounder by the scallop fishery in FY2023. The timing of the GRA aligns with the time of year when the scallop fishery and northern windowpane tend to overlap the most.

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Table 3. [Table 2 from FW29 Appendix II] GB yellowtail and N. windowpane bycatch savings gained by using a 5-row apron in each month for GB open-area fishing. The percentage of landings from GB open-area fishing in each month is given in the first column. Fishery data used were from 2012-2016.

Month	% landings	GB YT bycatch savings	NWP bycatch savings
April	5.8%	1.5%	9.0%
May	20.4%	9.1%	11.8%
June	29.3%	12.9%	2.8%
July	17.9%	7.0%	3.5%
August	14.5%	1.2%	4.7%
September	7.0%	1.0%	1.7%
October	1.6%	0.3%	0.3%
November	0.4%	0.0%	1.5%
December	0.4%	0.0%	0.0%
January	0.4%	0.0%	0.0%
February	0.3%	0.1%	4.5%
March	2.0%	0.3%	6.2%

Map 1 – Proposed Georges Bank GRA Shown in Blue. GRA would apply in open areas east of 68° 30' W.



7.1.5 - Biological Impacts:

Under Alternative 2, all scallop vessels fishing Georges Bank open area east of 68°30' W would be required to use a 5-row apron with 1.5:1 maximum hanging ratio during a specified time of FY2023. Option 1 would require the year-round use of the modified gear, while Option 2 would require vessels to use the gear from April 1 – May 31, 2023 and again from February 1 – March 31, 2024.

In addition to reducing catches of flatfish, this gear modification is also expected to reduce scallop catch by approximately 10%. The potential reduction of scallop catch is in part due to the modified dredge being more selective to larger scallops and less selective to smaller scallops compared to standard gear being used at present by industry (i.e. maximum apron length of 7 rows with no restriction on hanging ratio). In terms of the LA component, a reduction in scallop catch from using the modified gear is not expected to increase the amount of bottom time that dredges are being fished because vessels would already be operating under DAS under both option. If the modified gear selects fewer small scallops, biological impacts of Alternative 2 could be low positive compared to Alternative 1 because smaller scallops would be left on the seafloor to grow and reproduce in the future.

If Alternative 2 acts as a disincentive to fish Georges Bank open area east of 68°30' W, open area effort could be redistributed to other parts of Georges Bank or to the Mid-Atlantic, or to different times of the year when the gear modification is not required. This may lead to mixed impacts on the scallop resource, depending on where and when effort redirects. If Alternative 2 does not change fishing behavior, does not increase discard mortality of scallops, and leads to catches of fewer small scallops, biological impacts could be low positive compared to Alternative 1 because Alternative 1 does not reduce catch of small scallops. Overall, biological impacts of Alternative 2 are expected to be negligible to low positive relative to Alternatives 1 (No Action).

7.2.5 - Non-Target Species Impacts:

Alternative 1 makes no changes to gear requirements for scallop vessels fishing open trips on Georges Bank. Alternative 2 was developed with the specific goal of reducing catch of non-target species, particularly Northern windowpane, by requiring a modified dredge for open area fishing on Georges Bank east of 68° 30' W. The timing of the GRA under Option 1 is year-round versus Option 2 which is a seasonal GRA from April 1 – May 31 and February 1 – March 31 of fishing year 2023.

The timing of both GRA options is expected to be impactful for reducing bycatch of northern windowpane, though greater bycatch savings are associated with the year-round GRA option (Option 1). For example, bycatch savings of northern windowpane associated with the seasonal GRA (Option 2) could be as much as 32%, whereas the bycatch savings associate with the year-round GRA (Option 1) could be as much as 46%.

If Alternative 2 acts as a disincentive to fish Georges Bank open area while the GRA is in place, vessels could either direct effort to other parts of the resource or could direct effort to another time of year when the modified gear is not required on Georges Bank. Under either of these scenarios, Georges Bank open area fishing may not occur during months when bycatch of several non-target species, such as Northern windowpane, is at its peak. For these reasons, impacts of Alternative 2 on non-target species could be slightly positive compared to Alternative 1 in that bycatch of northern windowpane would be expected to be less under Alternative 2 compared to Alternative 1; however, the projected bycatch of northern

windowpane exceeds the sub-ACL but is less than the northern windowpane ABC and ACL for both Alternative 1 and Alternative 2.

