MARINE FISHERIES ADVISORY COMMISSION
BUSINESS MEETING AGENDA
8:30 AM
Tuesday, October 18, 2022
Via Zoom
Login: https://bit.ly/3UWdiOC
Call In: 1-646-931-3860
Webinar ID: 836-5178-0047
Passcode: 978467

1. Introductions,Announcements and Review of Agenda
2. Review and Approval of Meeting Minutes
    a. August 18, 2022 Draft Business Meeting Minutes
    b. September 13, 2022 Draft Business Meeting Minutes
3. Comments
    a. Chairman
    b. Commissioner
    c. Law Enforcement
    d. Director
4. Discussion Items
    a. 2022 Quota Managed Fishery Performance Update
    b. Protected Species Management Update
    c. Interstate Fisheries Management Update
    d. Federal Fisheries Management Update
5. Other Business
    a. Upcoming State Fisheries Management Meeting and Hearing Schedule
    b. Commission Member Comments
    c. Public Comment
6. Adjourn

Future Meeting Dates

November 22, 2022
DFW Field Headquarters
1 Rabbit Hill Road
Westborough, MA 01581

All times provided are approximate and the meeting agenda is subject to change. The MFAC may amend the agenda at the start of the business meeting.

MARINE FISHERIES ADVISORY COMMISSION
August 18, 2022
Via Zoom

In attendance:
Marine Fisheries Advisory Commission: Raymond Kane, Chairman; Michael Pierdinock, Vice-Chairman; Bill Doyle, Clerk; Kalil Boghdan; Shelley Edmundson; Bill Amaru; Lou Williams; Sooky Sawyer; and Tim Brady

Division of Marine Fisheries: Daniel McKiernan, Director; Kevin Creighton, CFO; Story Reed; Bob Glenn; Jared Silva; Nichola Meserve; Melanie Griffin; Julia Kaplan; Jeff Kennedy; Anna Webb; Nick Buchan; and Scott Schaffer

Department of Fish and Game: Ron Amidon, Commissioner

Massachusetts Environmental Police: Lt. Matt Bass

Members of the Public: Phil Coates, Heather Haggerty, John Moran, and Beth Casoni

INTRODUCTIONS AND ANNOUNCEMENTS

Chairman Ray Kane called the August 18, 2022 Marine Fisheries Advisory Commission (MFAC) business meeting to order.

REVIEW OF AUGUST 18, 2022 DRAFT BUSINESS AGENDA

No amendments were made to the August 18, 2022 MFAC agenda.

REVIEW AND APPROVAL OF JUNE 16, 2022 DRAFT BUSINESS MEETING MINUTES

Chairman Kane asked for comments or edits to the June 16, 2022 MFAC draft business meeting minutes. No comments were made. Chairman Kane sought a motion to approve the meeting minutes.

Tim Brady made the motion to approve the June 16, 2022 business meeting minutes as provided. Shelley Edmundson seconded the motion. The motion passed unanimously 7-0 with Bill Doyle abstaining.

CHAIRMAN'S COMMENTS

Chairman Kane thanked everyone for their attendance at the 60th anniversary celebration of the MFAC in New Bedford.

COMMISSIONER'S COMMENTS

Commissioner Amidon discussed his work to have the MFAC members reappointed. He asked Commission members to complete all required paperwork and background checks in a timely manner to ensure reappointment.

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LAW ENFORCEMENT COMMENTS

Lt. Matthew Bass provided comments for the Massachusetts Environmental Police (MEP). On fisheries enforcement, there were minor violations during the commercial striped bass season. MEP were also seasonally focused on boating safety, particularly concerning the aggregation of humpback whales and striped bass fishing activity off Plymouth.

Lt. Bass then moved on to discuss personnel. Three new officers started field training this summer. Chairman Kane asked if these officers were adding to the ranks or backfilling vacant positions. Lt. Bass stated they were backfilling vacancies.

DIRECTOR'S COMMENTS

Director Dan McKiernan followed up on Lt' Bass' comments regarding the aggregation of humpback whales off Plymouth. He noted whales and striped bass had been aggregated off Plymouth feeding on a dense school of menhaden. In turn, this produced a lot of boating activity in the area and presented public safety and whale safety issues.

Mark Amorello was surprised to receive the 2022 Belding Award. He appreciated receiving the award and enjoyed the award ceremony and celebration.

On the state budget, Dan discussed earmarks for shellfish propagation, sediment removal, a winter flounder study, white shark tags and transmitters, marsh restoration and revitalization, and funding for dual lobster permit holders to offset costs associated with the required buoy line marking schemes.

Dan welcomed questions from the commission.

Sooky asked if monies were appropriated to fund the Cape Cod Bay dissolved oxygen study. Kevin Creighton stated there is earmarked funding for this year.

Bill Amaru supported the funding to better understand winter flounder genomics, as this may in turn better inform time-of-year harbor dredging restrictions to safeguard winter flounder spawning.

Dan then discussed some federal funding issues. This included disaster relief for Atlantic sea herring disaster. The monies were allocated and the states needed to coordinate distribution efforts. Congress also appropriated funding to help fishermen cover costs related to gear modifications to protect right whales and electronic tracking devices.

Dan moved on to discuss the challenges regarding the 2022 horseshoe crab fishery. Among other things, this included increased demand for crabs from the biomedical sector and supply and demand in the bait fishery. DMF had scheduled meetings with the biomedical firms and was working to schedule meetings with bait dealers, harvesters, and conservation interests early this fall. Then DMF would hold broader meetings later this year to discuss potential management changes moving forward.

Dan briefly discussed the 2022 menhaden fishery. He noted the ASMFC was considering an addendum to the FMP for 2023, which may affect the management of the fishery moving forward. DMF intended to host a public hearing for the ASMFC addendum and an industry scoping meeting in September.

ITEMS FOR FUTURE PUBLIC HEARING

Jared Silva provided a brief presentation to the commission regarding upcoming items for public hearings. Prior to the next commission meeting, there will be an 8AM public hearing to finalize the recreational cod and haddock limits to match federal limits for this fishing year. Jared then discussed a potential fall omnibus public hearing that will take place in October.

Vessel Trackers for Federal Lobster Permit Holders
Director McKiernan reminded the MFAC that the ASMFC recently passed addendums to the Jonah crab and lobster FMPs requiring the installation of electronic trackers on vessels associated with commercial lobster and Jonah crab trap operations with federal lobster trap allocations. This measure will enhance resolution of spatial data collected from this fishery to better understand the industry's offshore footprint. This was of critical importance when considering emerging challenges related to marine spatial planning (e.g., development and siting of offshore wind energy, aquaculture, and marine protected areas), stock assessment and stock exploitation estimates, and risk management for protected species. Given these pressing spatial data needs, DMF was proposing to adopt this electronic tracking requirement for May 1, 2023 to begin collecting the data this upcoming season. This is earlier than the mandatory January 1, 2024 implementation date established in the FMP.

Congress has appropriated funding to the industry to cover the costs of the installation of the electronic tracking device and potentially two-to-three years of data service. DMF was working with coastal states and the ASMFC to develop a program to distribute this funding to affected fishers.

Whelk Gauge Schedule Petition
Dan described a petition from Heather Haggerty of Big G Seafood (a New Bedford based whelk processor) and the Massachusetts Conch Association. The petition

requested DMF amend the schedule to increase the whelk gauge by: delaying the next gauge change from 2023 to 2024; and having future increases occur every three years rather than biennially. The petitioners argued this was necessary to allow for additional recoupment into the fishery following gauge increase to address severe declines in whelk fishing effort and landings in Massachusetts that jeopardize shoreside infrastructure.

Dan invited Heather Haggerty to speak on her petition. Chairman Kane indicated he would afford Heather several minutes to speak to the petition.

Heather described decreases in local fishing effort and increased reliance on product from out-of-state for processing. The petitioners felt an additional year would not only allow for additional recoupment but would provide an opportunity for additional scientific investigations into the state's whelk resource and discussions about how to better manage the fishery.

Chairman Kane asked if any members of the public wanted to speak in opposition to the petition. No comments were made. The Chairman opened the discussion up to the MFAC.

Lou Williams supported the petition. He voted in opposition to the original gauge increase schedule approved in 2019 because he expected it would negatively impact the industry in the manner described by the petition.

Mike P. asked about how warming waters may affect growth and recoupment into the fishery. Bob Glenn explained that marine snail species are slow growing and sedentary. As such, they are prone to localized depletion, in this is a trend seen in marine snail fisheries globally. Massachusetts is the northeast extent of the species range. As such, whelks reach maturity more slowly and at a larger size here, as compared to areas to our south and west. With these factors in mind, Massachusetts' whelk population is very susceptible to overfishing without spawning stock biomass protections, which is what we have observed over the past 10-20 years. The current 3 1/8" gauge size does not protect any female spawners. Based on DMF's size-at-maturity work, the gauge width will not protect any female spawners until it is increased to 3 3/8"; this gauge width will not occur until 2025 under the current schedule or 2027 under the petitioned schedule. With fishery dependent data showing catch is truncated around the gauge size, harvest is almost exclusively on juvenile animals. Bob opined that even if warming local waters influenced size-at-maturity he would expect to see these changes occur over a long time-series and generations of animals. Moreover, if this were to occur, he would not expect to see female spawners at the current minimum gauge width.

Shelley Edmundson was concerned about the potential impacts the current size-at-harvest management strategy may have on male-to-female population ratios. With females growing larger than males, as the gauge size increases the expectation is the harvest will become increasingly dominated by female animals. Shelley advocated for more research into how skewing sex ratios may affect the resource and fishery moving forward. Ray Kane and Shelley then discussed her ongoing whelk research.

Kalil Boghdan noted DMF's stock assessment demonstrated the stock was overfished with overfishing occurring and questioned whether the decline in fishery performance was also related to the status of poor status of the resource.

Mike Pierdinock asked about natural predation on whelks. Bob Glenn stated black sea bass and tautog are whelks primary natural predators in Massachusetts. Bob added that larger the whelk are generally less susceptible to predation.

Heather Haggerty stated that fishermen are claiming their pots are coming up full of sub-legal sized whelk. Bob Glenn explained it is typical of a heavily exploited stock, because catch becomes truncated around the minimum size. This is because larger animals are caught and removed from the population once they reach size-at-harvest, leaving only those at or below the legal size in the catch. Bob was concerned about this observation in the whelk fishery because exploitation is occurring before the animal has had the ability to reproduce and few animals are reaching sexual maturity before harvest is occurring.

Heather then asked about specific sex-ratio data. Bob Glenn stated he did not have this data on hand. However, his staff could query it and he could reach out to Heather on the subject.

Protected Species Regulatory Amendments and Clarifications
Dan reminded the MFAC that when it recently enacted its buoy line modification regulations, DMF sought to enact rules in advance of the federal Atlantic Large Whale Take Reduction Plan to advance the state's Incidental Take Permit Application. As such, DMF retained the requirement that commercial trap fishers rig their buoy lines with a 600-pound weak link at the buoy. The weak link requirement was subsequently removed from the federal rule with the federal implementation of the weak buoy line requirements. However, the weak link rule remains in state regulation. Accordingly, DMF sought to similarly eliminate this requirement for the state's commercial trap fishery. However, it would be retained for the recreational trap fishery, as this gear is not subject to the same weak buoy line requirements as the commercial fishery.

Jared and Bob then highlighted additional proposed amendments and clarifications.

Jared discussed a proposal that would amend the regulations to have the recreational lobster closure subject to the same extension and recission criteria as the other regulated fixed gear closures. This will ensure that future actions to adjust the start of the open season apply uniformly to all affected fixed gear fisheries.

Bob then highlighted an additional aspect of this proposal meant to simplify weak contrivance definitions, adopt a standard definition for buoy line that would accommodate it, and eliminate the redundant language in the weak contrivance rule.

Sooky Sawyer expressed concern this may result in fishermen having to add new modifications to their gear. Bob Glenn stated the intent was not to change how the rule applied (i.e., the same number of contrivances would be required) but to make the application of the rule more simple.

Jared also highlighted some housekeeping proposals that reorganize where the gear marking rules lie in the CMR.

Area 1A (Gloucester/Rockport) Mobile Gear Open Season
Jared Silva stated DMF was proposing to extend the wintertime exemption allowing mobile gear fishing in Area 1A (Gloucester/Rockport). The current exemption is February 1 – March 31; the proposed exemption is February 1 – May 15. This exemption will provide additional access to potentially exploitable inshore sea scallop resource for CAP permit holders. It is unlikely to result in additional targeted groundfish fishing effort, landings, and bycatch because of overlapping groundfish mortality closures, seasonal availability, and gear modification requirements. Jared explained the area was seasonally closed since the 1930s to avoid conflicts with fixed gear fisheries. Now with the February 1 – May 15 trap gear closure in effect, the interest in preventing mobile gear fishing in this area in April and early May was diminished.

Lou Williams suggested the proposal be amended to seasonally open the entire North Shore area to mobile gear fishing. Lou reasoned that as the historic purpose of this mobile gear closure was to prevent gear conflicts with trap fishers, and trap gear is currently prohibited in the area during the late winter and early spring months, there was no reason to maintain the closure. Bill Amaru supported Lou's request to amend the proposal.

Director McKiernan did not support amending his proposal. Dan felt it was better to move forward with a proposal to expand the temporal extent of an existing open mobile gear fishing area than to do this while also proposing to open an area that has been closed to mobile gear fishing for about 100-years. He reminded the MFAC that DMF previously accepted public comment on a pilot program to open up an area off Nahant to wintertime sea scallop dredging and there was a tremendous amount of opposition to the proposal from a variety of constituents.

Sooky Sawyer stated the end date should be pushed up to May 1 due to the possibility of opening the lobster fishery sooner than May 15. Lou supported Sooky's interest in ending mobile gear fishing prior to the start of the trap fishing season.

Mike Pierdinock asked about potential bycatch and discards in this fishery. Jared Silva stated DMF did not have observer data for this specific state waters fishery, but could potentially query federal observer data for NGOM fishery occurring in adjacent federal waters. That said, given twine top requirements, Jared expected the gadiform bycatch would be limited and the primary bycatch would be flounders. Given the time-of-year, the winter flounder resource may be settled into inshore spawning habitats where dredging is prohibited from occurring. Lou Williams stated he could not recall catching a codfish in his scallop dredge and stated flounders are the principal finfish bycatch.

Jared added the overall ACL for Gulf of Maine winter flounder has been underutilized in recent years. Accordingly, even if the state-waters were to exceed its state-waters set-aside, which it has not recently done, there would be a substantial buffer preventing the triggering of accountability measures. Moreover, given overlapping seasonal groundfish, winter flounder bycatch at this time of year would likely have to be discarded.

Recreational Tautog Trophy Fish
Dan reviewed the proposal to adopt a 21” maximum size for recreational tautog and allow anglers to retain one trophy fish (i.e., 21” or greater) per calendar day. This would make Massachusetts recreational fishing regulations match Rhode Island’s consistent with the theme of the FMP. Having complementary rules across these jurisdictions may enhance on the water enforcement and restrict any eastward movement of recreational effort targeting larger fish in Massachusetts. However, Dan acknowledged the frequency of catch of trophy fish in MA is likely low and the expected impact of this proposal may be nominal. A DMF rod and reel study showed only 3% of the tautog caught were greater than 21”; MRIP data showed similar results (but was a less reliable metric given potential sample size issues).

Mike Pierdinock stated that the tautog fishery is not overfished and overfishing is not occurring. Accordingly, he was curious about the impetus for the proposal. Jared stated he spoke to his colleagues in Rhode Island. Their decision to implement this rule for 2022 was not driven by science but by stakeholder interest in preventing an eastward shift in effort to target large fish in Rhode Island waters.

DISCUSSION ITEMS

Updates Concerning the Atlantic States Marine Fisheries Commission
Nichola Meserve provided an update on recent happenings at the ASMFC.

The 2022 Atlantic herring stock assessment maintained the stock status (previously assessed in 2020) as overfished but overfishing is not occurring. Recent fishing quotas, catch and effort are low. There was some discussion about the 2023 – 2025 specifications, quotas, and projection modeling. Lastly, Maine’s portside sampling program will no longer receive ACCSP funds and thus alternative sources, including direct multi-state funding, is being discussed.

Director McKiernan provided an update on the happenings at the American Lobster Board. Draft Addendum XXVII was initiated to increase the biological resiliency of the GOM/GBK stock. However, given uncertainty regarding how NOAA Fisheries may address the right whale conservation issue, and the potential for new effort controls in the lobster industry, the addendum was shelved. On the subject of right whale conservation, Dan also raised NOAA's proposed vessel speed limit rules and the draft Roadmap to Ropeless Fishing.

Mike Pierdinock and Tim Brady expressed strong objections to NOAA's proposed vessel speed limit rules and the impact this would have on all maritime industries coastwide. Kalil Boghdan was curious as to why NOAA did not propose more surgical controls. Bob Glenn provided some background on NOAA's proposals and explained the limitations of monitoring right whales in real time.

Nichola Meserve the provided an update on happenings at the Striped Bass Board. Amendment 7 provided flexibility to the Board to immediately address striped bass conservation without initiating an addendum or amendment process should the 2022 stock assessment determine it is necessary. The Board was evaluating several tools to achieve potential fishing mortality reductions. Additionally, there was interest in a draft addendum to allow for state-to-state quota transfers, which would require additional Board review prior to being approved for public comment.

Kalil Boghdan discussed the potential need for additional conservation following the release of the 2022 stock assessment. He was concerned states would be unable to implement additional conservation measures for 2023. His perception is that many striped bass fishers are frustrated by perceived foot dragging at the Striped Bass Board and lack of political will to address striped bass conservation during the Amendment 7 process. Many believe the Board punted its management responsibility when determining to stay more substantial conservation measures until the 2022 assessment was completed. Even with the Amendment's pathway for expedited rule making, Kalil was worried states administrative procedures would prevent them from expediently implementing measures for 2022. If conservation is needed, this would significantly frustrate a large segment of the striped bass community and may become a tipping point with the ASFMC management process.

Ray Kane agreed with Kalil's assessment that it was critical for states to timely respond to the stock assessment and implement measures for the upcoming year, if necessary.

Mike Pierdinock asked when the Maryland juvenile index will be available. Nichola stated it starts in mid-July. Based on preliminary results from the first two weeks, she expected it would again show a weak year class. Mike P. asked that the index be forwarded to him once available. Mike P. then questioned to what extent environmental factors may be leading other spawning areas (e.g., Hudson River) to becoming more productive and potential replacing the Chesapeake Bay.

Nichola moved on to discuss menhaden management. She reviewed the 2022 stock assessment update, which showed the stock was not overfished with overfishing not occurring. She then discussed Draft Addendum 1 to the FMP, which was approved for public comment. DMF would host a public hearing on this addendum in September. The addendum addresses state-by-state quota allocations; the episodic event set-aside

(EESA); and the incidental catch and small-scale fishery provision. Changes to the EESA and incidental catch and small-scale fishery rules may change how DMF manages its state quota, as it may limit the ability for the fishery to continue to operate at an industrial scale once the initial state quota allocation is taken.

Lastly, Nichola discussed the dual MAFMC-ASMFC managed species—bluefish, summer flounder, scup, and black sea bass. The 2023 specifications were recently updated resulting in changes from initial commercial quotas and recreational harvest limits in response to accountability measures and the Commercial-Recreational Allocation Amendment. Nichola then went on to remind the MFAC that the recently enacted Harvest Control Rule will go into effect for 2023 and will impact how recreational harvest limits are set. Additionally, the MAFMC was conducting a management strategy evaluation (MSE) for summer flounder which evaluated stakeholder preferences to potential management actions to improve stakeholder satisfaction in the management of recreational summer flounder.

Updates Concerning Federal Fisheries Management
Melanie Griffin updated the MFAC on federal fishery management issues, particularly at the NEFMC.

Melanie then provided a high-level summary of the recent June NEFMC meeting in Portland, ME and an overview of issues coming before the Council at its September meeting in Gloucester. For Atlantic herring, the 2023 – 2025 specifications were discussed, as well as concerns regarding continued development of the Georges Bank spawning protection measures in Framework 7. For multi-species groundfish, the Council is focused on Framework 65, which addresses the 2023 – 2025 specifications, rebuilding cod and Southern New England winter flounder, and ABC control rule provisions. On sea scallops, the NEFMC will be deciding whether to pursue development of a limited access leasing program, as well as developing Framework 36 to set specifications for 2023 and 2024. For skates and monkfish, the update was on pending annual monitoring reports and Framework 13 to set the 2023 – 2025 specifications. The NEFMC continues to work on the development of Eco-system Based Management and issues relative to habitat management areas, dedicated research areas, as well as offshore wind and aquaculture developments. At the upcoming September NEFMC meeting, Eric Hansen will replace Dr. Michael Sissenwine as a Massachusetts delegate. Dr. Sissenwine has reached his term limit for the NEFMC.

Bill Amaru stated fishermen are concerned about the limited access scallop leasing proposal affecting the general category vessels. Melanie stated these concerns were heard during the initial public scoping process. The NEFMC now had to decide whether or not it would pursue a management action.

Protected Species Updates
Bob Glenn stated DMF had completed initial draft of its Habitat Conservation Plan, which is the foundation of the state's Incidental Take Permit application. DMF would be

submitting this draft plan to NOAA Fisheries in the coming weeks. Bob expected NOAA's review process to be length and iterative.

Bob then discussed the recent federal court decision in the Center for Biological Diversity v. NOAA Fisheries. The judge found NOAA Fisheries violated the Endangered Species Act and failed to satisfy the Marine Mammal Protection Act's negligible impact requirement for setting the authorized level of take in its Incidental Take Statement. Consequentially, the 2021 Biological Opinion for the North Atlantic Right Whale and the recent federal Atlantic Large Whale Take Reduction Plan regulations were invalidated. The court ordered parties to submit a joint schedule on remedies and the plaintiffs requested NOAA Fisheries submit a new final rule that meets potential biological removal within six months. As a result of this, there is great uncertainty regarding the future management of the lobster trap fishery and how this may impact Massachusetts.

Lastly, Bob highlighted an upcoming grant program to provide economic assistance to the commercial trap fishers to help comply with the gear modification requirements to protect right whales. This included funding for weak rope, weak contrivances, and gear marking mechanisms. Priority will be given to dual state-federal permit holders who likely need to configure two sets of buoy lines to satisfy different buoy line marking requirements for state and federal waters.

Sooky Sawyer asked if the recent federal court decision would impact NOAA's listing of the Massachusetts' mixed species trap fishery as a Category 2 fishery on its 2022 List of Fisheries designation. Bob felt the listing was well justified. However, at this point, he was uncertain as to how NOAA Fisheries would achieve additional risk mitigation, how that may impact state-waters fisheries, and to what extent the Category 2 designation would insulate Massachusetts.

