## Quota Change Model Prediction for 2026 Groundfish Fishing Year

### Methods

The Quota Change Model (QCM) is used to analyze the impacts of each combination of measures on the sector portion of the groundfish fishery, which has comprised 99% of commercial groundfish revenues over the last five fishing years (see Affected Environment: Human Communities). The QCM is a Monte Carlo simulation model that selects from existing records the trips most likely to take place under new regulatory conditions. To do this, a large pool of actual trips is created from a reference dataset. For this prediction, the reference dataset consists of groundfish trips taken from the 2024 fishing year (May 1, 2024 – April 30, 2025). The composition of this pool is conditioned on each trip's utilization of allocated Annual Catch Entitlement (ACE), under the assumption that the most likely trips to take place in the FY being analyzed are those fishing efficiently under the new sector sub-ACLs. The more efficiently a trip uses its ACE, the more likely that trip is to be drawn into the sample pool. ACE efficiency is determined by the ratio of ACE expended to net revenues on a trip, iterated over each of the allocated groundfish stocks. Operating profits are calculated as gross revenues minus trip costs minus the opportunity cost of quota, where trip costs are from at-sea observer data (Figure 1) and quota opportunity costs are estimated from a model of inter-sector lease price and quantity data.

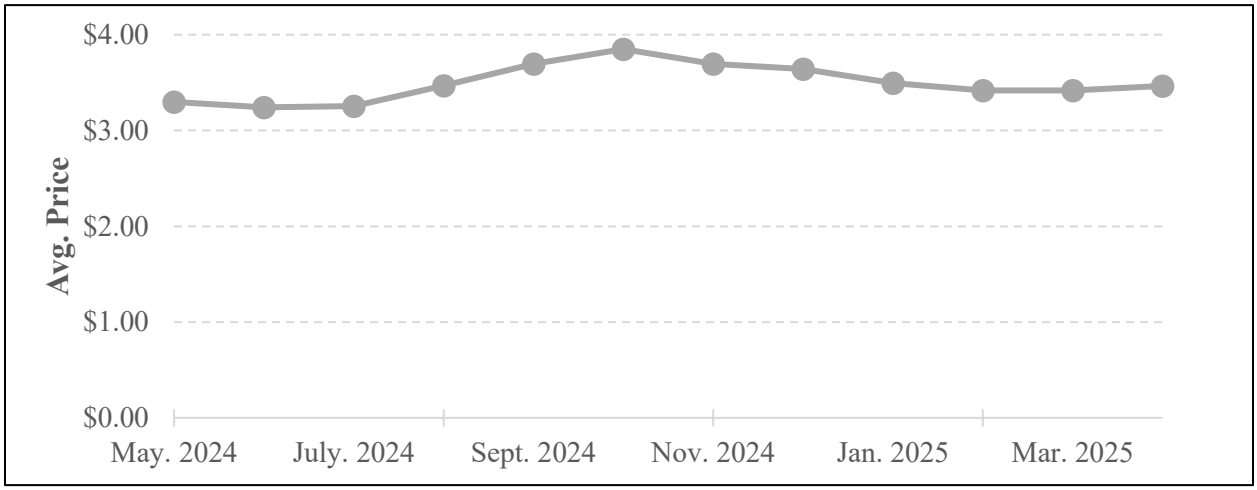


Figure 1- Monthly average fuel price (nominal $), sector vessel trips, May 2024 – April 2025. Source: Northeast Fisheries Observer Program (NEFOP) and At-Sea Monitoring (ASM) data.

Once the sample pool is constructed, trips are pulled from the pool at random, summing the ACE expended for all allocated groundfish stocks as each trip is drawn. When one stock's ACE reaches the sector sub-ACL limit, no further trips from that broad stock area are selected. The model continues selecting trips until sector sub-ACLs are achieved for areas that encompass the WGOM cod and GB broadstock areas or if sub-ACLs are reached for one of the unit stocks.