7.3.5 – Protected Resources Impacts:

The modified dredge that would be required under Alternative 2 is not expected to increase or decrease incidental catch of protected species, such as sea turtles and(or) sturgeon, relative to a standard scallop dredge; therefore, if the modified gear were required while fishing open area on Georges Bank either year round (Alternative 2 Option 1) or seasonally (Alternative 2 Option 2), interactions with protected resources are not expected to increase or decrease compared to Alternative 1 (No Action).

It is possible that Alternative 2 may deter open-area fishing on Georges Bank when the AM is in place, meaning that effort could be displaced to other parts of the resource, or to a time of year when the modified gear is not required on Georges Bank. Alternative 2 could have some negative impacts on protected resources if effort was displaced to parts of the resource where interactions with protected resource species are more common, such as the Mid-Atlantic region where turtle interactions have been observed more commonly than on Georges Bank. If the timing of open-area fishing on Georges Bank simply shifted to avoid months that required using the modified gear (i.e., under the seasonal GRA measure, Alternative 2 Option 2), the impacts of Alternative 2 on protected resource species could be slightly negative because fishing would still occur and therefore the risk of interacting with protected species would exist at some level.

Alternative 2 is expected to have slightly negative to negligible impacts on protected resources overall as well as in comparison to Alternative 1.

7.4.5 – Essential Fish Habitat Impacts:

Fishing the modified dredge under Alternative 2 may reduce scallop catch and could be more selective to larger scallops compared to the standard dredge configuration used by industry at present. The potential reduction in scallop catch could deter vessels from fishing open area on Georges Bank while the GRA is in place. If this occurs, open area effort will be either be directed outside of the GRA, or effort will be displaced to a time of year when the modified gear is not required. Under either scenario, impacts of Alternative 2 are expected to be neutral compared to Alternative 1 because a displacement of effort within the fishing year likely would not increase area swept.

If vessels elect to fish the modified gear, area swept is not expected to increase because vessels will be operating under DAS management, meaning it will not be possible for vessels to fish more bottom to make up for a potential reduction of scallop catch (and associated LPUE). It is therefore likely that impacts of Alternative 2 on fish habitat are negligible overall as well as in comparison to Alternative 1.

7.5.5.1 – Social Impacts

The following impact statements have been adapted from Framework 29:

Social Impacts of Accountability Measures

The following section describes in general terms the potential social impacts of accountability measures on the scallop fishery, which apply to the development of bycatch reduction measures for northern windowpane flounder (Action 4.5).

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Entities to which the alternatives apply

The alternatives under consideration in Action 5 of Framework 36 would apply to both the LA and LAGC IFQ components of the scallop fishery. The alternatives have the potential to negatively impact the *Attitudes, Beliefs, and Values* of fishermen in their perceptions of fairness amongst the fishery components. Since the majority of the northern windowpane bycatch is attributed to the Limited Access component, Alternative 2 may cause resentment or conflict between fishing groups, a negative social impact in the form of changes to *Social Structure and Organization*.

Impacts of gear modifications, generally

The social impacts likely to result from changes to gear modifications are related to the compliance cost for vessels and the ability of gear suppliers to adapt. The magnitude and nature of the impacts would depend on the cost and catch efficiency of the new gear, the current availability of the new gear, and the choices fishermen must make between whether or not to fish in the areas where the new gear is required. The cost of making gear changes may prove to be a burden for some businesses. Gear modifications can alter daily routines and make long-term planning difficult. The social impacts can be manifested in changes to the *Social Structure and Organization* of the fishery and communities and to the *Attitudes, Beliefs and Values* of the fishery participants and other stakeholders.

For affected fishing businesses, gear modifications can be an economic burden. The ability of a business to adapt to new gear regulations will depend on its current economic situation and ability to cover the short-term costs of the gear. For the vessels that can cover the short-term costs of the gear, long-term impacts are related more to the loss of revenues from fishing that may occur because of the new gear. For example, the required dredge configuration may affect the catch per unit effort of scallops. Since Alternative 2 applies to DAS fishing, vessels may not be able to make up the lost revenue. Over the long-term, this may result in more significant economic impacts and, ultimately, more severe dislocation of vessels in the fishery. It should be noted that the Council developed measures in FW29 that would require the same gear modification to comply with any AMs that are triggered. Therefore, there could be cost saving for vessels to comply with reactive AMs for northern windowpane, and these required measures.