Shellfish Program Updates
Jeff Kennedy provided the MFAC with an update on issues affecting DMF's Shellfish Program. The focus of the update was the ongoing annual FDA PEER evaluation. This year's PEER focused on growing areas impacted by wastewater treatment plants in Buzzards Bay and growing areas containing mooring fields in Chatham.

On *Vp.*, Jeff stated that we were midway through the 2022 *Vp.* Control Season. At present there have only been single source illnesses and no outbreaks.

SMAST completed their first draft of the Scituate wastewater treatment plant outflow model. DMF was reviewing the draft and will be requesting some clarification on certain items related to the model. I. DMF was hopeful to apply this model to those wastewater treatment plants around Buzzards Bay.

It has been an active year for biotoxin closures. The Nauset system was closed for about two months for PSP, and then closed again for DSP. There have also been PSP closures along the North and South Shores. However, the bloom waned over the summer with toxicity becoming diminished enough to reopen areas.

Bill Amaru asked if there was an explanation for the prolonged presence of DSP in the Nauset System. Jeff was uncertain at this time. Bill then opined that lawn chemicals may be contributing to extended presence of biotoxin producing algal blooms. to what extent these blooms may be .

Quota Managed Species Update
Story Reed and Anna Webb presented on the performance of 2022 quota managed fisheries.

- <u>Striped Bass</u>. The fishery was closed on August 5 after landing 100% of the annual quota. There was a slight overage this year which will come off of next years' quota. Compared to the previous two-years, the quota was landed much sooner, as the fishery closed on October 1 last year and did not close in 2020. There was a slight overage this year which will come off of next years' quota.
- <u>Bluefish.</u> The state had landed about 50% of its annual quota. DMF did not anticipate needing to acquire quota transfers for other states to keep the commercial fishery open for the remainder of the season.
- <u>Black Sea Bass.</u> About one-third of the quota was a landed so far this calendar year. Quota utilization tracks similarly to how it has in prior years despite liberalizations to the fishing limits and season. DMF anticipated the quota would be underutilized this year.
- <u>Summer Flounder.</u> Similar to black sea bass, about one-third of the quota was landed so far this calendar year. Despite liberalizations to fishing seasons and limits, DMF anticipated the quota would again be underutilized in 2022.
- <u>Horseshoe Crabs.</u> About 50% of the horseshoe crab quota was landed this year. Landings have slowed in recent weeks and are tracking below recent years. This may be related to changes in effort in the fluke trawl fishery and fishermen shifting effort from bait fishery for horseshoe crabs to the biomedical fishery for horseshoe crabs.
- <u>Menhaden</u>. The state's initial quota was taken during the period of June 1 – June 20. Massachusetts then opted into the EESA fishery, which lasted until July 7. Following the EESA fishery, DMF obtained quota transfers from other states allowing he fishery to remain open from July 11 through July 27. The directed fishery closed on July 28 and commercial fishing effort has continued under the incidental catch and small-scale fishery allowance.

Mike Pierdinock asked about the ex-vessel value for black sea bass. Anna Webb stated there has not been a significant change in price in recent years and this year's ex-vessel value tracked with recent years.

Mike P. then asked about gear type specific contributions to this year's landings for black sea bass and summer flounder. Anna stated this data was not yet available. DMF depends on harvester reports to obtain data on things like gear type, as it is more accurately reported by the harvester. Harvester reports are submitted monthly and these data are typically not quality controlled and usable until the following spring.

Kalil Boghdan asked about the relationship between stock health and fishery performance. Bob Glenn then provided an in-depth answer. He explained that quotas are developed using stock assessment information and catch data is factored into stock assessments. However, fishery performance, while certainly affected by stock health, is also influenced by local availability, fishing effort, environmental factors, and regulatory controls. Kalil expressed concern that the performance of this year's striped bass fishery may undermine stock assessment findings if the upcoming assessment demonstrates additional conservation is needed.

Mike P. was concerned about how environmental factors may be influencing opinions and science related to striped bass abundance. He opined that in recent years the biomass of striped bass seemingly shifted offshore to colder and deeper waters. As a result, lack of inshore availability could be misconstrued as decreasing overall abundance. He was also concerned about how a shift in spatial availability coupled with the EEZ prohibition on striped bass may influence the upcoming stock assessment.

Recent Adjudicatory Proceedings
Jared Silva provided the commission with an administrative law program update. He focused on both changes to personnel and roles in the agency's Administrative Law Program, as well as results from adjudicatory proceedings initiated since 2020.

Sooky Sawyer expressed frustrations regarding the timeline for resolving administrative hearings and fishermen being able to continue to fish while facing an administrative proceeding. Jared Silva recognized these frustrations but underscored the critical need to provide parties with due process before sanctioning their permits and affecting their livelihood.

OTHER BUSINESS

Commission Member Comments
Tim Brady discussed a massive school of menhaden off Plymouth. He then discussed the status of the ocean pout resource in Cape Cod Bay and potential for research opportunities that may allow for some recreational retention.

Sooky Sawyer stated he was being targeted by a litigious conservationist who was suing him as both a MFAC member and the President of the MLA. As a MFAC member, he was frustrated by the lack legal assistance from the state. Dan McKiernan stated he would speak to DFG's legal staff on the subject and reach out to Sooky directly.

Kalil Boghdan stated he has offered to help Ben Gahagan count the alewife coming through Alewife Brook. He commended Ben for his work on monitoring the alewife.

Shelley Edmundson thanked Lt. Bass and his fellow MEP officers for attending the waterfront festival and the meet the fleet event.

Bill Amaru stated fishing has been good this summer.

Mike Pierdinock stated the hook and line mackerel fleet has been providing samples which are being forwarded to the NE Science Center for DNA testing. He concluded his comments by highlighting some areas where he has seen mackerel.

Ray Kane thanked everyone for their participation and asked Jared about an in-person meeting on the Vineyard. Jared stated the September meeting will be virtual due to the public hearing being held beforehand. The location of the October meeting remains to be determined.

PUBLIC COMMENTS

Beth Casoni expressed concerns regarding the lobster market. She had received calls from fishermen stating their dealers may not be accepting their catch this fall. Beth also asked for a copy of DMF's Habitat Conservation Plan once it is submitted to NOAA Fisheries. Lastly, she stated that MLA received a $1M grant to develop fully formed weak rope with a trace ribbon in it. She was hopeful this may make it easier for Massachusetts' trap fishermen to comply with gear modification and marking requirements moving forward.

Phil Coates discussed the abundance of menhaden off of Plymouth as well as striped bass fishing and some mishandling of fish he witnessed.

Heather Haggerty expressed concern over raising the bait limit for horseshoe crabs given limited demand. Dan McKiernan noted he was trying to create equity between the bait and the biomedical limits to prevent user group conflicts while still meeting end user demands. He noted that if the bait market were to dry up then dealers could inform fishermen that they would not be accepting full limits.

Heather then asked about potential industry meetings for horseshoe crabs. Dan stated staff were meeting with a variety of horseshoe crab stakeholders and he expected to have an industry meeting during the early fall. fa

ADJOURNMENT

Chairman Ray Kane requested a motion to adjourn the August MFAC business meeting. **Sooky Sawyer made a motion to adjourn the meeting. The motion was seconded by Shelley Edmundson. The motion was approved by unanimous consent.**

MEETING DOCUMENTS

- August 2022 MFAC Agenda
- June 2022 Draft Business Meeting Minutes
- Presentation on Upcoming Public Hearings
- Memo on Requirements for Electronic Tracking Devices in Lobster Fishery
- Memo on Petition to Adjust Schedule to Increase Whelk Gauge Width
- Memo on Proposal to Update and Refine Protected Species Regulations
- Memo on Proposal to Extend Mobile Gear Exemption Area 1A
- Memo on Recreational Tautog Trophy Fish Proposal
- Presentation on Updates from the ASMFC
- ASMFC Summer Meeting Summary
- Presentation on Updates from the NEFMC
- Presentation on Protected Species Updates
- Presentation on Performance of Quota Monitored Fisheries
- Presentation Administrative Law Program
- DMF Comment Letter on Hudson Canyon MPA

UPCOMING MEETINGS

September 13, 2022	October 18, 2022
Via Zoom	**TBD**

MARINE FISHERIES ADVISORY COMMISSION
September 13, 2022
Via Zoom

In attendance:
Marine Fisheries Advisory Commission: Raymond Kane, Chairman; Michael Pierdinock, Vice-Chairman; Kalil Boghdan; Shelley Edmundson; Bill Amaru; and Tim Brady
Absent: Bill Doyle, Clerk; Arthur "Sooky" Sawyer; and Lou Williams

Division of Marine Fisheries: Daniel McKiernan, Director; Mike Armstrong, Assistant Director; Kevin Creighton, CFO; Story Reed; Bob Glenn; Jared Silva; Nichola Meserve; Melanie Griffin; Kelly Whitmore; Brad Chase; Anna Webb; Julia Kaplan; Stephanie Cunningham; Kerry Allard; Nick Buchan; Gary Nelson; Scott Schaffer; and Jeff Kennedy

Department of Fish and Game: Ron Amidon, Commissioner

Massachusetts Environmental Police: Lt. Matt Bass

Members of the Public: Beth Casoni; and Lizzie Roche

INTRODUCTIONS AND ANNOUNCEMENTS

Chairman Ray Kane called the September 13, 2022 Marine Fisheries Advisory Commission (MFAC) business meeting to order.

REVIEW OF SEPTEMBER 16, 2022 DRAFT BUSINESS AGENDA

No changes to the agenda were requested.

REVIEW AND APPROVAL OF AUGUST 18, 2022 DRAFT BUSINESS MEETING MINUTES

Chairman Kane asked for comments or edits regarding the August 18, 2022 MFAC draft business meeting minutes.

Kalil Boghdan requested changes to a paragraph on page eight of the minutes. He stated he emailed Jared with the requested changes.

Chairman Kane questioned the wording regarding the status of the herring fishery listed on the second paragraph of the second page. Jared stated that he will talk with Melanie Griffin and revise the minutes accordingly.

There was then some discussion regarding the approval of amended meeting minutes. Mike P. stated there should be no vote on the amended meeting minutes until the specific changes proposed by Kalil and Ray are seen by the MFAC. Jared suggested no action be taken. Instead, Jared would incorporate these potential edits into the draft

August business meeting minutes and recirculate them to the MFAC for their review and approval at the October business meeting. There were no objections to this approach.

CHAIRMAN'S COMMENTS

Chairman Kane thanked Ron Amidon for expediting the re-appointment of commission members. He reminded commission members of a required ethics webinar and asked that they complete the training if they have not done so already.

COMMISSIONER'S COMMENTS

Commissioner Amidon stated he is pleased to see the re-appointment process coming to completion. He stated he went to Hingham Harbor Day for the re-opening of the Hingham Harbor Boat Ramp and commended Ross Kessler and Doug Cameron for their work on the project. Commissioner Amidon welcomed any questions.

LAW ENFORCEMENT COMMENTS

Lt. Matthew Bass provided comments for the Massachusetts Environmental Police (MEP). He highlighted a few minor fisheries enforcement issues along the North Shore, south of the Cape, and in Chatham.

DIRECTOR'S COMMENTS

Director Dan McKiernan started his comments noting that former Director Pierce sends his regards.

Dan then discussed fisheries aid programs. DMF continued to work with the other states and the ASMFC to address the federal disaster relief funds for the sea herring fishery. Massachusetts was allocated $500,000 to help trap fishers comply with new right whale conservation regulations, including offsetting the cost of materials to mark buoy lines for dual state and federal permit holders. Dan added that DMF will be working with the MA Lobster Foundation to help distribute the funds.

Director McKiernan moved on to highlight several updates concerning ongoing federal litigation surrounding the right whale and interactions with fixed fishing gear. Additionally, DMF submitted its draft Incidental Take Permit application to NOAA Fisheries for their review; the review process is iterative and may take more than a year to complete.

The Monterey Bay Aquarium released its Seafood Watch Assessment, which red-listed American lobster due to potential interactions with right whales. The red-listing means they are recommend consumers choose other seafood options. Dan was frustrated and concerned by this action. He noted that prior the release of the assessment, DMF actively advocated for the organization to not take this action based on the state's aggressive conservation program. DMF was now considering appropriate responses.

DMF established a task force to develop a program to improve and modernize how the state handles and disposes of abandoned fishing gear and fishing gear debris. The Task Force consists of DMF staff (Bob Glenn, Jared Silva, David Chosid, and Julia Kaplan); DFG's Office of General Counsel; two MFAC members (Ray Kane and Sooky Sawyer); the Executive Director of the Massachusetts Lobster Association (Beth Casoni); and personnel from the Center From Coastal Studies who do derelict gear work (Laura Ludwig). Dan then mentioned that Julia Kaplan, as part of her master's program, had drafted a white paper on the subject, which provided a foundation for the task force to work from.

The menhaden fishery will likely be facing some changes to its management system next year. The ASMFC will be voting on an addendum at the November meeting affecting how state quotas are allocated. There will be a public hearing tomorrow night in Gloucester regarding the addendum and an industry meeting will be held directly after the public hearing. Dan welcomed any questions from the commission.

Bill Amaru thanked Dan for his thorough comments and expressed frustration over the Seafood Watch Assessment.

ACTION ITEMS

Recreational Fishing Limits for Cod and Haddock
DMF held a public hearing on this recommendation immediately prior to this MFAC business meeting. Jared Silva briefed the MFAC on the final recommendations. In summary, the final recommendation was to finalize the recreational fishing limits for Gulf of Maine cod and haddock and Georges Bank cod that were implemented on an emergency basis earlier this summer and are set to expire this fall. These recommended limits are also identical to those enacted by NOAA Fisheries. The recommendations were as follows:

- Georges Bank Cod. Open season of August 1 – April 30 with a 22" minimum size and 28" maximum size and 5-fish per angler bag limit.
- Gulf of Maine Cod. Open season of September 1 – October 7 and April 1 – April 14 with a 22" minimum size and a 1-fish per angler bag limit.
- Gulf of Maine Haddock. Open season of April 1 – February 28 with a 17" minimum size and 20-fish per angler bag limit.

Mike Pierdinock thanked DMF for the work to improve the data used in the stock assessments for these species. However, he noted some recreational anglers remain frustrated by restrictive federal limits for recreational cod. Mike P., Bill Amaru, and Tim Brady all argued there is a disconnect between NOAA Fisheries' stock assessments and what is being observed on the water by the fishing community. Dan McKiernan added these observations generally correspond with the strong 2018-year class aging into the fishery, but noted recruitment is down from historic levels.

There was then some discussion from Tim Brady and Ray Kane about how surveys are being conducted and whether they are accurately capturing biomass. Melanie explained the trawl survey is a random stratified design and is not built to dynamically target fish where they are known to be abundant. Melanie added this has been a longstanding concern from industry regarding survey design and the NEFMC is well aware of it.

Director McKiernan appreciated the comments but reminded the MFAC the recommendation was more narrowly focused on whether DMF should finalize the emergency regulations as implemented and complement federal limits.

Ray Kane asked for a motion to approve the recommendation. **Tim Brady made a motion to approve the recommendation. Shelley Edmundson seconded the motion. The motion was passed 4-0-1, with Bill Amaru abstaining.**

<u>In-Season Adjustment to October - December Commercial Summer Flounder Trip Limit</u>
Director McKiernan briefed the MFAC on the recommended in-season adjustment to the October-December commercial summer flounder trip limit. Despite the regulatory liberalizations to the summer flounder limits for 2022, the fishery is performing similarly to how it has in recent years and will likely underperform its quota again by a large margin. Accordingly, Dan recommended increasing the 2022 commercial summer flounder possession limit for the period of October 1–December 31 from 3,000 pounds per trip to 10,000 pounds per trip. The trip limit increase would encourage vessels to land fish caught offshore in adjacent federal waters in Massachusetts' ports, rather than steaming further distances to other states with more substantial seasonal trip limits (e.g., Virginia and North Carolina) to offload. Additionally, with the recreational fishery closing on September 29, Dan did not expect this would lead to user group conflicts.

Mike P. stated that the recreational community appreciated DMF's attention to time frames and implementing this increase after the recreational fishery closes. He asked if this increase in trip limit would apply to both state and federally permitted vessels. Jared and Dan explained the trip limit would apply to any vessel with a fluke fishery endorsement, regardless of where the fishing activity is occurring. However, given seasonal spatial shifts in distribution, DMF anticipated the benefits would principally be to those vessels fishing in federal waters.

Mike P. then asked about quota utilization in other states. DMF staff reached out to other states and it seemed commercial quota was being underutilized coastwide. Jared Silva stated he spoke to a number of industry members regarding the performance of this fishery to date and there were a number of economic factors limiting participation and effort this year. It was thought that increasing the trip limit to 10,000 pounds would create the economic incentive to target the fish. Nichola Meserve heard similar refrains from her counterparts in other Atlantic coastal states.

Mike P. then asked if a vessel hailing from Mid-Atlantic state would be able to land summer flounder in Massachusetts and if this fish would count against Massachusetts quota. Jared stated that regardless of where a vessel is homeported fish caught in federal waters can be landed in Massachusetts provided the commercial fishing permitted in Massachusetts to land the fish. For summer flounder, there is no federal quota so all poundage landed in a state is counted against that states quota regardless of where the fish was caught or the homeport of the vessel.

Chairman Kane asked for a motion to approve the recommendation. **Kalil Boghdan made a motion to approve the recommendation. Shelley Edmundson seconded the motion. The motion was passed unanimously 5-0.**

DISCUSSION ITEMS

2022 Quota Managed Fishery Performance Update
Story Reed and Anna Webb provided the MFAC with an update on the performance of 2022 quota managed fisheries. Story noted the update will only cover those fisheries that remain open.

- The bluefish quota is currently projected to be reached in late-October. However, performance usually declines dramatically around early October. DMF would consider obtaining a quota transfer should the quota be taken and the fish remain available.
- On a pound-for-pound basis, the black sea bass fishery performing similarly in 2022 to prior years. However, the 2022 quota is much higher than these prior years. As such, the fishery would likely remain open throughout the fall and eventually underperform the quota by a small margin.
- On a pound-for-pound basis, the summer flounder fishery is performing better in 2022 than it was in 2021. However, the quota is substantially higher this year than in past years. At present, about 60% of the quota remains available. DMF was interested in how performance may change in the fall with the approval of the October 1 – December 31 trip limit increase.
- The horseshoe crab bait fishery is tracking below previous years. Story stated that this could be attributed to the performance of the inshore fishery and some harvesters switching over from the bait fishery to the biomedical fishery.

Anna Webb then moved on to discuss ex-vessel value and landings across all species. Anna Webb stated the total ex-vessel value and landings are down compared to previous years. Sea Scallops and lobster landings and ex-vessel value are down. These two species are driving the downward trend of ex-vessel value and landings. Oyster trends have not changed at all in 2022 and has been very consistent with previous years.

Ray Kane asked if the prices were higher in 2021 due to domestic consumption rather than eating at restaurants. Anna stated that to the best of her knowledge this question had not been looked into by a fisheries economist.

Ray Kane asked about the export value of oysters. Anna noted DMF only collects ex-vessel value data. Data on exports may be tracked by NOAA Fisheries. Dan added that oyster exports are currently fairly limited due to the complexities of international trade with raw shellfish product and varying public health programs across jurisdictions.

There was further discussion between Ray Kane and Nichola regarding dogfish and a possible reduction in quota for 2023.

Fall 2022 Industry and Stakeholder Meetings
Jared Silva reiterated DMF was an ASMFC public hearing on menhaden and a menhaden industry meeting tomorrow night in Gloucester. Additionally, DMF would convene a horseshoe crab and summer flounder industry meeting later this fall to scope regulatory changes for 2023.

Director McKiernan discussed various challenges regarding the management of the limited entry menhaden fishery. He was hopeful the fleet will provide good guidance on how to improve management moving forward and respond to the pending ASFMC addendum. Dan then discussed challenges with the horseshoe crab fishery and shifting demands for these crabs for bait and biomedical purposes. DMF was meeting individually with the biomedical companies and conservation advocates before meeting with the industry more broadly.

Bill Amaru stated he was now working with a biomedical company to rebroadcast bled crabs and spoke to the care taken to handle the animal throughout the biomedical process.

Amendment 23 and Allowance for Maximum Retention of Groundfish
Story Reed discussed a federal experimental permit where the combination of electronic monitoring and dockside monitoring allowed for the maximum retention of certain groundfish species caught in federal waters. This so-called “maximum retention program” was formalized in Amendment 23 to the Multi-Species Groundfish FMP. As such, it was expected that by the end of this year this would become a regulatorily formalized program rather than experimental fishery. SAt the state level, DMF accommodated the experimental federal fishery with a Letter of Authorization (LOA) and would continue to temporarily do so once a final federal rule is implemented. However, DMF over the long term, DMF would likely need to produce a regulatory amendment. Story and Jared were working with partners at NOAA Fisheries, Gulf of Maine Research Institute, and other New England state fishery agencies to manage implementation. One of the biggest challenges is managing the exemption for non-conforming product throughout the seafood supply chain.

Convening MFAC Sub-Committees
DMF was seeking to convene the MFAC’s Permitting Sub-Committee and Law Enforcement Sub-Committee during the fall.

PRESENTATION ON RIVER HERRING MANAGEMENT PLANS AND HERRING RIVERS

Brad Chase provided a presentation regarding the ASMFC's River Herring Sustainable Fishery Management Plans. In the mid-2000s, the ASMFC implemented a moratorium on the harvest of river herring from state waters. More recently, in 2017, the ASMFC allowed states to open river herring runs subject to a sustainable fishery management plan. To date, Massachusetts has not opened any of its runs.

In Massachusetts, DMF sets the overarching regulatory program for river herring, then river herring runs are managed subject to "home rule". Under home rule, municipalities may set run specific limits and permitting requirements. Therefore, in most instances, the burden of developing, implementing, and managing a potential sustainable fishery management plan falls primarily on the municipality. Municipalities have been hesitant to reopen runs but there remains persistent interest in opening two of the state's stronger runs—the Nemasket River (Middleborough/Lakeville) and the Herring River (Harwich). Brad the reviewed the biological metrics for both runs.

Dan asked Brad to speak to the run counts. Brad stated numbers have generally improved but recent years have seen some drop offs, which may be due to environmental conditions. Brad noted the impacts of droughts on future recruitment.

Ray Kane asked about permitting and enforcement should these runs open. Brad stated the primary authority would be the local warden. However, the towns would share their permitting rosters with MEP and DMF to assist in the enforcement of possessing river herring.

Mike P. and Brad Chase discussed some of the management choices towns would have to make, such as allowing harvest for bait and permitting non-residents. Brad noted this would likely be an iterative process requiring alignment with DMF regulations and ultimately approval from ASMFC.