This selection process forms a synthetic fishing year. A total of 250 synthetic years are constructed, and median values and confidence intervals are reported. By running simulations based on actual fishing trips, the model implicitly assumes the following:

- stock conditions, fishing practices and harvest technologies existing during the data period are representative;
- sector enrollment from the data period are representative (i.e. a shift from sectors to the common pool could cause an overestimate in fishery revenue)
- allocations to individual sectors are not considered, as the fishery is modeled as a whole;
- trips are repeatable;
- demand for groundfish is constant, noting that fish prices do vary between the reference population and the sample population, but this variability is consistent with the underlying price/quantity relationship observed during the reference period;
- operating costs are constant;
- ACE flows seamlessly from lesser to lessee such that fishery-wide caps can be met without leaving ACE for constraining stocks stranded;

The net effect of the constraints imposed by these assumptions is unclear. The selection algorithm draws mainly from efficient trips—if fishermen make relatively less efficient trips the model estimates will be biased high. Through a combination of technological improvement (gear rigging, equipment upgrades, etc.) or behavioral modifications, fishermen are likely to improve on their ability to avoid constraining stocks. If these adjustments are successful, the model predictions may be biased low. Furthermore, the model will under-predict true landings and/or revenues if stock conditions for non-constraining stocks improve, if demand for groundfish rises, or if fishing practices change and fishermen become more efficient at maximizing the value of their ACE. Conversely, the model will over-predict true landings and/or revenues if stock conditions of non-constraining stocks decline, markets deteriorate, or fishing costs increase.

The model is intended to capture fishery-wide behavioral changes with respect to groundfish sub-ACL changes, and groundfish catch is maximized by the constrained optimization algorithm. Catch of non-groundfish stocks on groundfish trips are captured in the model, but not explicitly modeled, such that constraints on other fisheries are not incorporated. At-sea monitoring costs are assumed to be fully subsidized/reimbursed to sectors.

**Model Performance (FY2021-FY2025)**

Performance of the QCM from recent fishing years is shown in Table 1. The model under-predicted revenues and profit for FY2021, followed by over-predictions for FY2022-2023, and performed well for FY2024. Based on fishing activity through the first half of FY2025, the model is likely to under-predict values for the current fishing year, noting that FW69 has not been implemented to date.

From a revenue perspective, the accuracy of predictions depends on the total volume of landings, the composition of landings, and fish ex-vessel prices. A drop-off in landings from FY2020-2022 was primarily responsible for the FW63 over-prediction. A drop-off in fish prices was primarily responsible for the FW65 over-prediction. The FW66 accurate revenue predictions were a function of slight over-estimates in harvest and relatively stable/slight decline in prices. Thus far FY2025 is showing a relatively large increase in fish prices (Figure *2*) preventing a decline in revenues (Figure 3). If these price increases continue into FY2026, the revenue predictions that follow may be under-estimates.

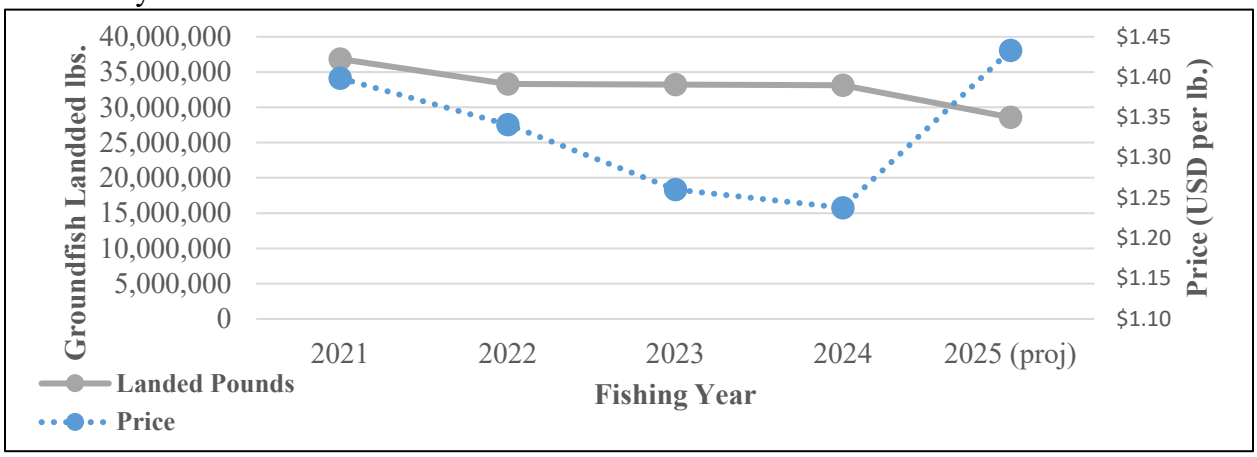


Figure 2- Sector groundfish landings and prices, fishing years 2021-2025. Projected landings for FY2025 based on fishing activity from May-October, 2025.