Impacts of gear-restricted areas, generally

The measures under consideration may impose gear-restricted areas rather than outright closures, however, the impacts may be similar to that of closed areas, particularly for vessels that decide not to fish these areas to avoid using the gear while fishing DAS. Social impacts of closed areas may tend to be more far-reaching in nature than social impacts from other management measures that are more administrative in nature, although the impacts are not as great as those that may result from very low catch limits. Area closures tend to have the most significant impacts on disruption in daily living and changes in occupational opportunities and community infrastructure, potentially affecting the *Size and Demographic Characteristics* of the fishery-related workforce. Area-based restrictions are likely to cause effort shift to other areas, which could change opportunities and infrastructure in homeports and landing ports. Additionally, closures often lead to a concentration of effort localized at the boundaries of closures, which can lead to crowding and gear conflicts among fishermen. This congestion could have a negative impact on *Social Structure and Organization*. Reductions in scallop fishing opportunities compromise business flexibility and can have direct impacts on fishing activity within a port, consequently impacting the shoreside facilities that are dependent on the affected vessels. If vessels from certain ports choose to relocate or not to operate as a result of these closures, social impacts associated with economic loss could occur, including increased uncertainty and instability in the fishery and/or community, problems finding and keeping crew members on a year-round basis, family and business

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financial problems, overall increased stress at the individual, family, and community level, and reductions in job satisfaction.

The ability to adapt to closed areas is highly variable and largely dependent on the physical location of the closed areas. Less mobile fishermen may bear a heavier burden, as they are less able to easily switch harvest areas. Smaller vessels will be less able to adapt to closures of areas near shore as their range is limited, and they cannot easily target offshore areas. The most impacted communities will be those that are geographically proximate to the area and/or that serve as the homeport for vessels that fish there. In the near-term, area closures could reduce the *Size and Demographic Characteristics* of the fishery-related workforce and alter the *Historical Dependence on and Participation in* the fishery.

7.5.5.2 - Economic Impacts

Alternative 2 would implement a gear restricted area (GRA) for a specified period in open areas of Georges Bank east of 68° 30' W, not to exceed one (1) year.

The dredge modification in this alternative is expected to reduce catch by up to 10% in terms of catch weights. The results from this gear study also demonstrated that while the modified gear caught fewer scallops, the gear was more selective at catching larger scallops and could reduce catches of smaller scallops.

The gear modifications will be applied from April 1 – May 31 and February 1 – March 31. In terms overall landings in all open areas by LA vessels, about 51% of open area scallop landings occurring in April, May, February, and March of 2021. The majority of open area landings occurred in April, with the LA component landing 4.3 million pounds, ~25% of the total open area landings for FY2021. Fishing year 2022 began differently, with the LA component landings 3.6 million pounds when fishing open areas on DAS in April and May combined. The difference can be attributed to the delayed implementation of FW33 due to the impacts of COVID-19, and limited rotational fishing opportunities.

While fishing gear that retains fewer, larger scallops could be viewed as a positive from a biological perspective by leaving smaller animals on the seafloor to grow and reproduce, under DAS, the economic impacts could be viewed as negative since it is reasonable to expect LPUE would be reduced using the gear modification. This impact could be magnified in FY2023 as LPUE is expected to decline from recent years, with the best catch rates expected on Georges Bank. The impacts of Alternative 2 could be viewed as low negative relative to No Action.

As noted in Section 7.5.1 covering social impacts, some vessels may opt not to fish the modified gear, and re-direct effort to different months or different areas. The GRA would cover two areas where substantial open bottom fishing is expected to occur in 2023 (northern flank and southern flank). Under Option 1, implementing a year-round GRA could result in lower LPUE and landings, or displacement to areas with lower catch rates. The potential for negative impacts of effort redirection are lower under Option 2 than Option 1 in Alternative 2.

The economic impacts of Alternative 2 compared to No Action would likely be low negative, depending on the relative impacts on landings and revenues. Option 1 (year-round GRA) would likely have greater negative impacts than Option 2 (seasonal GRA).