Mike P. closed his comments by commending DMF for getting the fishery to this point.

Lt. Bass sought clarification on the possession of river herring as bait, as it may be fished at a location other than the run from which it was taken. Brad stated the intention is to only allow the permittee to possess herring. DMF regulations require anyone in possession of river herring to hold a permit and harvest receipt for the fish.

Kalil Boghdan thanked Brad for his presentation and asked how long the YOY can survive in a freshwater system. Brad stated they typically can overwinter, but there is a significant decline in food sources resulting in mortality.

Mike P. asked about toxic algae blooms affecting herring. Brad Chase stated systems with blooms may be a cause for concern. However, he would be more concerned about the impacts of nutrient loading in spawning habitats and impacts on water quality and juvenile herring recruitment. Dan asked Brad about the water quality of the Nemasket and Herring Rivers. Brad stated the water quality is generally good, but it remains a key area of concern.

OTHER BUSINESS

Commission Member Comments
Bill Amaru discussed the importance of water quality in managing fish populations. He highlighted various concerns he has about nutrient loading in Cape Cod waterways and the runoff of these nutrients into the Sounds.

Tim Brady thanked Brad for the presentation and stated he appreciated the work to rebuild herring habitat and populations.

Mike P. was curious about potential impacts people moving to to coastal communities, like the Cape, during the pandemic and as a result of telecommuting may have on local water quality given the likely increase in year-round pressure on septic and sewer systems.

Ray Kane stated he would like to be updated on the permitting sub-committee meetings as they move forward. He thanked everyone for their attendance and opened the meeting up to public comment.

PUBLIC COMMENTS

Beth Casoni thanked the Commission and stated a public relations strategy is needed to counter Seafood Watch Assessment's red-listing of lobster and to promote the various steps the lobster industry has taken to protect right whales.

ADJOURNMENT

Chairman Ray Kane requested a motion to adjourn the September MFAC business meeting. **Bill Amaru made a motion to adjourn the meeting. The motion was seconded by Shelley Edmundson. The motion was approved by unanimous consent.**

MEETING DOCUMENTS

- September 13, 2022 MFAC Business Meeting Agenda
- August 18, 2022 MFAC Draft Meeting Minutes
- Recreational Cod and Haddock Limit Recommendation Memo and Presentation
- Summer Flounder In-Season Adjustment Recommendation Memo and Presentation
- Quota Managed Species Update Presentation
- River Herring Sustainable Fishery Management Plans Presentation

UPCOMING MEETINGS

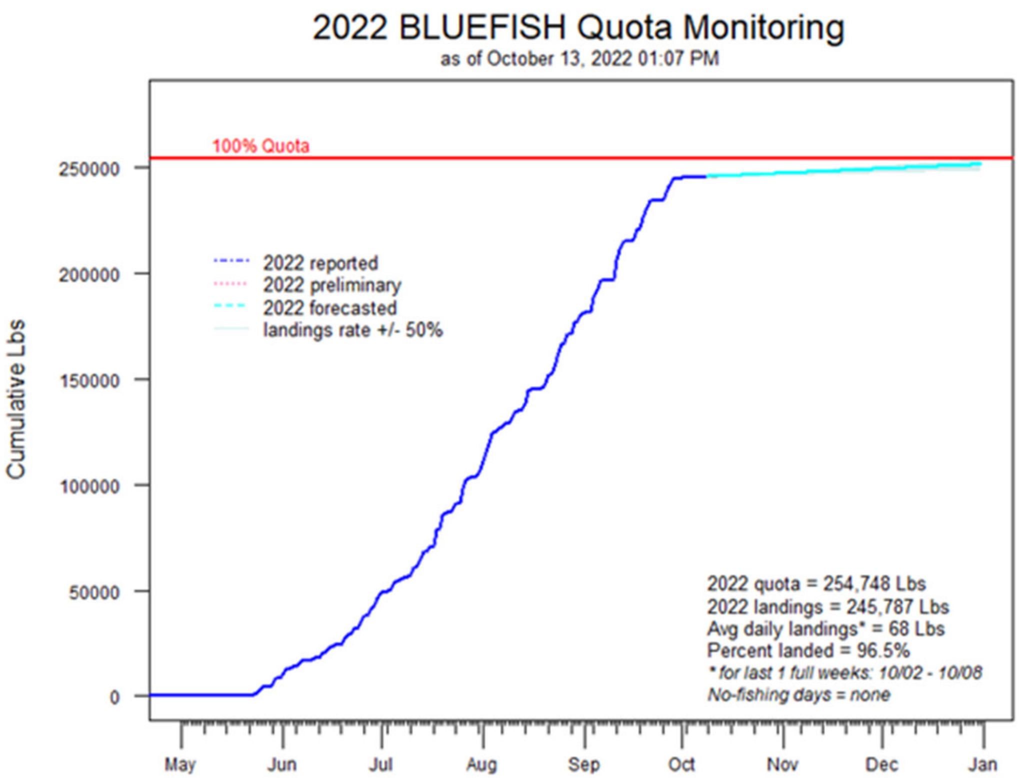
October 18, 2022	November 22, 2022
Virtual Meeting	DFW Field Headquarters
Via Zoom	Westborough, MA

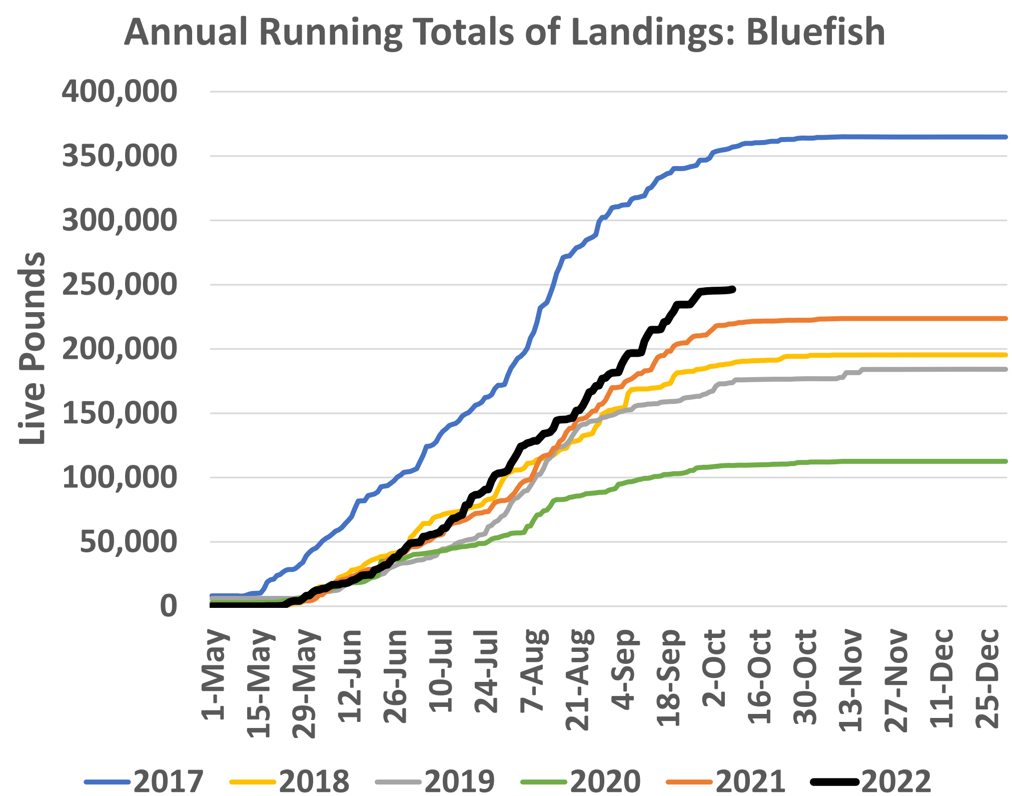
Quota Monitored Species Update

Data current as of 10/8/22 and are subject to change

MFAC meeting, 10/18/22

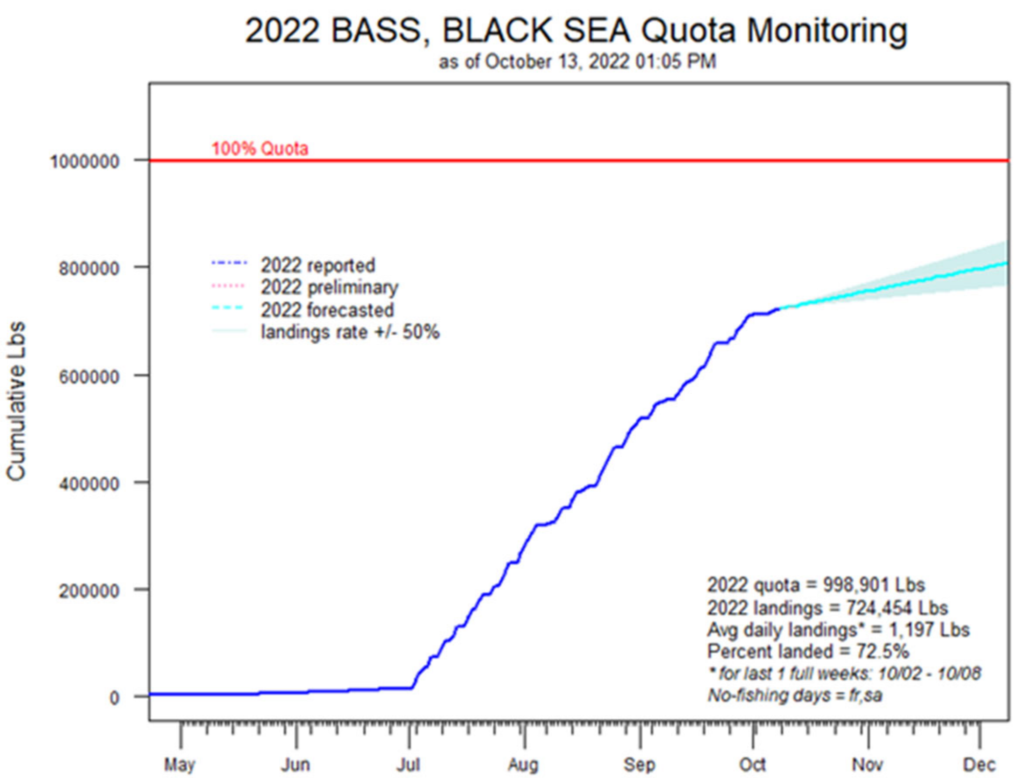
Bluefish

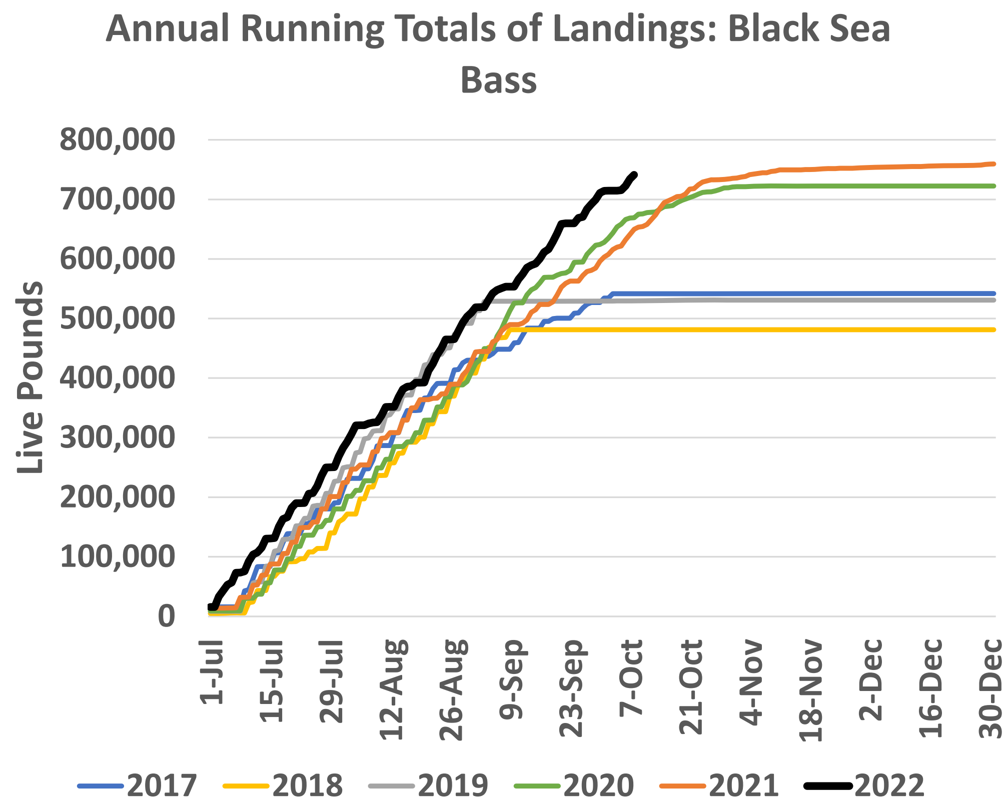




Quota significantly decreased in 2020

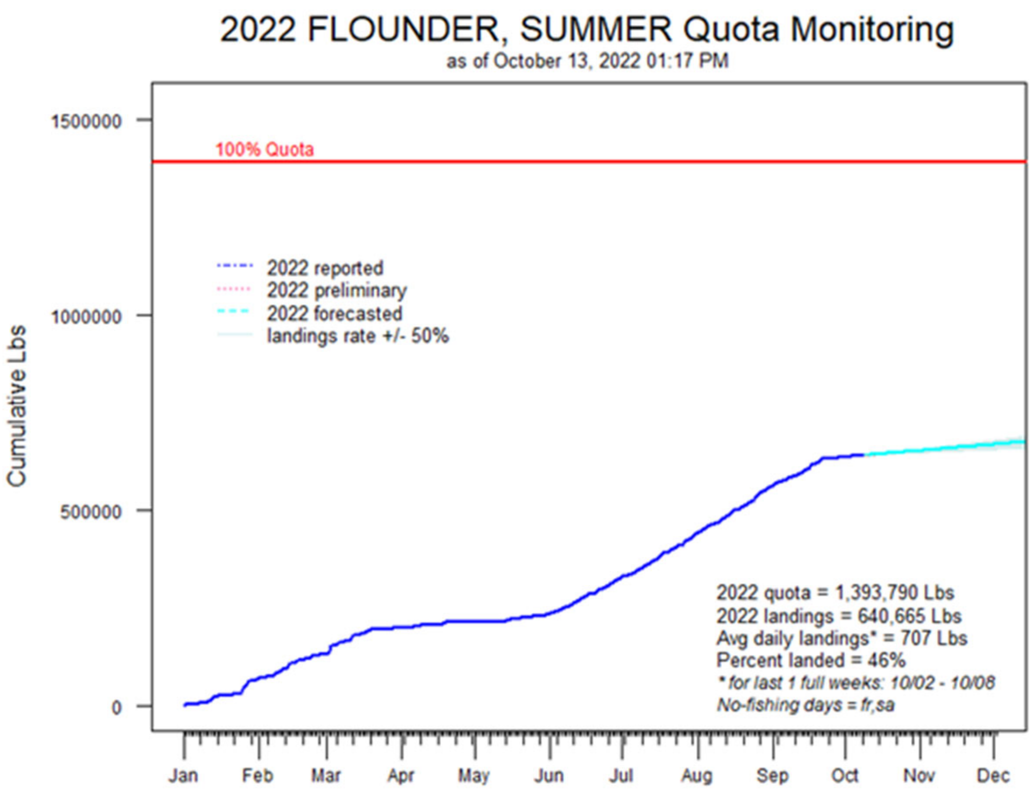
Black Sea Bass

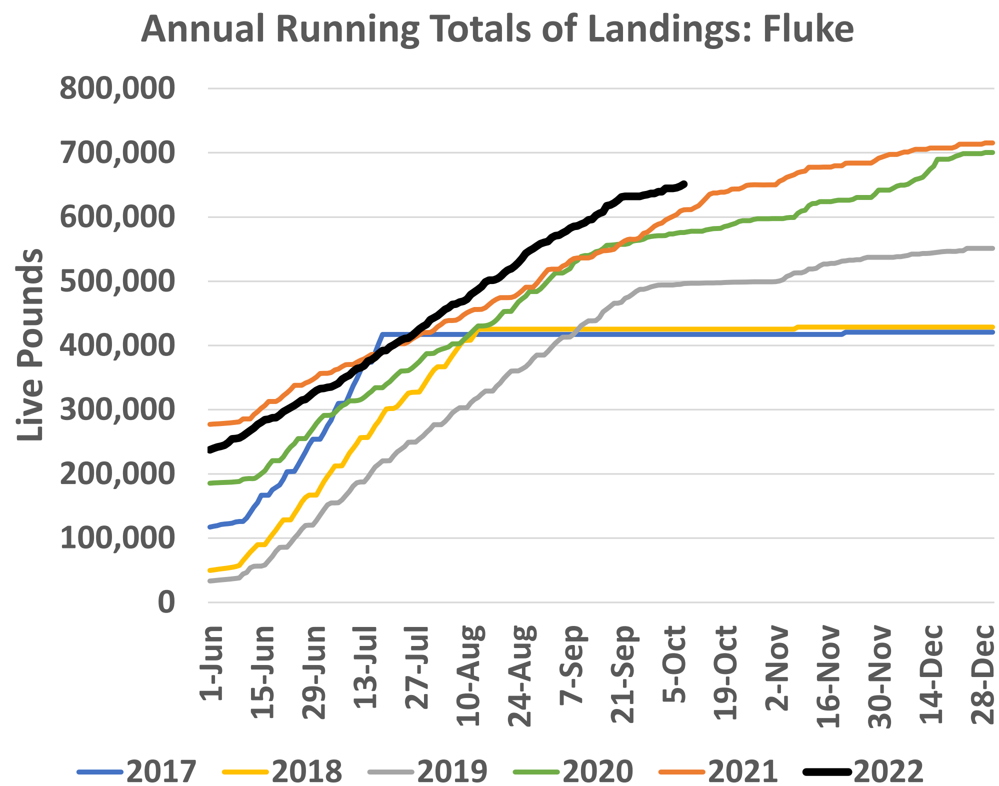




Quota significantly increased in 2020 and again in 2022

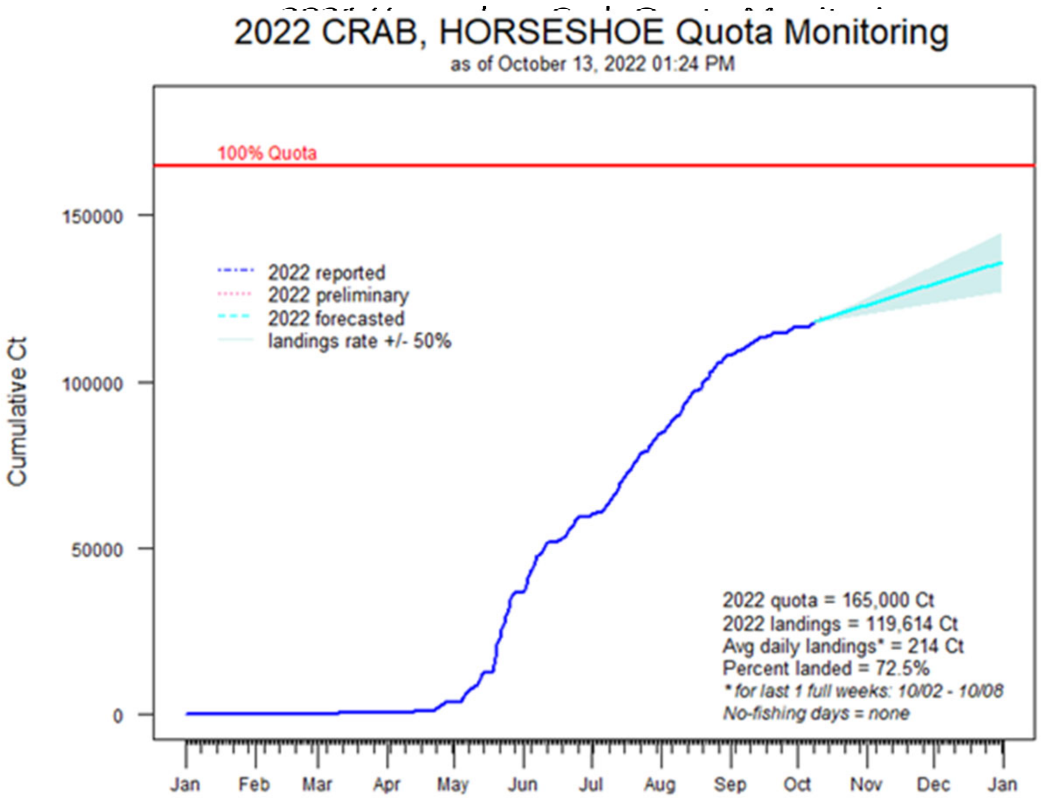
Summer Flounder (Fluke)