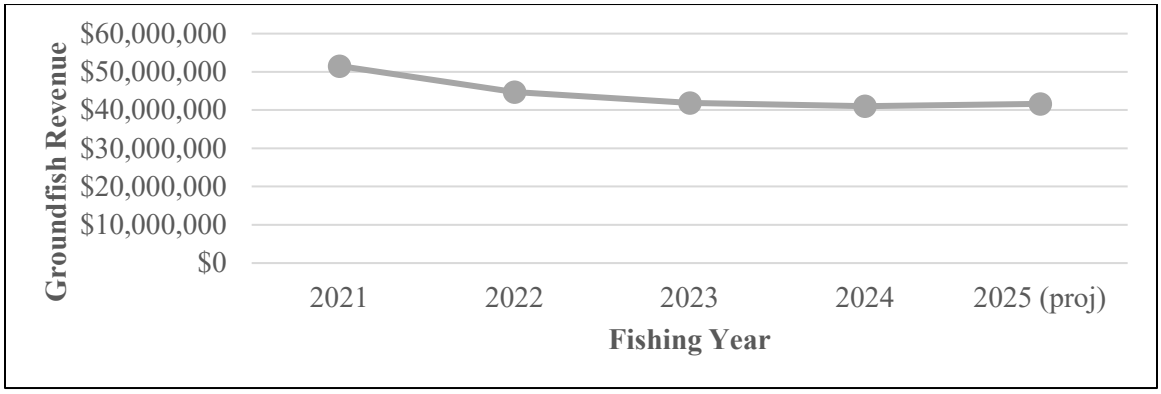


Figure 3- Sector groundfish revenue, fishing years 2021-2025. Projected revenue for FY2025 based on fishing activity from May-October, 2025.

Table 1- Performance of Quota Change Model, fishing years 2021-2025. Revenues and costs are for the sector component of the groundfish fishery (nominal USD).

| | FY2021 | | FY2022 | | FY2023 | | FY2024 | | FY2025 |
|---|---|---|---|---|---|---|---|---|---|
| | Predicted[1] | Realized | Predicted[2] | Realized | Predicted[3] | Realized | Predicted[4] | Realized | Predicted[5] |
| Groundfish Revenue | 45.3 | 51.9 | 51.9 | 45.1 | 47.9 | 41.7 | 40.8 | 41.0 | 34.7 |
| Total Revenue | 63.5 | 75.1 | 73.3 | 66.6 | 74.2 | 61.6 | 58.2 | 59.8 | 51.7 |
| Operating Cost | 10.9 | 16.1 | 10.9 | 17.5 | 19.1 | 14.8 | 15.0 | 14.5 | 11.6 |
| Sector Cost | 1.8 | 1.6 | 1.8 | 1.5 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 |
| Quota Cost | 3.6 | 4.3 | 2.7 | 4.2 | 4.3 | 6.1 | 6.1 | 6.9 | 5.0 |
| Operating Profit | 47.1 | 53.1 | 59.4 | 43.4 | 51.0 | 39.3 | 36.1 | 37.2 | 33.9 |

[1] FW61, reference pool = FY2019

[2] FW63, reference pool = September 2020 – August 2021

[3] FW65, reference pool = November 2021 – October 2022

[4] FW66, reference pool = November 2022 – October 2023

[5] FW69, reference pool = FY2023

**Results**

Table 2- Summary of realized FY2024 and predicted FY2025 and FY2026 revenues and costs for the sector portion of the commercial groundfish fishery; median values; nominal dollars.

| Option | Groundfish Gross Revenues | Total Gross Revenues | Operating Cost | Sector Cost | Quota Cost | Operating Profit | Days Absent |
|---|---|---|---|---|---|---|---|
| FY2024 Realized | 41.0 | 59.8 | 14.5 | 1.2 | 6.9 | 37.2 | 9,214 |
| FY2024 Prediction | 40.8 | 58.2 | 15.0 | 1.3 | 6.1 | 36.1 | 8,342 |
| FY2025 Prediction (FW69) | 34.7 | 51.7 | 11.6 | 1.2 | 5.0 | 33.9 | 7,192 |
| FY2026 (No Action) | 16.8 | 23.9 | 5.2 | 0.5 | 3.3 | 18.7 | 3,405 |
| FY2026 (Alt. 2 with MUBs; white hake 70% Fmsy) | 36.8 | 52.6 | 11.9 | 1.0 | 6.5 | 33.1 | 7,511 |
| FY2026 (Alt. 2 w/o MUBs[6]; white hake 70% Fmsy | 38.6 | 55.1 | 12.6 | 1.1 | 6.9 | 34.6 | 7,869 |

[6] The Management Uncertainty Buffer (MUB) would be removed for all groundfish stocks other than SNE cod, assuming an ASM target rate of 100% for FY2026.

**Results- Alternative 1/No Action ACLs for FY2026**

Under No Action, the groundfish fishery would operate under default specifications until Oct. 31, 2026. The QCM simulates revenue and operating profit for a complete fishing year. To estimate 6 months of activity, the QCM outputs (revenue, costs, operating profit) were multiplied by the percentage of respective values that have occurred in May-October over FYs 2020-2024. For groundfish revenue, the multiplier was .502 (Figure 4). Multipliers were also used for total revenue (.487) and days absent (.526), with the latter being applied to operating cost as well. Finally, a multiplier for groundfish landings (.510) was applied to sector costs and quota costs.

Since there is a seasonal component to stock-level, port-level, and vessel size-level revenues, these results are not presented under No Action. Given the substantial reduction in revenues and profits under No Action relative to Alternative 2, all components of the groundfish fishery are expected to incur negative impacts. In anticipation of an Oct. 31 fishery closure, an increase in effort would certainly be possible. This potential increase was not incorporated in the No Action estimates given uncertainty around how the profitability of groundfish trips would be impacted in a situation with a large volume of landings occurring in a condensed fishing year.

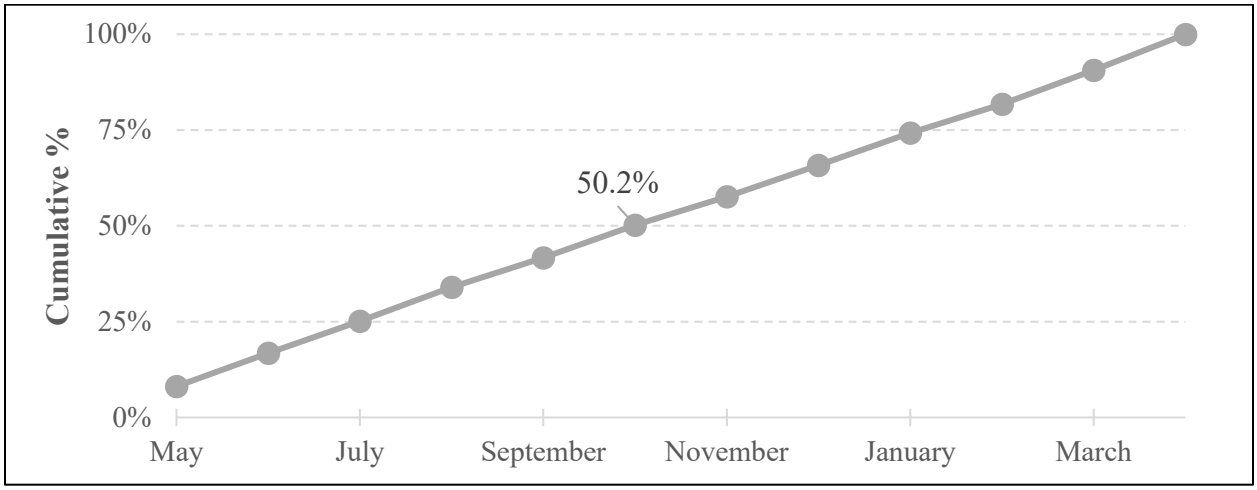


Figure 4- Cumulative percentage of groundfish revenue by month, fishing year 2020-2024

**Results- Alternative 2, Revised ACLs for FY2026**

The FY2026 Alternative 2 prediction includes the management uncertainty buffer (MUB) in place for all groundfish stocks and a separate prediction for the MUB removed for all stocks, other than SNE cod (Table 2).