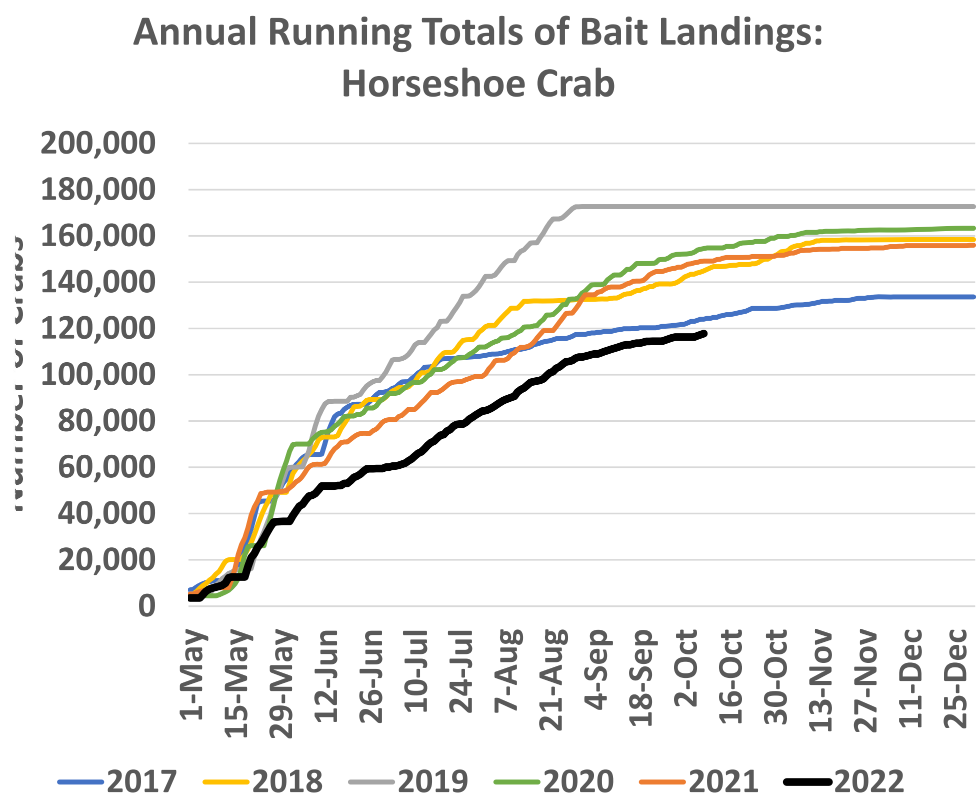




Quota increased almost 100% between 2018 & 2021 with further increases in 2022

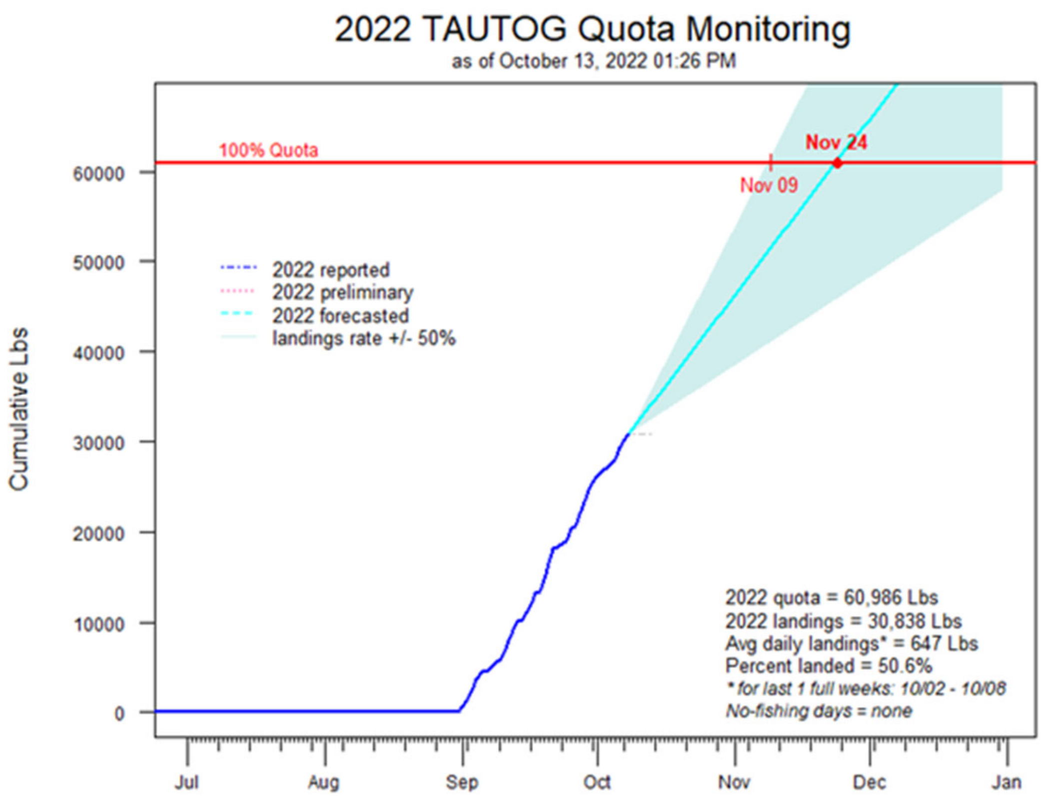
Horseshoe Crab

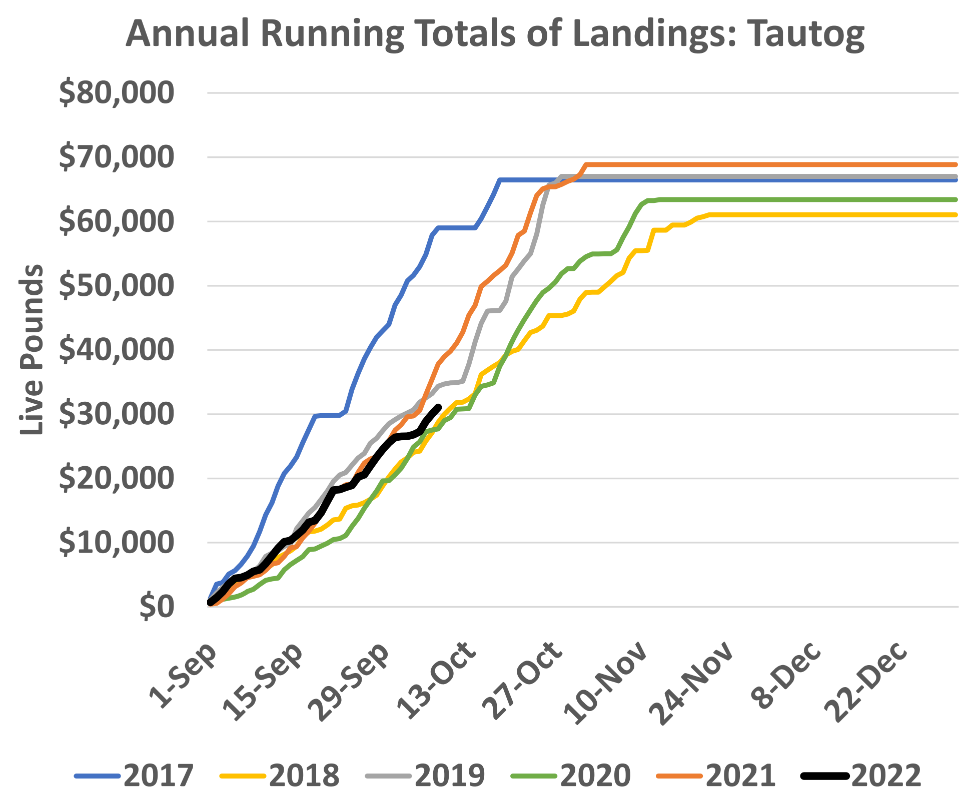




No change in quota over time series

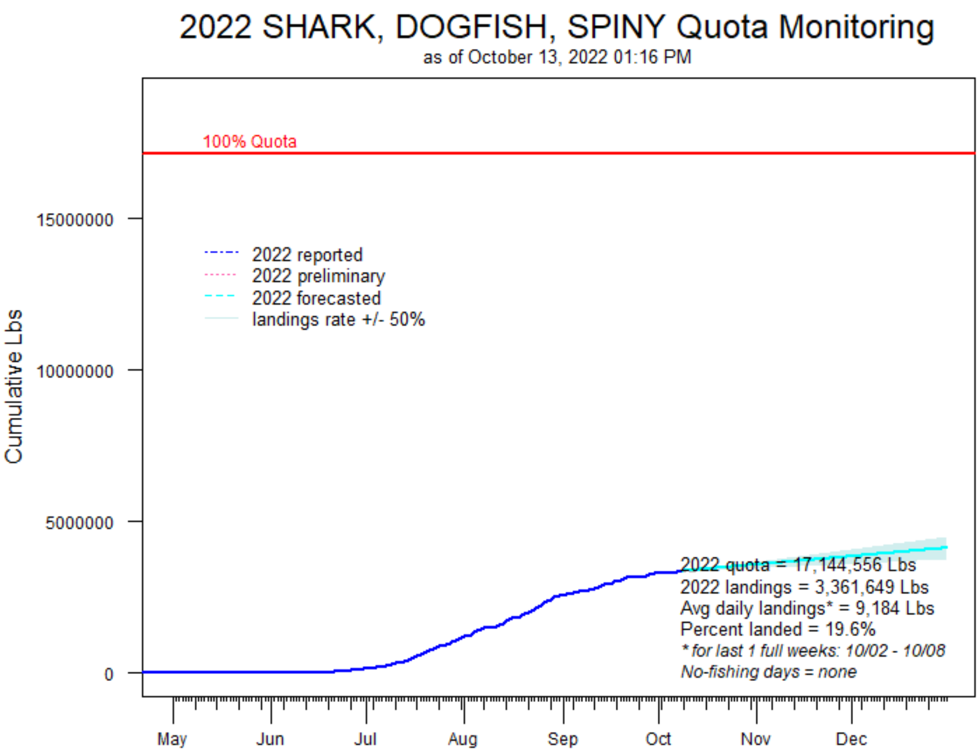
Tautog





No change in base quota over time series

Spiny Dogfish



Protected Species Update

- **ALWTRP Rule Making**
- **Ship Speed Rule**
- **Incidental Take Permit Update**

Atlantic Large Whale Take Reduction Plan - Rulemaking

- Boasberg Decision in CBD vs. NOAA Fisheries
  - Invalidated the 2021 biological opinion and conservation framework
  - Found NOAA Fisheries violated MMPA
    - failed to reduce mortality to below PBR (0.7) within 6 months
    - Mortality must be reduced by 90% to achieve PBR
  - Judge ordered NOAA Fisheries to work with the Plaintiffs to find a remedy
  - NOAA Fisheries has requested
    - until December 2024 to complete rulemaking
    - Until 2025 for plan implementation
    - Plaintiffs have not responded to request yet
- NOAA Fisheries filed notice of intent to initiate rulemaking on 9/9/22
  - Goal: Reduce the risk of serious injury and mortality to NARW by 90%
  - Scoping period for comment was 9/9 through 10/11

Atlantic Large Whale Take Reduction Plan - Rulemaking

- **DMF provided written comments to NOAA Fisheries**

- **Major themes**
  - **Full accounting of all measures for all fixed gear fisheries in MA**
  - **Calculate and provide risk reduction credit for the original Mass Bay Restricted Area**
  - **Update the mortality estimates to include 2020 and 2021 data**
  - **Test DST model's sensitivity to the stanza of years of whale sightings used in the Duke Whale Model**
  - **Request that NOAA Fisheries negotiate with court/plaintiffs to delay action until empirical data are collected on effectiveness of weak rope (1,700 lbs. breaking strength) and buoy line marking by jurisdiction to effectively and responsibly reduce risk**

Atlantic Large Whale Take Reduction Plan - Rulemaking

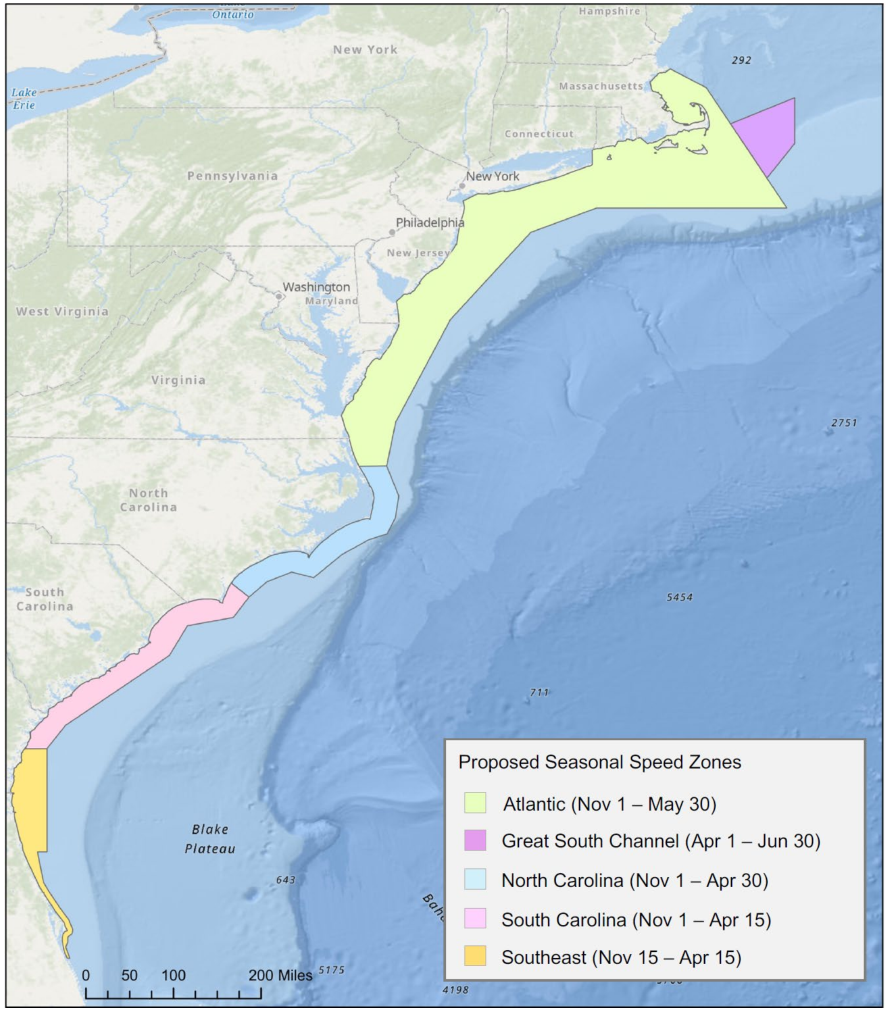
- DMF hosted 4 ALWTRP scoping meetings with fishing industry leaders (Oct 3 –6)
  - Gloucester – LMA1 Lobster – MA/NH
  - Plymouth – LMA1/LMAOCC Lobster – MA
  - New Bedford – LMA2/LMA3/OTP - MA/RI
  - New Bedford – SNE monkfish/skate gillnetters – MA/RI
  - MA Fishermen once again came to the table – over 75 fishermen attended
  - Developed a range of options for NOAA Fisheries to run in the DST model
    - Time/Area closure extension into federal waters adjacent to MA closure
    - Extension of MA weak rope rules into Federal waters
    - New Trawling/Paneling up options
    - Discussion of buoy line caps – buoy line reductions
    - Discussion of minimum trawl size
  - NOAA Fisheries will run these options through DST model and report back
- Next Steps
    - November ALWTRT meeting Nov 14 – 18 – team presented with results
    - December ALWTRT meeting Dec 1 –2 – team to vote on options and provide recommendations to NOAA Fisheries

NOAA Fisheries Proposed Modifications to Right Whale Speed Rule

- **NOAA Fisheries proposing modification to ship speed rules to reduce ship strikes by 90%**
  - **10 Knot or less rules currently applies to vessels 65 feet and greater**
  - **New rules proposed to apply to vessels 35' and larger**
  - **Seasonal speed zones substantially increased in time and space**

- **Public comment period is extended until October 31st**

- **DMF working on comments**
  - **Concerns economic impacts not fully captured**
  - **Concerns that scope and scale is very large and not "surgical"**
  - **Concerns about enforceability given vessels less 65' do not require VMS**



Incidental Take Permit Update

- **First draft submitted July 2022**
- **NOAA Fisheries provided feedback September 2022**
  - **Initial Feedback - "Thorough and well written"**
- **DMF working through and addressing comments**
- **Plan to formally submit to NOAA Fisheries in December 2022**

The Commonwealth of Massachusetts
Division of Marine Fisheries

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CHARLES D. BAKER Governor	KARYN E. POLITO Lt. Governor	BETHANY A. CARD Secretary	RONALD S. AMIDON Commissioner	DANIEL J. MCKIERNAN Director

To: Marisa Trego, Ph.D. ALWTRT Coordinator

From: Dan McKiernan, Director
Bob Glenn, Deputy Director

Date: October 11, 2022

Re: Comments on NOAA Fisheries Notice of Intent To Prepare an Environmental Impact Statement on Modifications to the Atlantic Large Whale Take Reduction Plan To Reduce Mortality and Serious Injury of Large Whales in Commercial Trap/Pot and Gillnet Fisheries (NOAA-NMFS-2022-0091)

Cc: Colleen Coogan, Mike Pentony, Erin Burke

The Division of Marine Fisheries (DMF) and the fixed gear fishermen of Massachusetts have long been leaders in conservation for the North Atlantic Right Whale (NARW). We have taken this responsibility seriously, offered meaningful management proposals, and adopted measures to reduce entanglement risk to NARW's, often proactively and ahead of jurisdictions in surrounding areas. This conservation has been squarely shouldered by Massachusetts fishermen, who despite weathering the uncertainty of a constantly changing regulatory landscape and the financial stress compounded by changing market conditions and increased operating costs, continue to persevere, and come back to the table in good faith to offer more options to protect NARW's. Their commitment is commendable and should be recognized by NOAA Fisheries and by the whale conservation community.

Last week DMF hosted four in-person scoping meetings for Massachusetts fishermen. More than 75 fishing industry leaders from the lobster, other trap pot, and gillnet fisheries attended these meetings. The focus of these meetings was developing new management measures to further reduce risk of serious injury or mortality caused by entanglement, to an unprecedented level of 90% from historical levels. This is a daunting task, especially when you consider the extensive management already in place in Massachusetts, in both state waters and adjacent federal waters. Despite the challenges Massachusetts fishermen face, highly productive discussions occurred, and once again Massachusetts fishermen have come to the table to offer conservation options for NOAA Fisheries to evaluate and consider. DMF is not endorsing these measures at this time. We first want to see the amount of risk reduction credit they provide and need more time to fully vet them internally and with the fishing industry. These measures are provided as an appendix at the end of this memo. In addition to the management measures, we offer the following comments and requests to NOAA Fisheries.

Full accounting of all measures for all fixed gear fisheries in MA

We request a full and accurate accounting of all management measures in place in Massachusetts state waters to protect NARW's. We specifically ask that the risk reduction be presented as a percentage of the total risk in MA state waters and as percentage of total risk coast wide for all fixed gear fisheries in MA: lobster trap, other trap pot (OTP), and sink gillnet.

These current measures include:

- closure of all MA state waters from Monomoy north to the NH border from February 1 to May 15th with dynamic extension
- closure of all MA state waters gillnet fishing from January 1 to May 15th with dynamic extension
- closure of all OTP fishing from December 15th through April 15th
- mandatory use of 75% weak rope in all lobster and OTP fisheries
- 50% lobster trap allocation reduction in Lobster Management Area 2 (south and west of Cape Cod) implemented between 2016 and 2021

Understanding the risk reduction contributed by each of these measures individually and in concert is critical to understanding the relative effectiveness of each measure and to ensure that credit has been appropriately assigned.

Calculate and provide risk reduction credit for the original Mass Bay Restricted Area

We request that NOAA Fisheries calculate and credit the risk reduction benefit of the original Mass Bay Restricted Area closure that was implemented in 2015. This measure is likely the single most important and effective management measure in place in all of U.S. waters. In 2019, DMF advocated to NOAA Fisheries and the Atlantic Large Whale Take Reduction Team (ALWTRT), that this measure be credited to the MA risk reduction responsibility even though it was implemented prior to the 2017 reference year. There was broad support by the ALWTRT and NOAA Fisheries to credit Massachusetts for this measure. It was DMF's and the MA fishing industries' understanding that credit was going to be given. However, in subsequent rule making NOAA Fisheries decided not to credit Massachusetts for the closure. At the heart of the issue is that NOAA Fisheries selected 2017 as the reference year because this was the year that an Unusual Mortality Event was first declared by NOAA Fisheries. DMF understands the significance of this and recognizes that there was a very substantial mortality event that started in that year. However, NOAA Fisheries published data demonstrate that NARW population started to decline seven years earlier – beginning in 2010. In fact, due to concern over stock decline, NOAA Fisheries developed and implemented the MBRA in 2015, recognizing that the aggregation of NARW's in Cape Cod Bay is the largest and most important in the world. At the time of implementation NOAA Fisheries did not possess an evaluation tool to calculate risk reduction.

The large mortality event in 2017 largely consisted of entanglements and ship strikes that occurred in the Gulf of St. Lawrence. Notably, there have been no serious injuries or mortalities attributable to fishing gear in MA state waters despite hosting the largest aggregation of NARW in the world. This speaks to the effectiveness of the MBRA. Furthermore, as is common in any model estimates, the model fitted annual abundance and mortality estimates from the NOAA Fisheries state-space population model for NARW's are sensitive to model input values several years prior and after any reference period. Consequently, estimates for the 2017 reference years are influenced by trends in abundance, birth rates, and mortality in 2015 (before and after).

Finally, the currently used mortality estimate which is gauged against Potential Biological Removal (PBR) is the average mortality from 2015 to 2019. This reference period for mortality includes 2015, the year the MBRA was implemented. Clearly, based on the use of a 2015 to 2019 reference period for mortality, NOAA Fisheries recognizes the importance of population trends and management measures in place in 2015. It is our opinion, based on all the previous mentioned reasons, it is critical and completely justified to credit the risk reduction attributable to the original MBRA closure. Not doing so puts MA-based fishermen at a real disadvantage and completely ignores the extremely valuable contribution to conservation they have made.

Update the mortality estimates to include 2020 and 2021 data

We request that NOAA Fisheries update annual mortality estimates to include more recent data. The current reference period for mortality is the 2015-2019 average. This value likely over-estimates the current average mortality rate that the population is experiencing. This average is largely influenced by extremely high mortality rates observed between 2015 and 2019. Since, 2019 the annual observed mortality rates have substantially decreased. Updating the five-year average to include 2020 and 2021 would likely reduce the 5-year average mortality rate and reduce the amount of risk reduction necessary to reduce mortality to below PBR. Even a few less percentage points of necessary risk reduction might provide some fisheries with substantial relief from additional management measures. We understand that updating the mortality estimates is labor intensive and requires a full analysis of all ID photos for the years in question. But given the importance of using the best available science, along with the huge burden that risk reduction poses to the fishing industry, it is NOAA Fisheries' duty to allocate the necessary staff resources to expedite updating these values. We believe that if mortality observations in 2020 and 2021 were very high, there would be a strong effort by the government to update these mortality rates for immediate inclusion in management.

Test DST model's sensitivity to the stanza of years of whale sightings used in the Duke Whale Model

We request that NOAA Fisheries test the DST model's sensitivity to the stanza of years of whale sightings data used in Duke Whale Density Model. The Duke Whale Density Model currently uses NARW sightings from 2010 through 2021. This time periods spans a period when NARW have dramatically changed their seasonal distribution. Using such a long time period to estimate average whale density when there are observed changes in NARW distribution has the potential to bias density estimates in specific areas. It has the potential to overestimate the importance of areas where whales may no longer be present, and to underestimate the importance of areas that NARW's currently use. We suggest that whale density estimates be broken down into 5-year stanzas to more accurately account for changing whale distributions over the last decade. We understand that a longer time series provides more stability in model estimates. However, sacrificing model precision may be warranted to more accurately reflect current whale distribution. It is our opinion that average whale density from a 12-year time series of observations, when there are significant changes in whale distribution, does not accurately reflect current whale distribution and has the potential to misrepresent actual entanglement risk.

Request that NOAA Fisheries negotiate with court/plaintiffs to delay action until empirical data are collected on effectiveness of weak rope (1,700 lbs. breaking strength) and buoy line marking by jurisdiction to effectively and responsibly reduce risk

Massachusetts fixed gear fishermen have been deploying fully weak buoy lines since May 2021 that are also uniquely marked. Additionally, other states' fishermen deployed some form of weak ropes and gear marking for the first time in 2022. The risk reduction provided by the deployment of weak rope is modeled in the Decision Support Tool. We are hopeful that empirical data on reported and documented entanglements will soon demonstrate the benefits of weak rope are higher than anticipated. Moreover, the buoy line marking scheme is already revealing locations of entanglement events, providing useful information on the potential risk posed by certain jurisdictions. Beginning next year all federally permitted lobstermen will be required to install vessel trackers which will provide unprecedented precision of fixed gear fishing locations. Within one to two years, we will have a more informed understanding of the benefits of weak rope and entanglement locations revealed through gear marking strategies, as well as a complete accounting of lobster trap fishing locations in the EEZ. This will enhance the precision and effectiveness of the DST and promote more effective management of risk.

Conservation measures developed at caucus meetings to be run through the DST model for risk reduction value

DMF conducted four industry caucus meetings across the state the week of October 9, 2022 to elicit feedback from trap and gillnet fishermen about potential risk reduction measures. We worked with Burton Shank from the Northeast Fisheries Science Center and other NOAA staff to develop a list of risk reduction measures to run through the DST for analysis and potential inclusion in a strategy to further reduce risk in state and federal waters portions of our region. They are listed below.

Sincerely,

Daniel J. McKiernan, Director

Robert Glenn, Deputy Director & ALWTRT Member

Risk Reduction Measures for Consideration

MA and NH state and federal waters, Area 1, Lobster

- Implementation of 100% weak in federal waters of southern LMA 1
- Implementation of 75% weak in federal waters of southern LMA 1
- Implementation of 75% weak in federal waters of southern LMA 1
  - + trawling up 3-6nm min trap/trawl= 15
- Implementation of 75% weak in federal waters of southern LMA 1
  - + trawling up 3-6nm min trap/trawl= 15
  - + trawling up 6-12nm min trap/trawl=20
- Implementation of 75% weak in federal waters of southern LMA 1
  - + trawling up 3-6nm min trap/trawl= 15
  - + trawling up 6-12nm min trap/trawl=20
  - +permanent closure of the “wedge”/”gap” area for Feb-Apr (also see effect of extending to May 15
- Implement closure all of stat 514 and Fed waters north to the border of Maine Zone G in January and February (lines out)
- Implement closure all of stat 514 and Fed waters north to the border of Maine Zone G in March and April (lines out)
- Implement closure all of stat 514 and Fed waters north to the border of Maine Zone G in Feb to May 15 (lines out)

MA state and federal waters, Area 1 and OCCLMA, Lobster and OTP

- Implementation of weak in federal waters off southern LMA1 and LMAOCC
- Implementation of 75% weak, federal waters off southern LMA1 and LMAOCC
- permanent closure of the “wedge”/”gap” area for Feb-Apr (also see effect of extending to May 15
- Implement closure all of stat 514 and Fed waters north to the border of Maine Zone G in January and February (lines out)
- Implement closure all of stat 514 and Fed waters north to the border of Maine Zone G in March and April (lines out)
- Implement closure all of stat 514 and Fed waters north to the border of Maine Zone G in Feb to May 15 (lines out)
- Extended Mass state waters trap closure from January 15th through May 15th
- Close southeastern portion (east of a line from Race Point to Barnstable Harbor) of CCB from December 1st to May 15th
- Ban on fishing single traps December and January in all MA state waters
- LMAOCC closure in December and January (lines out – evaluated separately and in combo)
- 10 pot trawl minimum in all MA state waters December and January

MA and RI state and federal waters, Area 3, Lobster and OTP

- 10% buoy line reduction
  - All year
  - Hot spot months
- 20% buoy line reduction
  - All year
  - Hot spot months

- 30% buoy line reduction
    - All year
    - Hot spot months
- 40% buoy line reduction
    - All year
    - Hot spot months
- 50% buoy line reduction
    - All year
    - Hot spot months
- Total closure of all LMA 2 (MA &RI) in Feb - Apr (lines out)
- Total closure of LMA 2 all year round
- Closure of OTP in MA state waters from Dec 15 – Apr 15
- Closure of OTP in MA state waters from Dec 15 – May 15
- 75% weak rope, all Area 2
- Closure of all LMA2 and extensions into hotspot areas Feb 1 to April 30th
- Endline cap with 50% buoy line reduction in LMA3

<u>MA and RI state and federal waters, Gillnet</u>

- Implement a 10 endline cap for all SNE monkfish/skate sink gillnet fishers
- Incorporate changes in set length since 2017
- Evaluate change in latent permits since 2017
- Panel up to minimum of 20 panels per two buoy lines
- Panel up to minimum of 25 panels per two buoy lines
- Spatial closure (lines out) to gillnets same boundaries as SIRA (plus small wedge of fed waters north of 41° 20") Feb 1 to April 30th
- Spatial closure (lines out this is equivalent to the discussion on closing "north of 43600") to gillnets from Feb 1 – April 30. Boundary as follows:
    - Northern boundary – 41° 20" plus small wedge of federal waters north of 41° 20" to state waters line
    - Southern boundary – 41° 40"
    - Western boundary – 71° 30"
    - Eastern boundary - 70°
- Spatial closure (lines out) to gillnets same boundaries as SIRA (plus small wedge of fed waters north of 41 20) Feb 1 to April 30th
    - + 75% weak rope rule
    - + 20 or 25 panel minimum per two buoys

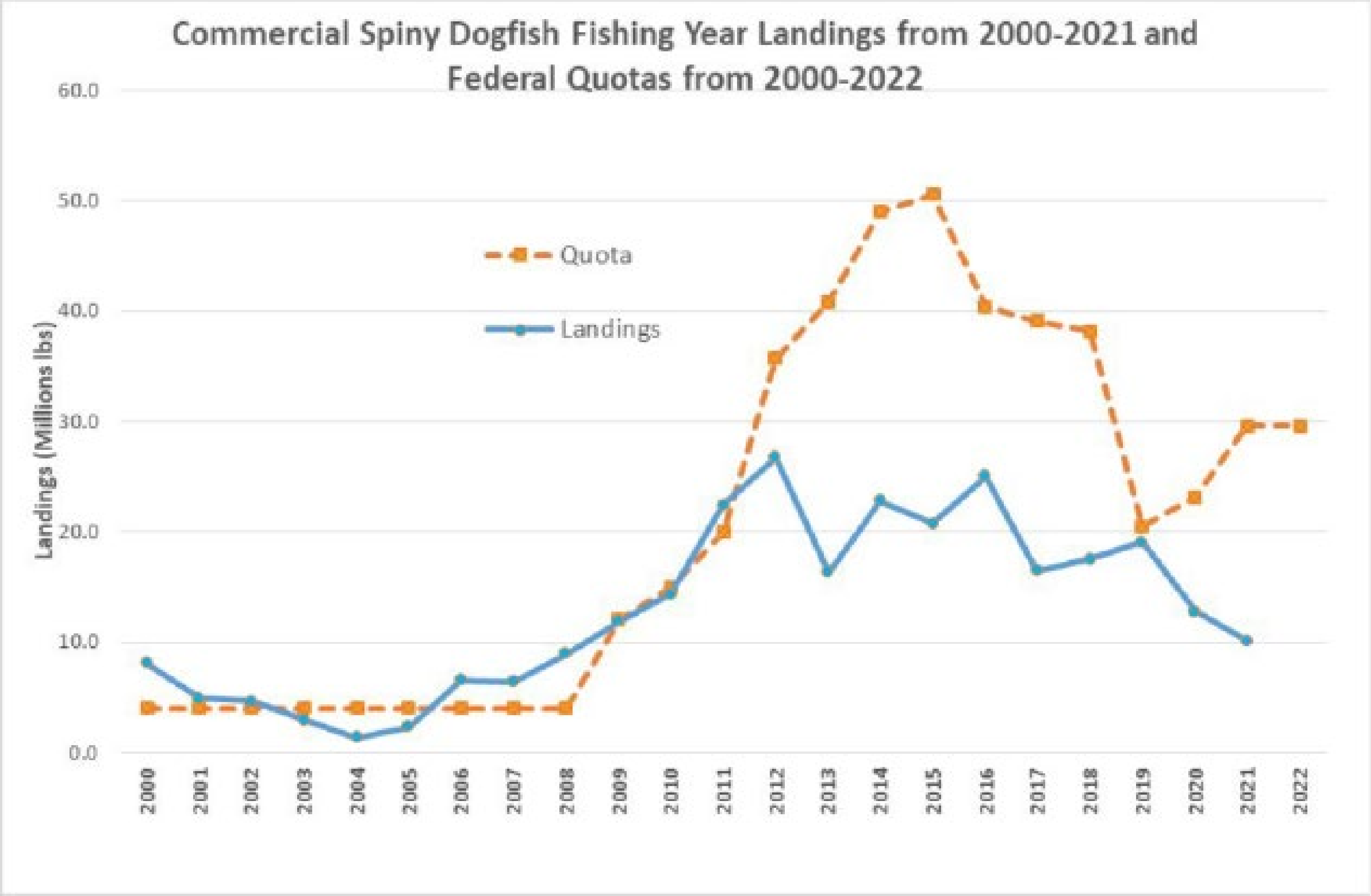
Interstate Fisheries Management Update

Marine Fisheries
Advisory Commission

October 18, 2022

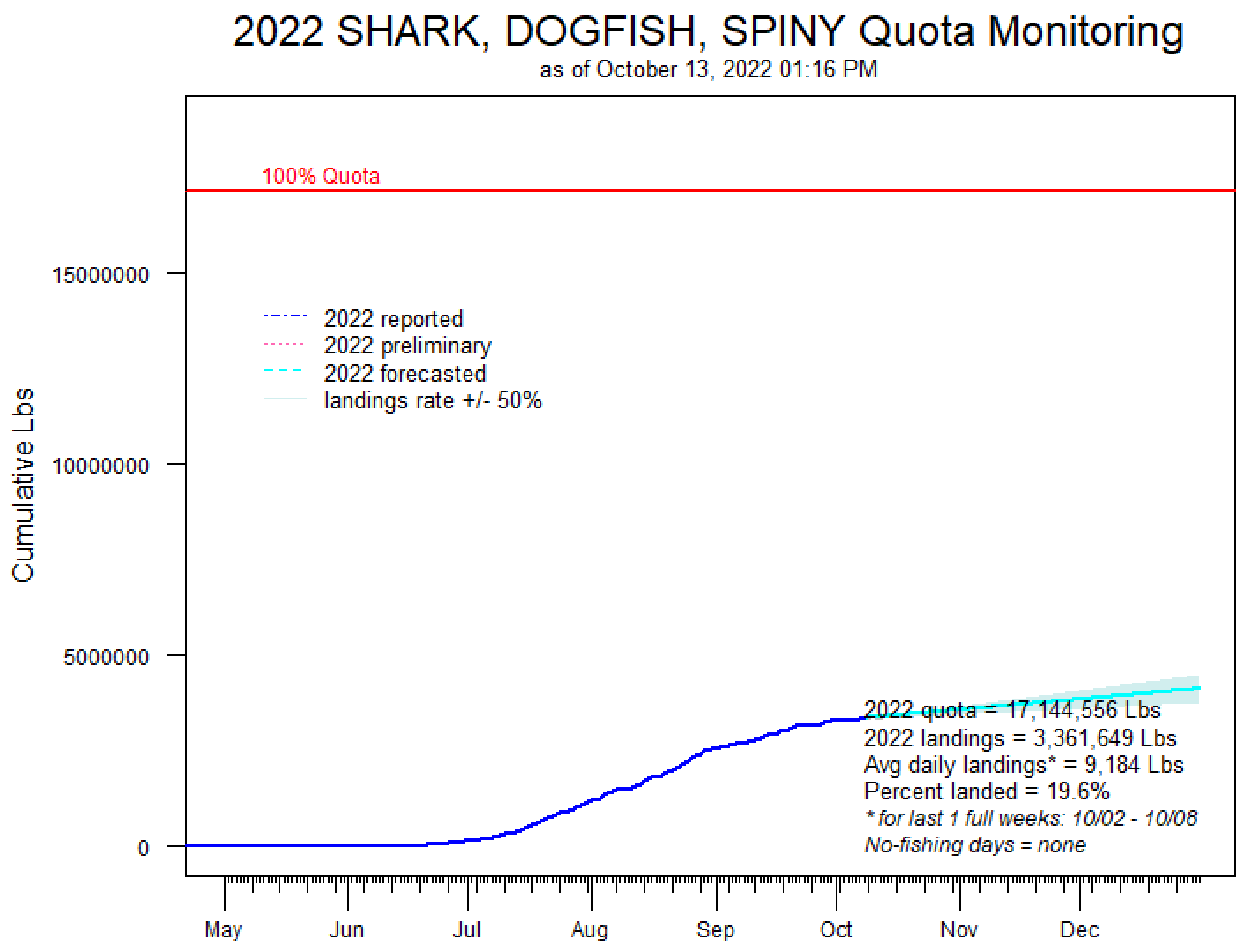
Spiny Dogfish

- Mid-Atlantic Council vote on 2023 specifications: 12-mlb quota for FY2023



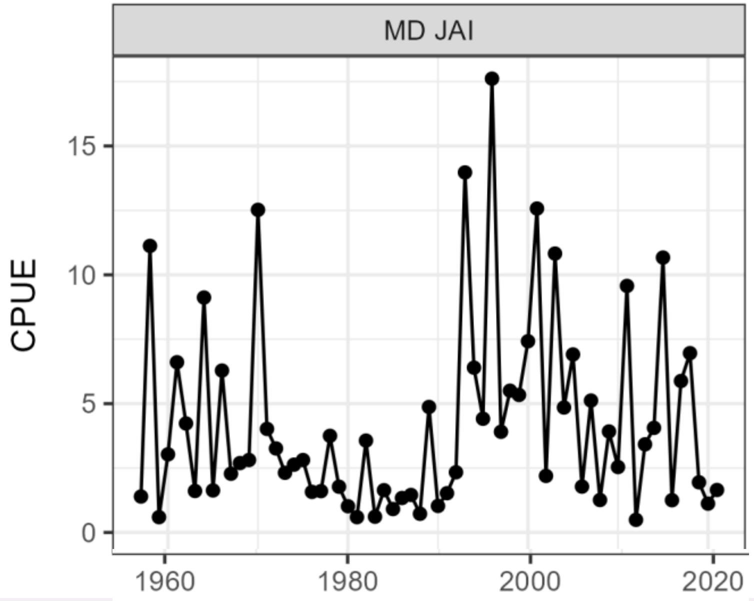
Spiny Dogfish

- ME-CT region: 58% share
  - 2022 quota: 17.1 mlb
  - Projected 2023 quota: 7.0 mlb



ASMFC Annual Meeting: November 7-10
Striped Bass

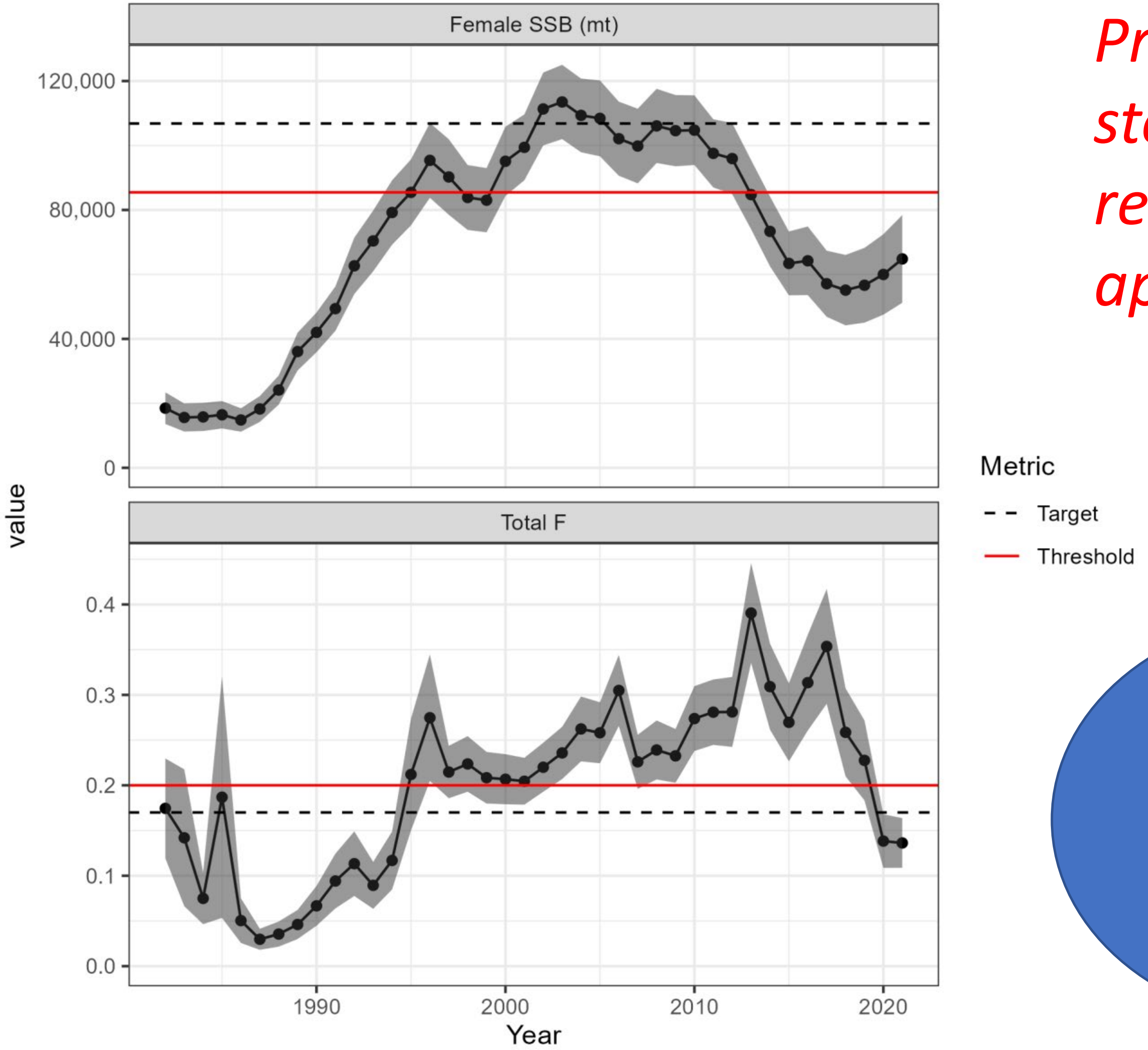
- Amendment 7: wait for 2022 stock assessment to determine if additional reductions needed to rebuild by 2029.
    - "Armstrong Rule": Board action to respond if needed.
- 2022 Stock Assessment
    - Maryland JAI fired the recruitment trigger (failure for 3 consecutive years) so interim F reference points calculated based on low recruitment regime.
    - Low recruitment regime assumption used in stock projections.



Stock Status:

SSB target = 106,820 MT	
SSB threshold = 85,457 MT	
SSB 2021 = 64,805 MT ***Overfished***	

F threshold = 0.20	
F target = 0.17	
F 2021 = 0.14 ***Not experiencing overfishing***	

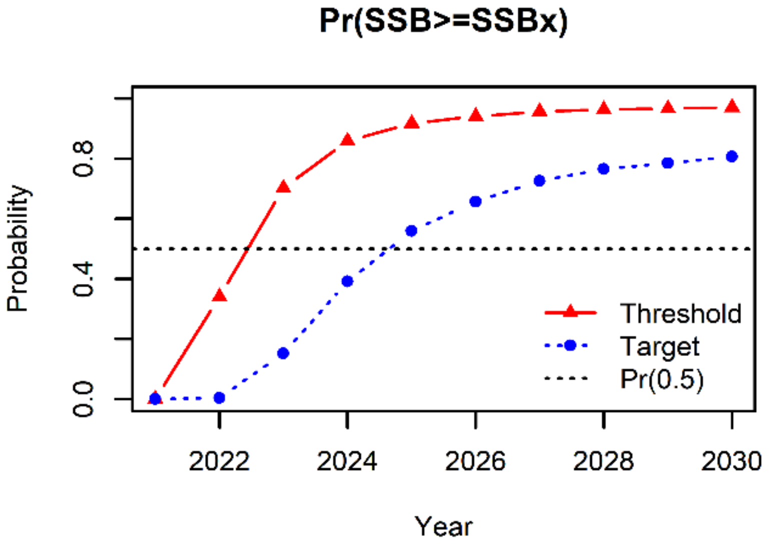


Preliminary 2022 stock assessment results for Board approval.

Confirm that Addendum VI cuts did reduce F to target level.

Projections:

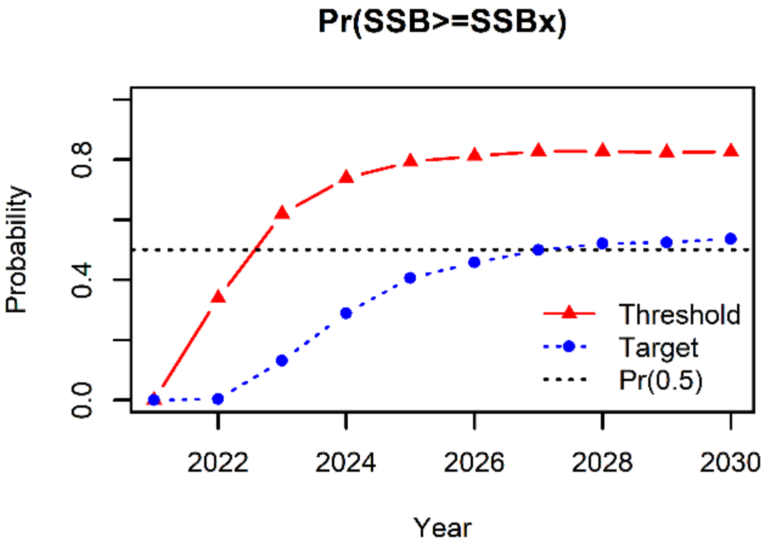
If F stays at 2021 rate (0.14):



> 50% prob. that SSB rebuilt in 2025

78.6% prob that rebuilt in 2029

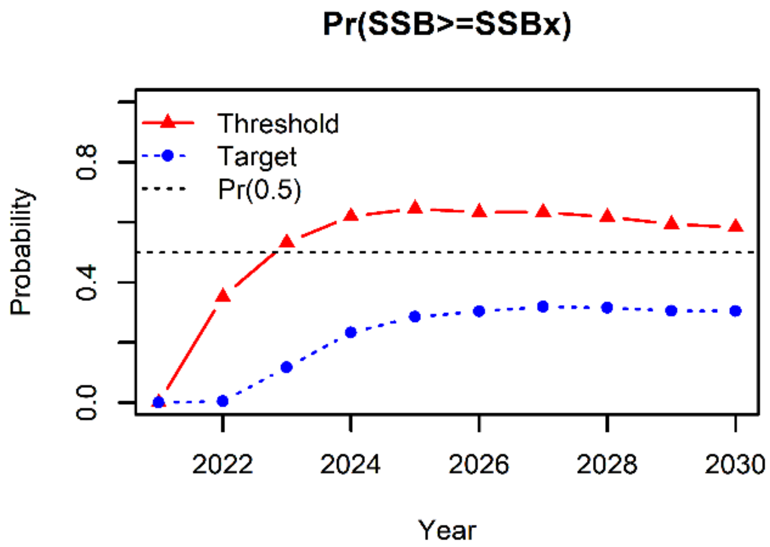
If F at target rate (0.17):



> 50% prob. that SSB rebuilt in 2028

52.5% prob that rebuilt in 2029

If F at threshold rate (0.20):



30.5% prob. that SSB rebuilt in 2029

“Under the current *F*, there is a 78.6% chance the stock will be rebuilt by 2029, indicating a reduction in catch is not necessary at this time.”