When all MUBs are included, predicted groundfish revenue for FY2026 is $36.8M, representing a $4.2M (-10.2%) decrease from the FY2024 realized value of $41.0M. Total predicted gross revenues from groundfish trips for FY2026 is $52.6M. This represents a $7.2M decrease from the FY2024 realized value of $59.8M. Predicted operating profit is $33.1M, representing a $4.1M (-11.0%) reduction from the FY2024 value of $37.2M.

When MUBs are removed, predicted groundfish revenue for FY2026 is $38.6M, an increase of $1.8M compared to the inclusion of buffers. Total revenue from groundfish trips is $55.1M, an increase of $2.5M compared to the inclusion of buffers. However, even with the removal of MUBs for groundfish stocks, FY2026 predicted groundfish revenue is still $2.4M (5.9%) lower than the FY2024 value. Total revenue from groundfish trips is still $4.7M (7.9%) lower. Operating profit during FY2026 is predicted to be $34.6M in the absence of management uncertainty buffers. Disaggregated results (by stock, port, and vessel size class) are shown below for Alternative 2 without MUBs.

Stock-level predictions show that four stocks (GB cod, WGOM cod, white hake, and redfish) have utilization rates >90% (Table 3). White hake and WGOM cod show the largest reductions in revenue relative to FY2024 while other less constraining stocks such as plaice, GOM haddock, and witch flounder show more moderate reductions. Port-level predictions are shown for both home port (Table 4) and trip port (Table 5) with most areas showing value reductions relative to FY2024. By vessel length (Table 6), all size classes are predicted to yield a reduction in total revenues from groundfish trips relative to FY2024.

Of note, behavioral changes in the fishery may occur with the transition from two cod stocks to four for FY2026. For example, few trips occurred in the EGOM cod broadstock area during FY2024. With separate WGOM and EGOM cod quotas in FY2026, and the WGOM quota predicted to be constraining, there is the potential for a shift in effort east. The QCM is unable to predict these sorts of potential large effort shifts as noted in the model assumptions listed under the methods section: “stock conditions, fishing practices and harvest technologies existing during the data period are representative”.

Stocks with predicted high levels of utilization in FY2026 are expected to have higher quota prices relative to less utilized stocks. Stock-level quota prices and costs are summarized in Table 8. Quota costs represent the opportunity cost of quota where each pound of catch is multiplied by the estimated quota price. That is, every pound of fish caught can no longer be leased out. Quota accounting costs would look quite different as sectors/vessels will have varying needs to lease in quota, based in part on their initial allocations.

Table 3- Alternative 2 (MUB removed for all stocks, other than SNE cod) stock-level catch and revenue predictions, median values with 5% and 95% confidence intervals, nominal dollars (millions). Stocks are presented in order of FY2026 predicted ex-vessel value.