ASMFC Annual Meeting: November 7-10
Menhaden

- Final action on Draft Addendum I to Amendment 3
  - Issues being addresses:
    - Changes in stock distribution & availability since 2009-2011 period used in allocations
    - Latent quota in numerous states amidst high reliance on quota transfers, EESA, IC/SSF elsewhere
    - TAC being exceeded due to IC/SSF landings
  - Options:
    - Incorporate recent years landings into allocations/change minimum allocations/ increase EESA
    - Remove gears or reduce trip limit for IC/SSF
    - Management trigger to change IC/SSF gears/limits if cause TAC to be exceeded
- Set Total Allowable Catch (TAC) for 2023-2025
  - Projections suggest some level of increase is likely
- Expect state scoping meeting and public hearing this winter to make changes for 2023

Questions?

New England Regional Fishery Updates

- **Summary September Council meeting in Gloucester**

- **Outlook for December meeting in Newport, RI**

New England Fishery Management Council

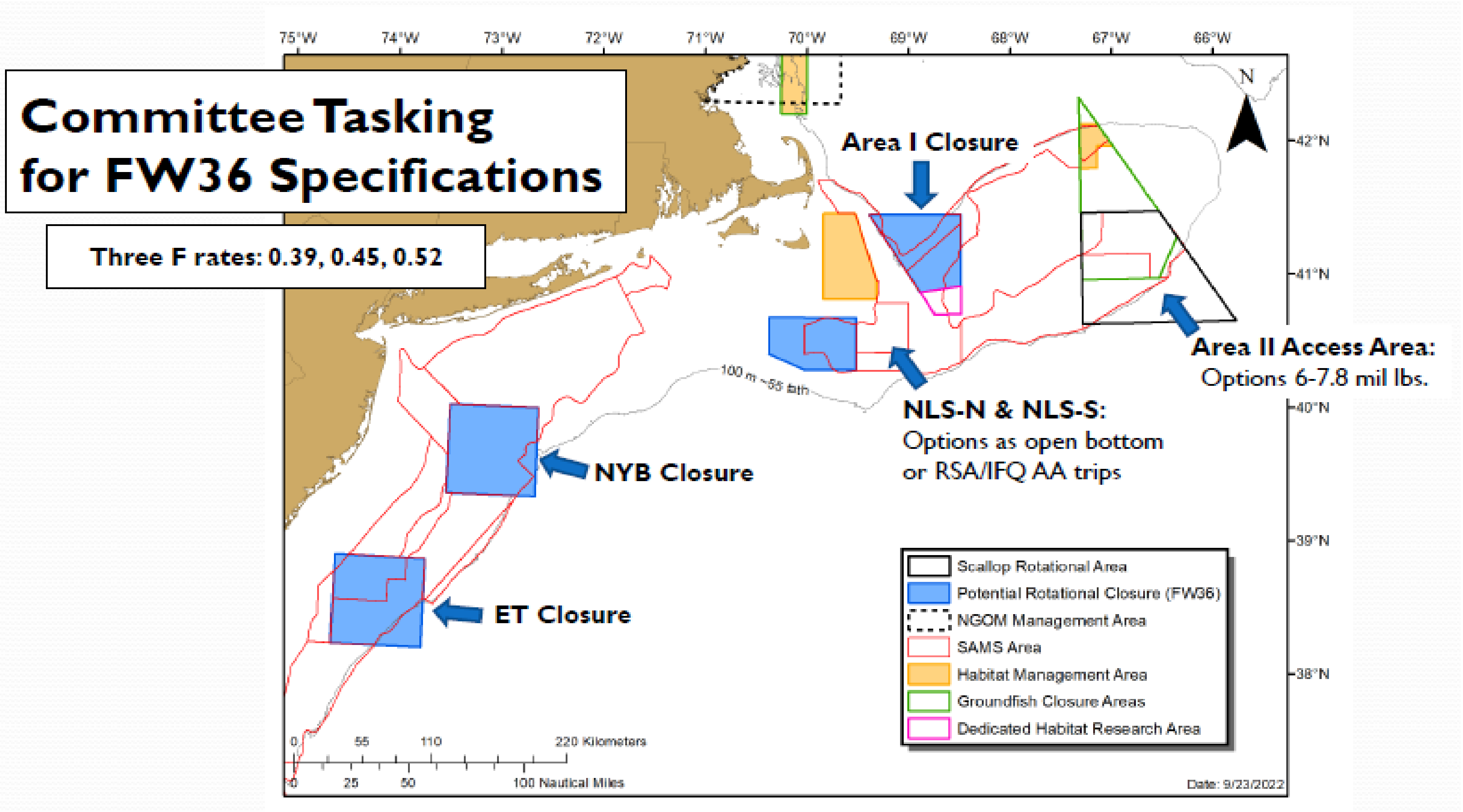
Atlantic Sea Scallop

- **Declined to Develop Limited Access Leasing**

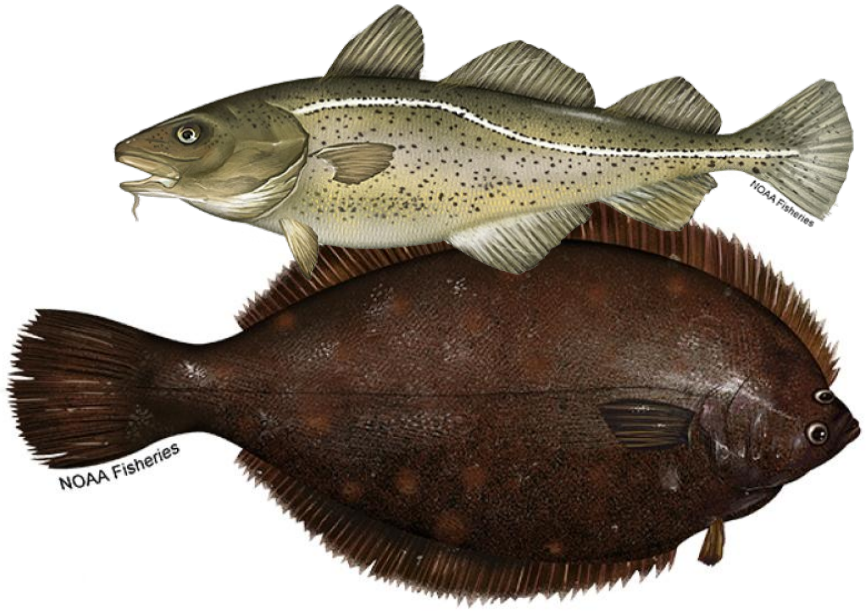
- **FW36 development:**

  2023 Specifications

  2024 Default measures



Groundfish



FW65:

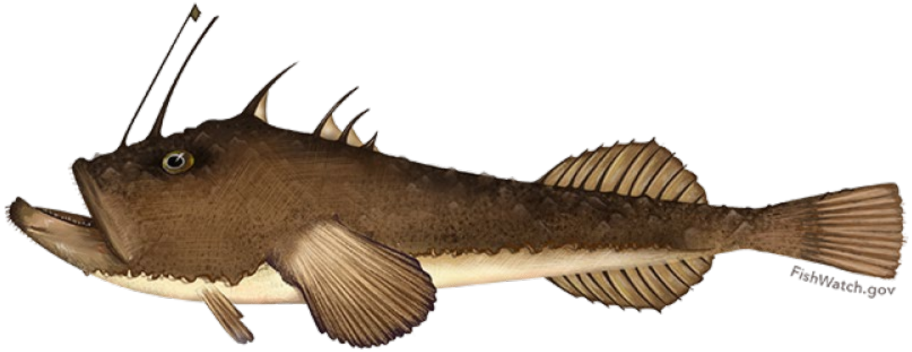
- **2023-2024/2025 specifications**
- **Rebuilding cod ~~and SNE/MA winter flounder~~**
- **ABC Control Rule revisions**

Atlantic Herring

- **2023-2025 Fishery Specifications**
- **FW7 – Georges Bank Spawning**

In mt	FY2022	FY2023	FY2024	FY2025
ABC	8,767	16,649	23,409	28,181
Area 1A (28.9%)	1,184	3,592	5,546	6,925
Area 1B (4.3%)	176	534	825	1,030
Area 2 (27.8%)	1,139	3,455	5,335	6,661
Area 3 (39%)	1,598	4,847	7,484	9,345

Skates & Monkfish



- **Monkfish FW13**

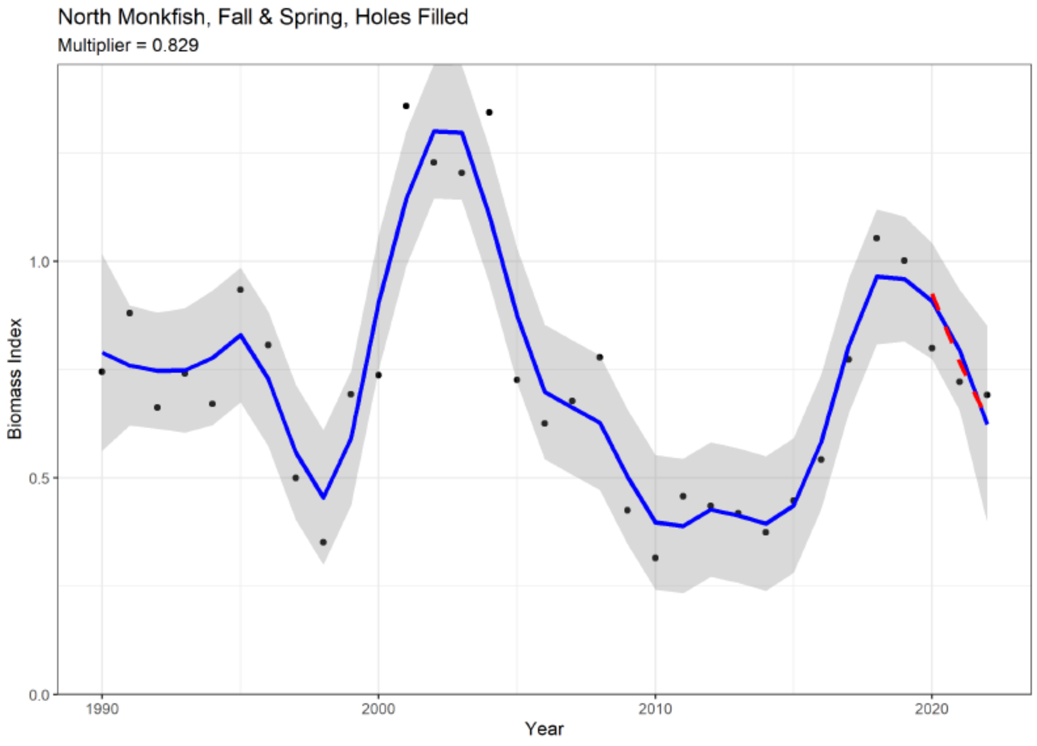


Figure 25: Results of the Ismooth approach in the North.

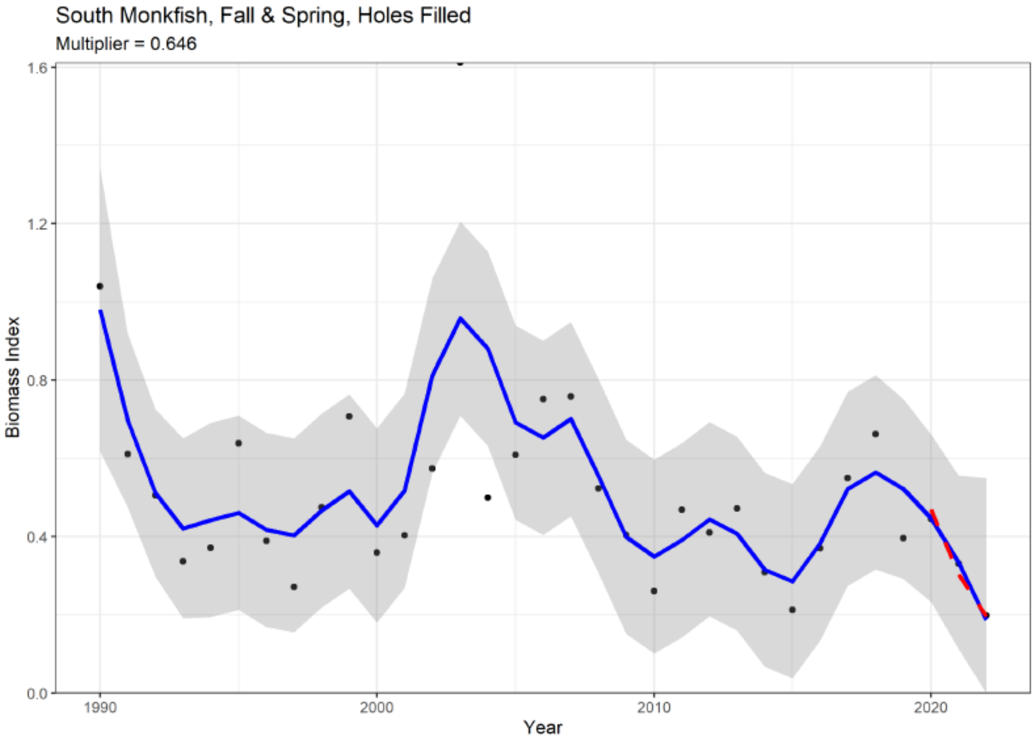
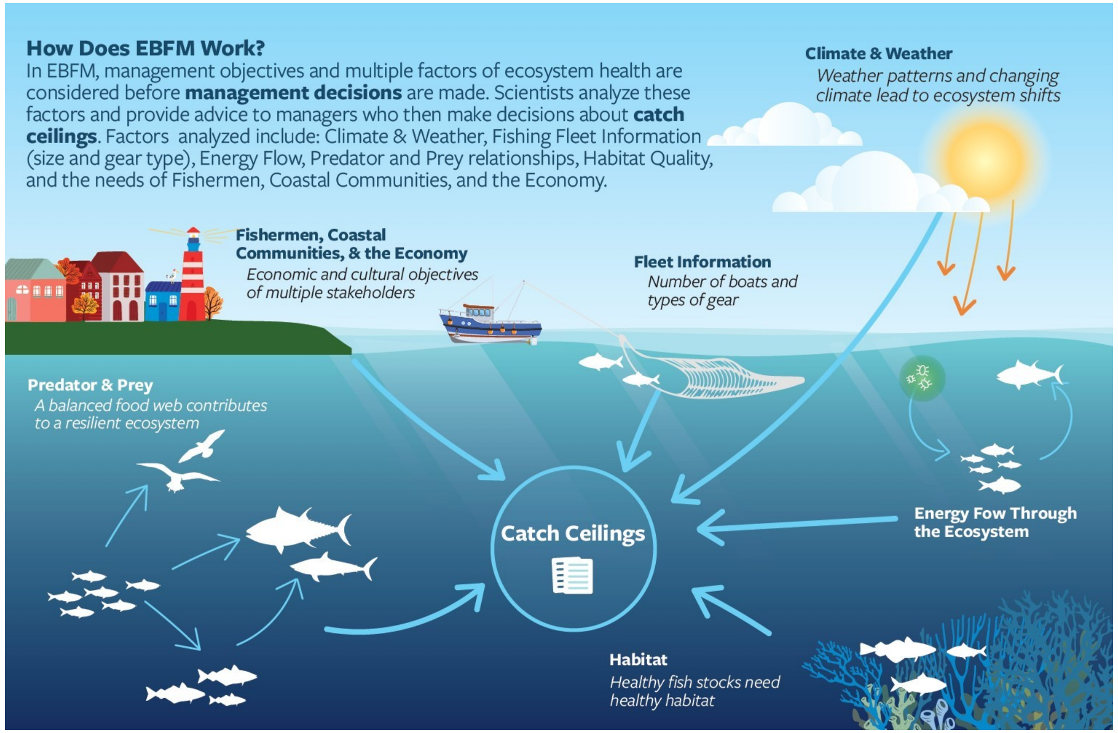


Figure 26: Results of the Ismooth approach in the South.

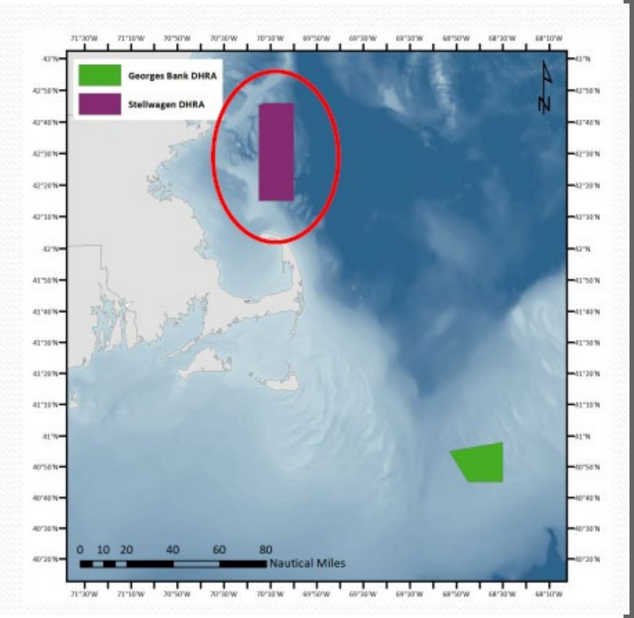
EBFM

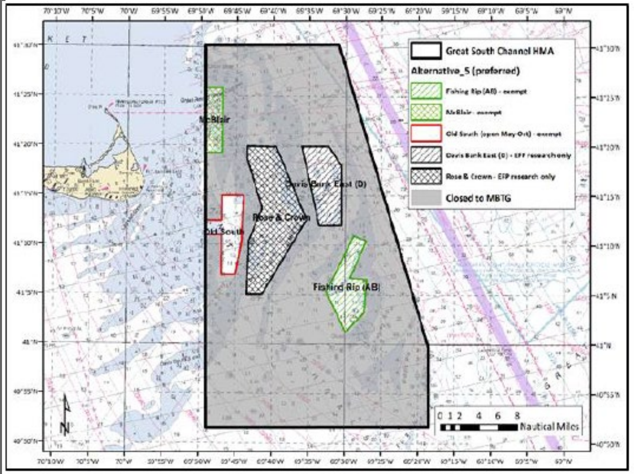
Date and Time	Location
Gloucester, MA Tuesday, October 25, 2022 3:00 p.m. – 6:00 p.m.	Maritime Gloucester 23 Harbor Loop, Gloucester, MA 01930 Telephone: (978) 281-0470
Portland, ME Wednesday, October 26, 2022 3:00 p.m. – 6:00 p.m.	DoubleTree Hotel 363 Maine Mall Rd., Portland, ME 04106 Telephone: (207) 775-6161
Chatham, MA Tuesday, November 1, 2022 3:00 p.m. – 6:00 p.m.	Chatham Community Center 702 Main Street, Chatham, MA 02633 Telephone: (508) 945-5158
New Bedford, MA Wednesday, November 2, 2022 3:00 p.m. – 6:00 p.m.	New Bedford Whaling Museum 18 Johnny Cake Hill, New Bedford, MA 02740 Telephone: (508) 997-0046
Point Judith, RI Tuesday, November 8, 2022 3:00 p.m. – 6:00 p.m.	Superior Trawl Conference Room 55 State St, Narragansett, RI 02882 Telephone: (302) 503-4869
Montauk, NY Wednesday, November 9, 2022 3:00 p.m. – 6:00 p.m.	Montauk Playhouse and Community Center 240 Edgemere Street, Montauk, NY 11954 Telephone: (631) 668-1612
Manahawkin, NJ Thursday, November 10, 2022 3:00 p.m. – 6:00 p.m.	Holiday Inn 151 Route 72 West, Manahawkin, NJ 08050 Telephone: (609) 481-6100