| Stock | Sub-ACL (mt) | Predicted Catch (mt) | Predicted Utilization | FY26 Prediction | *p(5%) Revenue* | *p(95% Revenue)* | FY24 Realized Revenue |
|---|---|---|---|---|---|---|---|
| Redfish | 5,567 | 5,380 | 96.6% | 6.8 | 6.2 | 7.2 | 6.7 |
| GB Haddock | 4,215 | 1,871 | 44.4% | 5.8 | 4.9 | 6.8 | 6.0 |
| American Plaice | 6,729 | 1,272 | 18.9% | 5.0 | 4.5 | 5.5 | 5.2 |
| Pollock | 9,777 | 2,187 | 22.4% | 4.0 | 3.7 | 4.3 | 4.2 |
| GOM Haddock | 2,269 | 1,136 | 50.1% | 3.9 | 3.6 | 4.3 | 4.1 |
| White Hake | 1,340 | 1,330 | 99.3% | 3.8 | 3.5 | 3.9 | 4.8 |
| Witch Flounder | 1,424 | 1,033 | 72.5% | 3.1 | 2.8 | 3.3 | 3.3 |
| GB Winter Flounder | 1,587 | 662 | 41.7% | 2.8 | 2.3 | 3.3 | 2.7 |
| WGOM Cod | 294 | 283 | 96.3% | 1.4 | 1.3 | 1.5 | 2.2 |
| GB Cod | 134 | 121 | 90.3% | 0.5 | 0.4 | 0.6 | 0.5 |
| GOM Winter Flounder | 588 | 102 | 17.4% | 0.5 | 0.4 | 0.6 | 0.5 |
| CC/GOM Yellowtail Flounder | 1,585 | 272 | 17.1% | 0.4 | 0.3 | 0.4 | 0.3 |
| Halibut | 23 | 35 | 150.7% | 0.3 | 0.3 | 0.3 | 0.3 |
| SNE/MA Winter Flounder | 341 | 47 | 13.9% | 0.2 | 0.2 | 0.4 | 0.2 |
| EGOM Cod | 37 | 1 | 1.6% | <0.1 | <0.1 | <0.1 | <0.1 |
| GB Yellowtail Flounder | 24 | 2 | 10.0% | <0.1 | <0.1 | <0.1 | <0.1 |
| SNE Cod | 7 | <0.1 | 5.8% | <0.1 | <0.1 | <0.1 | <0.1 |
| SNE/MA Yellowtail Flounder | 22 | <0.1 | 0.8% | <0.1 | <0.1 | <0.1 | <0.1 |

Table 4- Alternative 2 (MUB removed for all stocks, other than SNE cod) revenue prediction by **home port**, mean values with 5% and 95% confidence intervals in parenthesis, nominal dollars (millions).

| | **Groundfish Revenue** | | **Total Revenue** | |
|---|---|---|---|---|
| State/Port | FY2026 Prediction | FY2024 Realized | FY2026 Prediction | FY2024 Realized |
| Massachusetts<br>*Gloucester* | 8.6<br>(7.6 – 9.5) | 11.9 | 12.0<br>(10.7 - 13.2) | 16.0 |
| *Boston/Scituate* | 8.5<br>(7.5 – 9.4) | 10.1 | 11.1<br>(9.8 – 12.3) | 13.1 |
| *New Bedford* | 16.7<br>(15.2 – 18.3) | 13.9 | 23.6<br>(21.6 – 25.6) | 19.8 |
| *Outer/Lower Cape* | <0.1<br>(<0.1 - 0.1) | 0.1 | 0.7<br>(0.6 - 0.8) | 2.8 |
| *Other MA ports* | <0.1<br>(<0.1 - <0.1) | <0.1 | <0.1<br>(<0.1 - 0.1) | <0.1 |
| Maine<br>*Portland* | 2.7<br>(2.3 – 3.2) | 3.0 | 3.2<br>(2.7 - 3.8) | 3.7 |
| *Other ME ports* | 0.7<br>(0.6 – 0.9) | 0.7 | 0.9<br>(0.7 - 1.1) | 0.9 |
| Rhode Island (all) | 0.5<br>(0.3 - 0.6) | 0.4 | 2.1<br>(1.7 - 2.5) | 1.9 |
| New Hampshire (all) | 0.8<br>(0.6 – 1.0) | 0.9 | 1.4<br>(1.1 - 1.6) | 1.4 |

Table 5- Alternative 2 (MUB removed for all stocks, other than SNE cod) revenue prediction by **trip port**, mean values with 5% and 95% confidence intervals in parenthesis, nominal dollars (millions).

| | **Groundfish Revenue** | | **Total Revenue** | |
|---|---|---|---|---|
| State/Port | FY2026 Prediction | FY2024 Realized | FY2026 Prediction | FY2024 Realized |
| Massachusetts | | | | |
| *Gloucester* | 10.9 (9.7 - 11.9) | 11.8 | 14.7 (13.1 - 15.9) | 15.6 |
| *Boston/Scituate* | 9.1 (8.2 - 10.0) | 10.5 | 11.9 (10.7 - 13.1) | 13.5 |
| *New Bedford* | 16.2 (14.9 - 17.7) | 15.9 | 22.2 (20.5 – 24.2) | 20.8 |
| *Outer/Lower Cape* | 0.1 (<0.1 - 0.1) | 0.1 | 1.5 (1.2 – 1.8) | 4.6 |
| *Other MA ports* | <0.1 (<0.1 - <0.1) | <0.1 | <0.1 (<0.1 - <0.1) | <0.1 |
| Maine | | | | |
| *Portland* | 1.7 (1.4 - 2.1) | 1.9 | 2.2 (1.8 - 2.6) | 2.3 |
| *Other ME ports* | 0.3 (0.2 - 0.4) | 0.3 | 0.3 (0.3 - 0.4) | 0.4 |
| Rhode Island (all) | 0.1 (0.1 - 0.1) | 0.1 | 1.5 (1.2 – 1.8) | 1.3 |
| New Hampshire (all) | 0.3 (0.2 - 0.3) | 0.4 | 0.6 (0.5 - 0.8) | 0.8 |

Table 6- Alternative 2 (MUB removed for all stocks, other than SNE cod) groundfish species revenue and total revenue prediction by size class, mean values with 5% and 95% confidence intervals in parenthesis, nominal dollars (millions).

| | **Groundfish Revenue** | | **Total Revenue** | |
|---|---|---|---|---|
| Vessel Length Category | FY2026 Prediction | FY2024 Realized | FY2026 Prediction | FY2024 Realized |
| 75'+ | 25.2 (23.6 – 26.7) | 27.6 | 33.7 (31.5 – 35.8) | 36.3 |
| 50'to<75' | 8.9 (7.8 – 9.9) | 9.8 | 14.4 (12.9 - 16.0) | 15.4 |
| <50' | 4.4 (3.8 – 5.2) | 3.6 | 6.9 (6.1 – 7.9) | 8.1 |

Table 7. Stock-level landings (Alternative 2: MUB removed for all stocks, other than SNE cod), estimated quota prices[7], and quota costs. Stocks listed in order of predicted FY2026 revenue.

| Stock | Predicted Catch (lbs.) | Estimated Quota Price | Quota Cost ($) |
|---|---|---|---|
| Redfish | 11,860,094 | 0.10 | 1,186,009 |
| GB Haddock | 4,124,169 | 0.00 | 0 |
| American Plaice | 2,803,893 | 0.00 | 0 |
| Pollock | 4,820,552 | 0.00 | 0 |
| GOM Haddock | 2,504,148 | 0.36 | 896,435 |
| White Hake | 2,932,766 | 0.91 | 2,656,764 |
| Witch Flounder | 2,276,370 | 0.51 | 1,172,057 |
| GB Winter Flounder | 1,458,616 | 0.00 | 0 |
| WGOM Cod | 623,155 | 1.37 | 851,348 |
| GB Cod | 267,447 | 0.81 | 216,761 |
| GOM Winter Flounder | 225,653 | 0.00 | 0 |
| CC/GOM Yellowtail Flounder | 598,704 | 0.00 | 0 |
| Halibut | 76,739 | N/A | N/A |
| SNE/MA Winter Flounder | 104,699 | 0.00 | 0 |
| EGOM Cod | 1,262 | 0.00 | 0 |
| GB Yellowtail Flounder | 5,180 | 0.00 | 0 |
| SNE Cod | 826 | 0.00 | 0 |
| SNE/MA Yellowtail Flounder | 359 | 0.00 | 0 |
| *Total* | *34,684,631* | | *6,979,373* |

[7] For most stocks, the estimated quota price represents the inter-sector lease price from FY2024. Two exceptions are for redfish and white hake. The estimated lease price for white hake was calculated by taking the FY2024 price ($0.70 per pound) and increasing by 29.7%, the percentage decline in the sector sub-ACL for FY2026 relative to FY2024. The lease price for redfish was assumed to be $0.10 per pound, roughly 20% of the ex-vessel price.