Habitat

- **Salmon aquaculture FW**
- **DHRAs**
- **GSC HMA & Surf Clams**





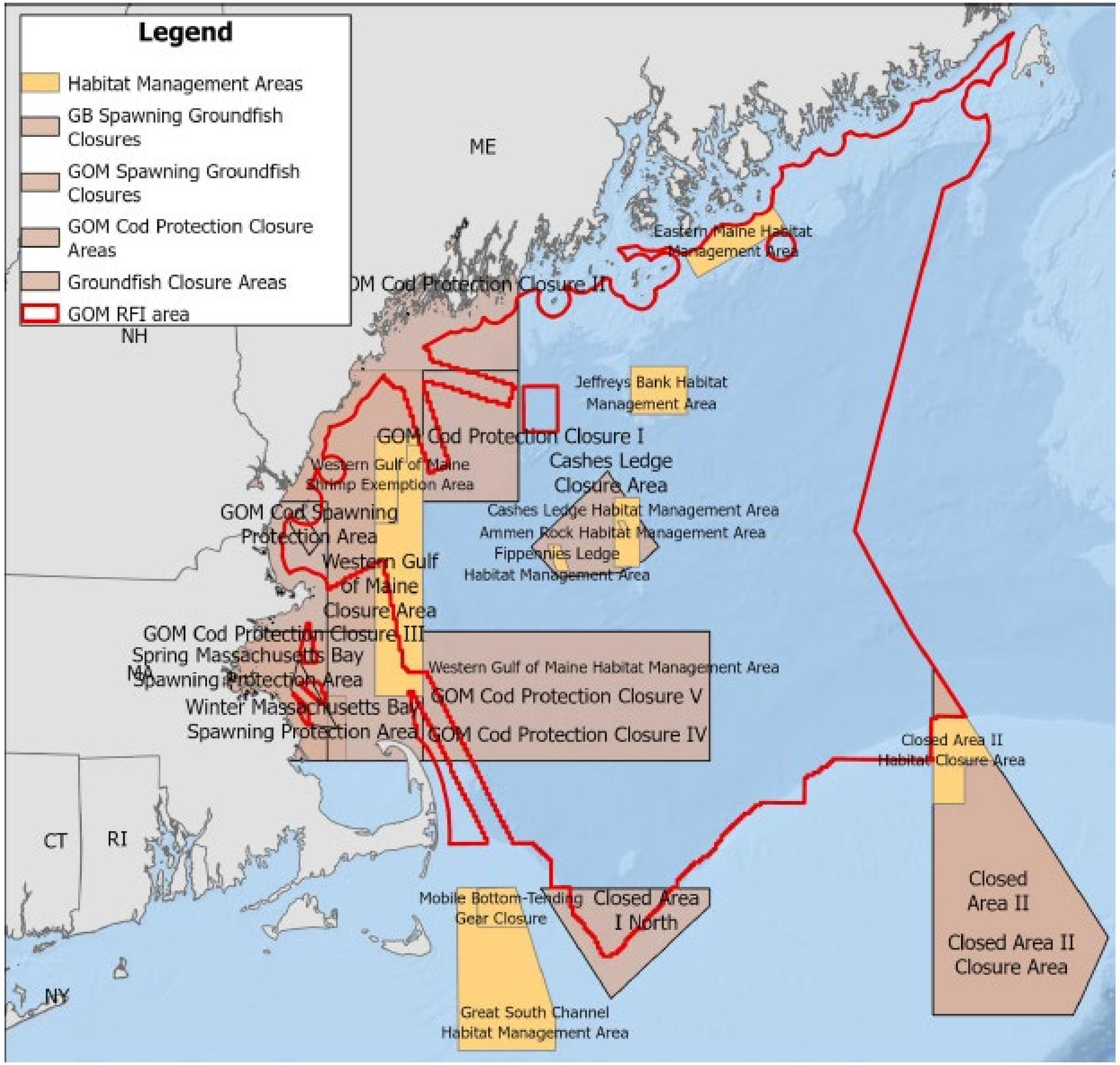
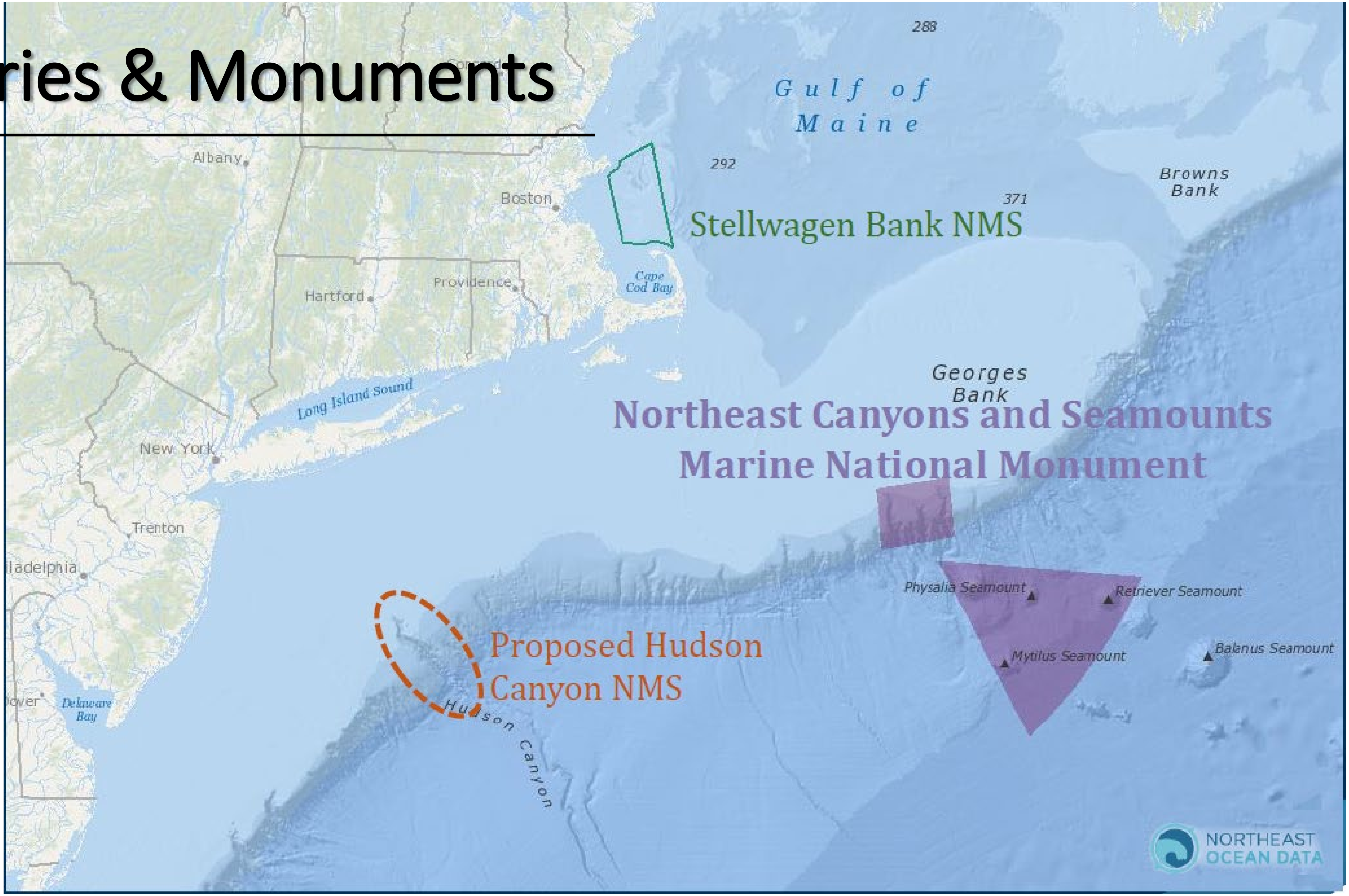


Figure 2: Habitat Management and Groundfish Spawning and Closure Areas[3] that overlap with the proposed RFI area.

Sanctuaries & Monuments



East Coast Climate Change

Mostly maintained

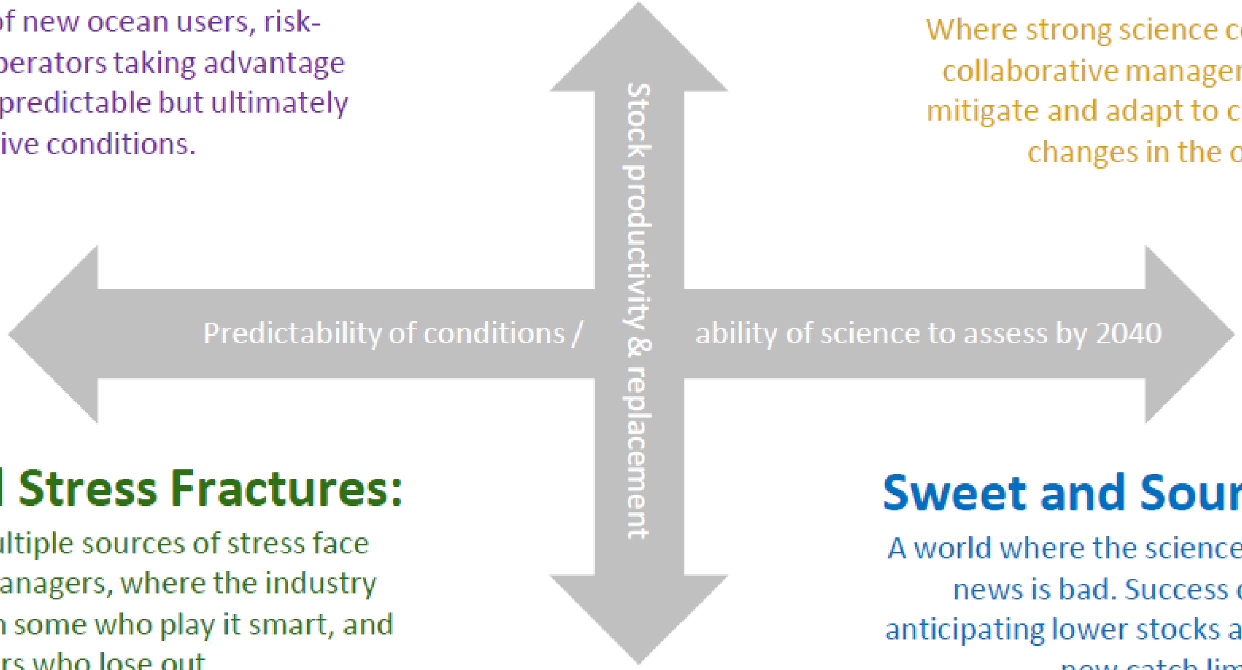
Ocean Pioneers:

A 'wild west' of new ocean users, risk-taking fishery operators taking advantage of confusing, unpredictable but ultimately positive conditions.

Checks & Balance:

Where strong science combines with collaborative management to help mitigate and adapt to climate-driven changes in the ocean.

Unpredictable changes & conditions, low ability to assess



Predictable changes & conditions, high ability to assess

Compound Stress Fractures:

A world with multiple sources of stress face operators and managers, where the industry fractures between some who play it smart, and others who lose out.

Sweet and Sour Seafood:

A world where the science is good, but the news is bad. Success comes from anticipating lower stocks and preparing for new catch limits.

Mostly declining

New England Regional Fishery Updates

Questions?

New England Fishery Management Council

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Bethany A. Card
SECRETARY

Tel: (617) 626-1000
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http://www.mass.gov/envir

October 3, 2022

Zachary Jylkka
Bureau of Ocean Energy Management
Office of Renewable Energy Programs
45600 Woodland Road Mailstop: VAM-OREP
Sterling, VA 20166

Dear Mr. Jylkka:

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) respectfully submits these comments to the Bureau of Ocean Energy Management (BOEM) in response to the Request for Information (RFI) and Request for Competitive Interest (RFCI) to inform the ongoing planning and leasing for offshore wind in the Gulf of Maine. These comments support the overall goal of balancing the management of vital economic and natural resources in coastal and ocean waters of the shared Gulf of Maine with the introduction of a new ocean use: offshore wind. Ensuring the continuity of maritime commerce, recreation, and commercial fishing are priorities for the Commonwealth along with avoiding and minimizing impacts to existing maritime habitats and species as BOEM commences the planning process for potential commercial leasing of offshore wind in the Gulf of Maine.

In 2008 EEA formed two working groups, a Fisheries Working Group,[1] which includes fishing industry representatives, agencies, and interested non-governmental organizations and a Habitat Working Group,[2] which involves representatives from state and federal agencies, the offshore wind industry, and interested non-governmental organizations. Discussions within the work groups helped to inform the planning for the Massachusetts/Rhode Island (MA/RI) Wind Energy Areas (WEAs) and will also inform the planning for offshore wind in the Gulf of Maine. We solicited input from these working groups in preparation of this comment letter.

Reducing carbon emissions through the development of renewable energy, including offshore wind energy, is critical to combatting the global climate crisis. The Commonwealth strongly supports

[1] https://www.mass.gov/service-details/fisheries-working-group-on-offshore-wind-energy
[2] https://www.mass.gov/service-details/habitat-working-group-on-offshore-wind-energy

the Biden-Harris Administration's ambitious goals to achieve 30 gigawatts (GW) of offshore wind by 2030, 15 GW of floating offshore wind by 2035, and commercial leasing in the Gulf of Maine in 2024. We applaud the federal government's legislative actions in support of this goal, including the Bipartisan Infrastructure Law and the Inflation Reduction Act. The goals of the Commonwealth align closely with those of the Biden-Harris Administration. Since 2016, with the signing of the Act Relative to Energy Diversity, Massachusetts has been a national leader in offshore wind policy and market development and will host the first-in-the-nation commercial-scale offshore wind project in federal waters, the 800 MW Vineyard Wind 1 project. We have committed to renewable energy targets including a statutory authorization of 5.6 GW, 3.2 GW of offshore wind projects under contract to date and currently under development,[3] a schedule of future offshore wind procurements to ensure timely delivery of offshore wind to Massachusetts ratepayers, and a goal to achieve net zero emissions by 2050. Offshore wind leasing in the Gulf of Maine is critical for Massachusetts to meet its legislatively mandated offshore wind energy goals.

Modeling conducted for the Massachusetts 2050 Decarbonization Roadmap[4] indicates that offshore wind will be a significant component of the Commonwealth's and the region's electricity generation, requiring over 15 GW for Massachusetts alone by 2050, and approximately 30 GW for New England to achieve the region's renewable or clean energy targets. With nearly 7 GW currently under contract to Massachusetts, Rhode Island, Connecticut, and New York for projects in the existing lease areas off Southern New England, existing offshore wind procurement authorities and goals in the Northeast are expected to utilize the capacity of the existing lease areas over the next few years. To meet the states' long-term energy and decarbonization goals, new offshore wind areas will be needed. The commencement of the comprehensive planning and analysis process for commercial leasing in the Gulf of Maine is an important step, and the Commonwealth is committed to supporting BOEM through our role on the Intergovernmental Renewable Energy Task Force and in other capacities.

Request for Information

As we look to the Gulf of Maine as the next region to support offshore wind, it is important to consider how the siting of new lease areas can drive advancements in technology, competitive energy pricing, and efficient use of existing transmission infrastructure. As with the southern New England areas, the identification of multiple wind energy areas in the Gulf of Maine would support the offshore wind goals of the northeastern states, increase competition between offshore wind developers, support the industry's growth, and put downward pressure on costs for ratepayers. In the MA/RI WEAs, seven lease areas held by five different developers/leaseholders has led to a relatively competitive offshore wind market in the Northeast and resulted in cost-effective pricing for ratepayers in state procurements and robust commitments to economic and workforce development.

With that experience, to maximize the economic benefits, WEAs in the Gulf of Maine should also be geographically distributed, with sufficient WEAs to maximize competition among offshore wind developers, which in turn encourages competition and diversity in developers' strategies for siting and use of innovative floating wind technologies. In addition, ensuring a wide geographic distribution of WEAs would allow for multiple offshore transmission routes to access onshore

[3] Current Massachusetts offshore wind procurements totaling 3,204 megawatts (MW) are comprised of Vineyard Wind 1 (800 MW), Mayflower Wind (804 + 400 MW), and Commonwealth Wind (1,200 MW).
[4] https://www.mass.gov/info-details/ma-decarbonization-roadmap

interconnection points that would allow for cost-effective integration of renewable energy into the onshore power grid.

Finally, WEAs in the Gulf of Maine should be sized to allow developers to take advantage of economies of scale, which can help reduce costs for ratepayers and minimize siting impacts to existing maritime uses such as fishing as well as marine habitats and species. Recent offshore wind projects contracted by states have been sized at around 1,200 MW, which can allow for efficient use of high-voltage direct current (HVDC) cable technology that can reduce siting impacts from offshore cabling and maximize use of onshore grid interconnection points.

The Commonwealth supports the delineation of the RFI planning area for the Gulf of Maine which excludes areas from further consideration for the siting of offshore wind. Specifically, we agree with BOEM's determination that the following areas are incompatible with offshore wind development: areas within 3 nautical miles (nm) from shore and those beyond 200 nm from shore; National Parks, National Wildlife Refuges, National Marine Sanctuaries, or any National Monuments; Existing Traffic Separation Schemes (TSS), fairways, or other internationally recognized navigation measures; existing BOEM lease areas; and unsolicited lease request areas that are the subject of a separate request for competitive interest (e.g., State of Maine's requested research lease). In addition, with these comments, we recommend: 1) additional areas that should be excluded from further consideration for leasing by BOEM; and 2) areas that require further data gathering, analysis, and discussion with stakeholders to determine whether they are suitable for the siting of offshore wind in the Gulf of Maine. Below are more details related to these two topics.

While Massachusetts legislation sets out ambitious offshore wind goals, it also requires offshore wind developers exporting electricity to Massachusetts to site wind turbine generators (WTG) at least 10 miles from any inhabited shore.[5] Areas within 10 miles from the Massachusetts coastline should be excluded from further consideration for the siting of offshore wind. Additionally, we recommend an extended shoreline buffer of an additional 10 nm along the entire Gulf of Maine shoreline to account for the increase in WTG size since 2016 and the potential for even greater increases in WTG size due to technological advancements and increasing efficiency in energy generation. This additional buffer will reduce potential visual impacts along the Gulf of Maine coastline. Further, we acknowledge that nearshore waters tend to exhibit higher concentrations of maritime uses such as recreational boating and day boat commercial fishing. Other maritime activities located closer to shore include offshore disposal sites, pilot boarding areas, port-related vessel traffic, and identified danger zones. Thus, we support BOEM investigating the implementation of an additional 10 nm shoreline buffer to a total of 20 nm to avoid and significantly minimize the potential for conflicts with these existing maritime uses and reduce visual impacts (see attached map).

In addition to a shoreline buffer, we recommend that BOEM exclude offshore wind development from areas designated by the National Oceanic and Atmospheric Administration (NOAA) as Habitat Management Areas (HMA). Fishing by bottom tending mobile gear is prohibited in HMAs due to the areas' importance in supporting various fish populations. These areas include the Western Gulf of Maine HMA, the Fippennies Ledge HMA, the Cashes Ledge HMA, the Ammen Rock HMA, the Jeffreys Bank HMA, and the Eastern Maine HMA (see attached map). Further, we recommend regions of significant seafloor ledges which are known to support diverse populations of

[5] https://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter188

marine species, including marine mammals, be assessed for exclusion from siting of offshore wind. These areas may include areas encompassing and adjacent to Georges Bank, Jeffreys Ledge, Fippennies Ledge, Cashes Bank, and Platts Bank.

To reduce potential conflict between future wind development areas and offshore commercial fishing, we recommend that BOEM, with input from fishing industry representatives, advance efforts to accurately represent where fishing activity occurs and identify areas of high priority, value, and density to commercial fishing. Areas known to be highly productive fishing grounds for mobile fishing should be excluded from further consideration for offshore wind.

Highly productive areas should also be identified for the offshore lobster industry where geospatial data are limited but represent the single most commercially valuable wild-harvested species in the northeastern United States. Although geospatial data for the lobster fishery are incomplete, conclusions regarding the general distribution of lobster fishing activity across the Gulf of Maine relative to distance from shore and the federal Lobster Management Areas (LMAs) (see attached map) should inform the selection of areas for further consideration for the siting of offshore wind. Lobster trap densities are expected to be highest in inshore (0-3 miles) and nearshore (3-12 miles) waters where vessels of all sizes, including small open boats make day trips and return to port every day. The largest vessels in the lobster fleet make multi-day trips and frequent waters beyond 12 miles out to the limits of the Exclusive Economic Zone (EEZ). A separate Lobster Management Area (LMA 3) was created for these larger multi-day trip lobster vessels because this fleet is unique in its scale of operation (i.e., vessel size, crew size, trip length, and distance fished from shore). Since 1999, participation in the LMA 3 fishery has been limited and reduced by NOAA National Marine Fisheries Service (NMFS) through a limited entry system and individual, vessel-specific trap limits that are based on the vessel's fishing history. In subsequent years, trap allocations have also been reduced in LMA 3 for conservation purposes by 25% on a per-permit basis. As a result of these management actions, the amount of fishing in LMA 3 is comparatively low and has been substantially reduced with no potential for increases. In total, 123 permit holders and approximately 108,000 traps are allocated for LMA 3 that extends from the Canadian Border south to waters off Virginia. Further, LMA 1 has more dense lobster fishery activity—the trap density in LMA 1 is approximately 122 traps/mile^2 while the trap density in LMA 3 is 8 traps/mile^2. Lobster fishing decreases with distance from shore and specifically within LMA 3. Potential conflict with the lobster industry would be reduced if WEAs were sited in the easternmost portions of LMA 1, east of the Western Gulf of Maine HMA, and within LMA 3 (refer to attached map). BOEM should consider this pattern of lobster fishing activity as the planning and leasing process continues.

Although marine spatial data for the Gulf of Maine are robust, there are maritime uses and species for which a reliable and data-driven understanding of their spatial footprints requires further development and analysis. Some work is already underway to fill known data gaps. Vessel tracking on lobster vessels will be required for all federal permit holders by the end of 2023 (MA will require the same beginning in May 2023); additional aerial surveys targeted at North Atlantic right whales have begun in the Gulf of Maine RFI area; seafloor mapping to 24 nm is nearing completion; and tracking of avian species across the Gulf of Maine is ongoing. We recommend that BOEM continue to coordinate with states, federal agencies, and other stakeholders to gather and analyze data to incorporate into the planning and leasing for offshore wind. Further, with these and other data and supplemented by expert input, we suggest that BOEM identify and avoid the following areas in the siting of offshore wind in the Gulf of Maine.

- Areas of high-density fishing activity and value across fishing sectors and inclusive of all state fishing fleets
- Areas of dense concentrations of large whales, especially the North Atlantic right whale and other endangered whales[6]
- Priority migration corridors and nesting, staging and foraging areas for federal and state endangered and threatened avian species

As a new technology, there is some uncertainty surrounding the implementation of floating offshore wind technology and compatibility with existing maritime uses including fixed and mobile fishing gear as well as marine habitats and species including large mammals. We recommend that BOEM solicit information from developers and industry leaders on the emerging technology and lessons learned from Europe and Asia where demonstration and early commercial stage floating wind projects have been deployed. Specifically, information relating to the potential interactions between floating wind platforms and cables with fishing activity; offshore floating array orientation, spacing and configuration to minimize impacts on maritime navigation and fishing activity; and the implementation of floating platform substructure designs, tethering, and cabling to minimize impacts to seafloor habitats while advancing opportunities to enhance habitats.

The offshore wind developers and their equipment suppliers are likely to have the best available information about the evolution of technologies and implementation techniques associated with floating wind energy projects. Thus, we suggest that BOEM seek information from offshore wind developers relating to the placement of WEAs relative to distance from shore and proximity to ports and interconnection points.

Given that information regarding the location of some existing resources and uses is still under development (e.g., aerial whale sightings, avian migration corridors and foraging areas, lobster fishery activity) and given the vital importance of the Gulf of Maine to the coastal economies of surrounding states, we recommend that BOEM commit to a data-driven Ecosystem Based Management (EBM) approach to identify areas within the Gulf of Maine with the least conflict with proposed floating offshore wind activities. Such an EBM approach would clearly define the data used to winnow the RFI area, how these layers are considered in relative importance in the geospatial analyses, how priorities are determined, how the interactions between maritime uses is incorporated and would include robust stakeholder involvement from maritime uses and state and federal agencies. Specifically, my agencies have a wealth of knowledge and experience in marine spatial planning in Massachusetts waters and within the Gulf of Maine and should be directly engaged in the development of any such EBM approach.

Request for Competitive Interest

The Commonwealth supports the state of Maine's application to develop a floating wind research array in the Gulf of Maine. The research grant represents an important opportunity to test designs and methods, understand impacts and opportunities, and develop technologies for the emerging floating offshore wind industry. The research grant can be used to support a broad range of research interests from regional and national stakeholders and institutions, which in turn will help advance the floating offshore wind in the United States. We support ensuring that the timeline for the research array would closely align with that for commercial leasing in the Gulf of Maine. However, we

[6] Blue, Fin, Humpback, North Atlantic right, Sei, and Sperm whales are all listed as endangered in Massachusetts.

suggest that BOEM ensures that commercial leasing would not be delayed due to any anticipated or unanticipated timeline or pending research schedules associated with the Maine research array. As with commercial projects, the research array should minimize potential impacts to marine resources, habitats, and users.

The planning for commercial leasing of offshore wind in the Gulf of Maine will require input and participation from those representing the many existing maritime uses, habitats, and species in this incredibly diverse and unique ecosystem. Massachusetts is committed to continuing to work with our stakeholders, ranging from offshore wind technology developers, environmental non-governmental organizations, commercial and recreational fishing industry representatives, scientists, and others to gather the best available data and information to inform BOEM's planning for the Gulf of Maine. We also commit to working across the Gulf of Maine to consider and incorporate inter-state perspectives and interests.

Further, Massachusetts sincerely appreciates the ongoing collaborative efforts among the states of Maine, New Hampshire, and Massachusetts regarding shared interests in planning for offshore wind in the Gulf of Maine and we look forward to continuing our joint efforts in supporting BOEM as the process moves forward. We also appreciate the joint efforts of the six New England states and federal agencies in developing a joint transmission development framework that will support the long-term goals to advance the integration of necessary clean energy, including offshore wind. That effort will be a necessary component in the successful deployment of offshore wind.

Thank you for the opportunity to provide comments to BOEM on the RFI/RFCI for offshore wind development in the Gulf of Maine. The Commonwealth appreciates BOEM for its expertise in siting energy on the continental shelf and working with the various agencies and entities with an interest in Gulf of Maine resources and uses. My agencies and offices look forward to continuing to work with BOEM, key stakeholders like our commercial fishing operations, other federal agencies and the states of Maine and New Hampshire as the planning process for siting offshore wind in the Gulf of Maine continues.

Sincerely,

Bethany A. Card

Bethany A. Card
Secretary

Attachment: BOEM Gulf of Maine RFI/RFCI map

cc:

James Bennett, David MacDuffee, Luke Feinberg, Bureau of Ocean Energy Management
Marc Sanborn, NH Department of Environmental Services
Dan Burgess, Maine Governor's Energy Office

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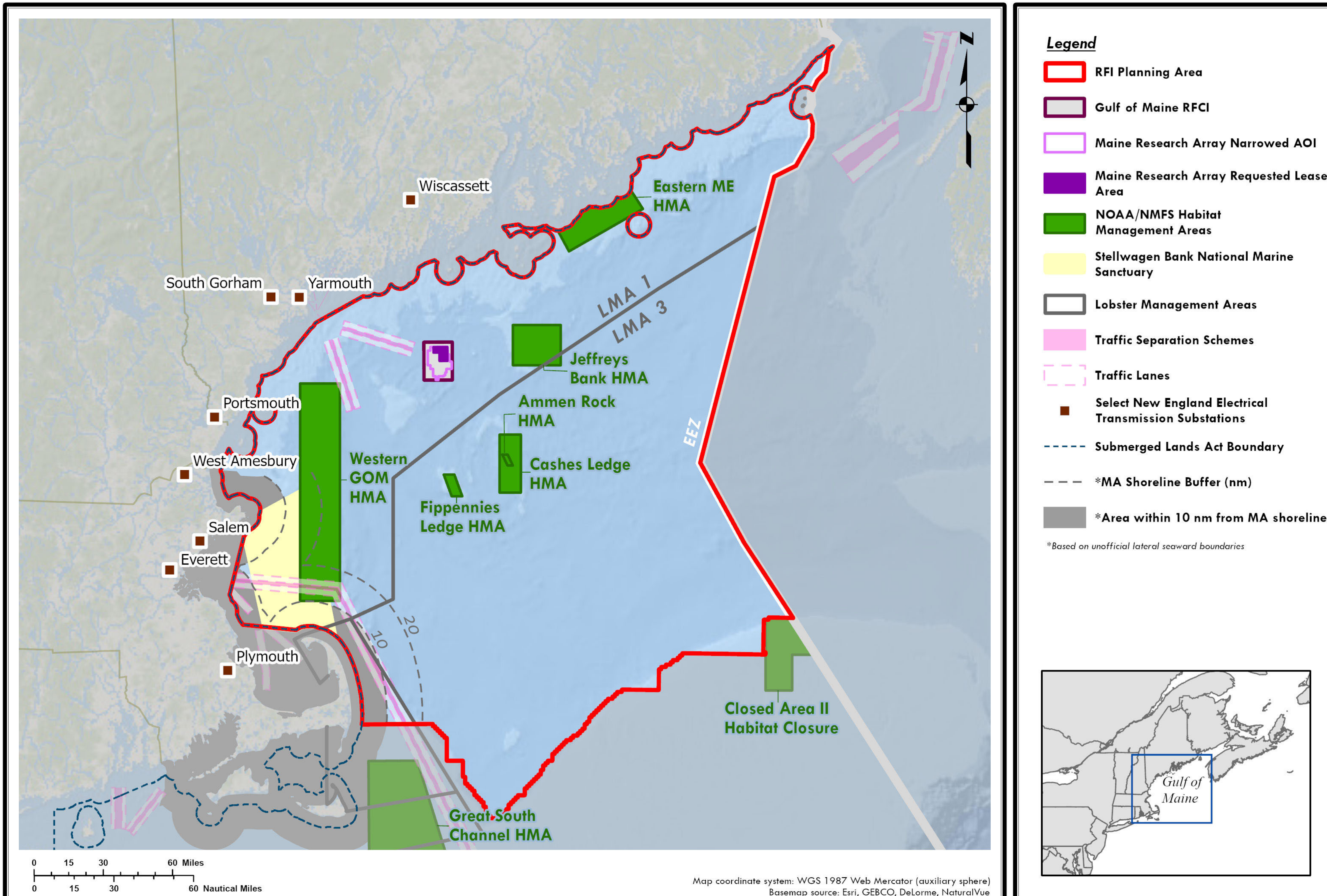

Massachusetts Office of Coastal Zone Management
Executive Office of Energy & Environmental Affairs

10/3/2022

BOEM Gulf of Maine RFI/RFCI

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
Eric Reid, *Chair* | Thomas A. Nies, *Executive Director*

October 3, 2022

Mr. Zachary Jylkka, Bureau of Ocean Energy Management
Office of Renewable Energy Programs
45600 Woodland Road (VAM-OREP)
Sterling, Virginia 20166

Re: Request for Interest in Commercial Leasing on the Gulf of Maine

Dear Mr. Jylkka,

Please accept these comments from the New England Fishery Management Council (Council) regarding the Request for Interest (RFI) in commercial leasing for wind energy development on the Gulf of Maine outer continental shelf.

The New England Council has primary management jurisdiction over 28 marine fishery species in federal waters and is composed of members from Maine to Connecticut. In addition to managing these fisheries, the Council has enacted measures to identify and conserve essential fish habitats (EFH), protect deep sea corals, and sustainably manage forage fisheries. The Council supports policies for U.S. wind energy development and operations that will sustain the health of marine ecosystems and fisheries resources. While the Council recognizes the importance of domestic energy development to U.S. economic security, we note that the marine fisheries throughout New England, including within the Gulf of Maine Request for Information (RFI) Area and in surrounding areas, are profoundly important to the social and economic well-being of communities in the Northeast U.S. and provide numerous benefits to the nation, including domestic food security.

On July 27, the Council requested[1] that BOEM consider developing a programmatic environmental impact statement (PEIS) to support commercial leasing in the region. We acknowledge your September 26 response. Your letter states, "BOEM is best equipped to undertake an EIS analysis when we have adequate information to inform how leases in the area are likely to be developed based on a final lease area size and location and site-specific conditions." Assuming we understand this part of your response correctly, while we would agree that a clearer picture of the magnitude, design, and location of offshore development would enable a more focused PEIS analysis, we remain concerned that collectively, we lack sufficient information about environmental characteristics in some areas of the Gulf of Maine to develop lease areas that balance multiple tradeoffs in the first place. The opportunity to gather additional information to help overcome some of these data limitations is part of the reason we suggested developing a PEIS.

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[1] https://s3.us-east-1.amazonaws.com/nefmc.org/220727_NEFMC-to-BOEM-re-PEIS-for-GOM-Leasing.pdf

We still believe that a PEIS for the Gulf of Maine Planning Area will support a more inclusive, collaborative, and transparent planning effort. A PEIS would help BOEM and ocean users better understand the risks and cumulative effects of offshore wind development on important resources. These resources are diverse, and include fishing communities and their cultural heritages, fishing and shoreside businesses with portfolios located entirely or largely within the Gulf of Maine, commercial and recreational fishery species, deep-sea corals and other sensitive and vulnerable habitats, and endangered/protected species and their designated critical habitat (e.g., North Atlantic right whale, Atlantic salmon, Atlantic sturgeon, sea turtles). Completing a PEIS prior to identifying WEAs would provide increased transparency and a more thorough review of how potential impacts are identified and evaluated when considering offshore wind development in the Gulf of Maine. It is crucial for all stakeholders, especially those likely to be impacted by offshore wind development, to fully understand the types of projects that may be developed as well as any expected impacts.

Acknowledging Ms. Baker's September 26 response, we agree it is possible that these issues could be addressed through an alternative mechanism, for example via a stakeholder process around spatial planning analyses, combined with engagement through the Gulf of Maine Intergovernmental Renewable Energy Taskforce and the state of Maine's Offshore Wind Roadmap process. Regardless of the mechanism, inclusive, detailed planning will take time. A transparent process is critical to ensure confidence in the development of offshore wind in the GOM. Careful siting analysis and leasing is extremely important for mitigating impacts on other ocean users and resources.

An important overarching question, which should be addressed through the GOM Taskforce, is how much renewable energy can and should be generated from these lease areas. This overall goal, combined with assumptions about turbine capacity and array spacing and design, is essential for determining the size of the areas that need to be leased through the current opportunity. Input from the states is important in making this determination. For example, the state of Maine is in the process of adjusting its 2009 goal of 5 GW[2]. This topic is well suited for exploration in a PEIS but can and should be considered through the Task Force as well. BOEM does not need to lease enough area to address all state goals through this first opportunity. It is possible, and we suggest desirable, given uncertainties in environmental data, to conduct leasing in the Gulf of Maine through multiple leasing opportunities.

The RFI area is enormous. It will be easier for the Council and other stakeholders to provide a more thorough analysis of a smaller candidate area or areas. To help narrow down the locations for which we need to provide input, including fisheries data, it would be helpful to first understand from potential wind developers where the wind resource is and what types of terrains, depths, habitats, and distances from shore are suitable construction. Also, it appears likely that developers may be restricted by where they are able to bring power to shore and by how much power offtake is possible given the current electrical grid and competition from other projects and other states. We assume this sort of feedback will come out of this RFI comment period, and

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2
https://www.maine.gov/energy/initiatives/offshorewind#:~:text=Offshore%20wind%20is%20one%20of,of%20offshore%20wind%20by%202030

it will be important to communicate findings with fisheries stakeholders and other ocean users through the taskforce process.

Timing-related concerns and the research array

The Council has repeatedly expressed concerns over the pace and number of offshore wind projects in development along the Atlantic coast. The speed of this process makes it difficult to conduct a thorough analysis of potential individual and cumulative impacts and provide informed recommendations to BOEM on behalf of the individuals and resources we manage. The Council is concerned that the commercial leasing process for the Gulf of Maine will not be adequately informed by development of the state of Maine's research array. The timelines for these two efforts overlap, making it difficult for us to understand how information gathered from the research array could be used to inform site selection or project design for commercial development. Learning from the research array will be important given that there is less experience worldwide with floating wind technology and only floating foundations are being considered in the GOM. We expect that floating wind arrays will have different impacts on natural resources and other ocean users compared to fixed arrays.

Comments on BOEM's data inventory

We appreciate that BOEM compiled and made publicly available the data inventory that is being considered as part of the GOM commercial planning and leasing process.

Regarding the fisheries data, we offer the following comments:

- The data are outdated (e.g., 2011-2015). It will be important to use a time series of data that includes the most recent data available. This has implications for many fisheries, especially those where catch volumes or fishing areas have shifted since 2015. For example, scallop fishing in specific parts of the Northern Gulf of Maine management area has become very important in the past few years, and fishing locations have changed through time. It would be helpful to understand how frequently the data being used for GOM planning and leasing will be updated and if there are opportunities for stakeholders to provide any data that become available throughout the planning process (published and ongoing research results). We are aware that Maine is working with the Northeast Regional Ocean Council and partners to update some of these data sets for use in offshore wind planning. We encourage BOEM to work with Maine to understand the scope and timing of these efforts, and to use these data for planning once available.
- Not all fisheries use Vessel Monitoring Systems (VMS) and Vessel Trip Reports (VTR), thus, it is important to include both data sources (e.g., monkfish, skates, and lobster are not required to have VMS if the vessels do not have other federal permits that require VMS; HMS-only vessels are not required to submit VTRs). If a vessel's only federal permit is for lobster, the vessel might not be represented in either data set and an electronic tracker mandate to collect and transmit spatial lobster data does not go into effect until the end of 2023. Lobster is a major fishery throughout many areas of the Gulf of Maine, thus, it will be important to ensure BOEM work with NMFS and the state of Maine to identify areas of high lobster fishing activity. We understand that updates to lobster effort data are also part of Maine and NROC's work.

- We suggest enhancing the inventory with a description of what specifically will be included from each of the datasets. For example, will species be identified, in addition to fishery management plan and gear type? It is important to understand which species will likely be impacted by wind development in GOM.
- The data do not seem comprehensive. We need to develop a shared understanding of who fishes where, for what species and with what gear types to adequately evaluate where lease areas should be identified for potential development. For example, in addition to Atlantic bluefin tuna, there are other highly migratory species to consider as part of the data inventory including swordfish, billfish, and sharks along with other gear types that are used within the GOM (e.g., purse seine and handline). We recommend consulting with NMFS on additional fisheries and gear types to include to ensure an exhaustive data inventory list.

Regarding habitat data:

- Once the habitat suitability model results from the Northeast Regional Habitat Assessment (NRHA) are finalized, the data outputs should be incorporated in the data inventory. These models will show which locations serve as suitable habitat for a variety of managed fish species and identify environmental variables that drive their distribution. Results from the assessment will be shared via the NRHA Data Explorer later this year: https://nrha.shinyapps.io/dataexplorer/#!/. We provide additional comments about habitat data and uncertainty below.

Regarding Industry, Transport, and Navigation data:

- The Council is unclear how the USCG's GOM Port Access Route Study will be incorporated to inform planning in the Planning Area, given that it is being completed concurrent with this leasing process. The location of traffic lanes with respect to planning areas is an important consideration for BOEM, as blocks overlapping the traffic lanes out of Boston and Portland have already been removed from consideration.

Other data-related comments:

The RFI states that BOEM will incorporate ecosystem-based spatial models in planning. For the Council to make specific suggestions for models to consider, it would be helpful if BOEM provided details on these ecosystem models, including study objectives. Is the intention to use these models to prioritize competing uses, identify ecologically important areas for one or more species, document oceanographic features, or something else? If certain data and/or areas are prioritized and weighted differently than other areas, we recommend making the weighting scheme publicly available, transparent, and open for public comment opportunities. It will also be important to make sure any data inputs to models are updated and compiled in a transparent manner given the model outputs are highly reliant on the data inputs.

Assuming BOEM plans to work with National Centers for Coastal Ocean Science (NCCOS) to develop spatial models useful for identifying lower conflict areas, it will be important to ensure completeness of data layers. The weighting of these various data layers is also important as this directly influences the suitability score of a particular area relative to another area. The weights should be developed in an open and transparent process with stakeholder input such that it is clear if and to what extent any data category is receiving a higher weighting for areas to avoid wind siting (e.g., critical species and habitats such as whales and sea turtles).

We have commented in the past about our concerns that wind development will hinder or preclude fisheries independent surveys, which are essential for stock assessment and understanding ecosystem conditions. We know that BOEM and NOAA Fisheries are working to identify and mitigate survey impacts. Any evaluations of wind leasing in the Gulf of Maine must thoroughly consider these issues.

Incompatible areas; including fisheries and habitat considerations

The Council regularly recommends avoiding areas with complex habitat, per the 2021 Council's Offshore Wind Energy Policy. In the offshore portions of the Gulf of Maine, these habitats tend to occur on shallower banks and ledges, for example Jeffreys Ledge, Cashes Ledge, Fippennies Ledge, Platts Bank, and Jeffreys Bank. Many of these features are designated by the Council as Habitat Management Areas, closure areas to protect groundfish species, Dedicated Habitat Research Areas, or Habitat Areas of Particular Concern. Avoiding these management areas for offshore wind siting is also a recommendation made by Maine's fisheries task force working group. Complex habitats are relatively common inshore and overlap sections of the planning area. We suggest using Barnhardt et al. (1998) substrate maps for Maine coast[3] and data from Massachusetts state waters (Sediment and Geology Workgroup, 2021) to understand where complex habitats occur adjacent and inshore of the planning area[4]. The forthcoming Seascape product which presents a CMECS classification of seabed features should also be considered. As the RFI area is narrowed to discrete Wind Energy Areas, the Council recommends mapping and characterizing all benthic habitats following NOAA's recommendations.

The Council also recommends that BOEM not locate wind energy areas in locations where deep-sea corals are known or likely to occur, particularly where they are found in high abundances, sometimes referred to as "coral gardens". Via our Deep-Sea Coral Amendment, the Council designated two areas as Deep-Sea Coral Protection Areas in the Gulf of Maine, Outer Schoodic Ridge and Mt. Desert Rock. These designations were implemented by NOAA Fisheries in July 2021. Also, through this amendment, an area in Jordan Basin referred to as "114 Fathom Bump" was designated by the Council as a Dedicated Habitat Research Area. Dense aggregations of deep-sea corals occur in at least three other locations in Jordan Basin, specifically at areas referred to as "96 Fathom Bump", "118 Fathom Bump", and further east along the EEZ boundary in the central portion of the basin. Coral habitats also occur in Georges Basin, specifically at a site charted as Lindenkohl Knoll. All these areas were considered by the Council as potential Deep-Sea Coral Protection Zones, and extensive information about the coral species that occur within them, including descriptions of data supporting the identification of these habitats, is available in the Council's Deep-Sea Coral Amendment document and environmental assessment.[5] An additional site further northeast along the Hague Line from the Central Jordan

[3] Walter A. Barnhardt, Kelley, J. T., Stephen M. Dickson, & Belknap, D. F. (1998). Mapping the Gulf of Maine with Side-Scan Sonar: A New Bottom-Type Classification for Complex Seafloors. Journal of Coastal Research, 14(2), 646–659. http://www.jstor.org/stable/4298818

[4] https://www.mass.gov/files/documents/2021/01/27/sediment-geology-wg-2021.pdf

[5] https://www.nefmc.org/library/omnibus-deep-sea-coral-amendment

Basin area shown on Map 1 was surveyed in 2019, and found to have coral gardens. This dive location is indicated on Map 3.

The Council has designated numerous areas for groundfish management including spawning protection. Some of these fishery closures are in effect year-round (Cashes Ledge, Western Gulf of Maine, Closed Area II) and others restrict fishing seasonally to minimize the effects of fishing-related disturbance and removals on species including Atlantic cod (GOM Cod Spawning Protection Area, Massachusetts Bay Cod Spawning Protection Area) or cod and haddock (Closed Area II Spawning Closure, and Closed Area I Spawning Closure). Dedicated Habitat Research Areas are intended to promote scientific studies related to habitat resilience and production. Many sites including Jeffreys Ledge and Stellwagen Bank in the western Gulf of Maine, Cashes Ledge/Cashes Basin, and eastern Georges Bank address multiple objectives and are managed for different purposes, with overlapping designations and regulations. Council managed areas are summarized on Map 1.

The northern flank and northern edge of Georges Bank are important fishing grounds and are also designated as Habitat Management and groundfish closure and spawning areas. The bank drops off steeply between depths of approximately 70 meters to around 140 meters. We are concerned that the RFI area extends up onto Georges Bank. We suggest eliminating portions of the RFI that include this edge, which is outlined on Map 1

The Council also recommends that BOEM avoid locating wind energy areas in areas with high fishing activity measured in terms of total revenue, total landings, and vessel traffic patterns. This is also a recommendation made by Maine's fisheries taskforce, which suggested avoiding fishing hot spots identified by VMS and stakeholder groups. Overall, we recommend avoiding areas of high fishing activity to reduce overall impacts. Based on NOAA Fisheries' analysis of the RFI area, the most impacted species in terms of revenue found within the Gulf of Maine RFI Area (> $100 million) include American lobster, sea scallop, Atlantic herring, cod, pollock, and haddock. The most impacted species in terms of total landings from the RFI Area (>65 million pounds) include Atlantic herring, pollock, American lobster, redfish, haddock, and cod. We note that fishing for redfish often occurs in specific exemption areas. Further analysis will be needed to avoid and minimize impacts to these economically important species.

From a vessel traffic pattern perspective, the Council urges BOEM to not rely on only Automatic Identification System (AIS) data to evaluate vessel traffic patterns and for access to principal ports within the study area. Not every fishing vessel has AIS, including many small vessels fishing in the Gulf of Maine region. Other data sources to include in identification of vessel traffic patterns are Vessel Monitoring System (VMS) and Vessel Trip Reports (VTR) databases. Like AIS, not every vessel has a VMS unit on board and not every vessel submits a VTR, thus, AIS, VMS, and VTR data sources should be examined together to gain a more comprehensive understanding of vessel traffic patterns.

The wind energy area development process must acknowledge areas of uncertainty in habitat and fisheries data. For example, outside of coastal areas, some shallower features offshore, and selected areas surveyed for deep-sea corals, sediment data in the Gulf of Maine are sparse. The Council has developed a model to estimate the distribution of fishing impacts to habitat in space and time (NEFMC 2020)[6]. To support this effort, we compiled seafloor sediment data from various sources, with U.S. Geological Survey's usSEABED and University of Massachusetts Dartmouth School for Marine Science and Technology drop camera survey databases as our primary sources. At the 5 km x 5 km resolution used for our model, many grids have no sediment data points (hollow grids; Map 2), or only one data point (light grey grids; Map 2).

As another example, we are still learning about the seafloor terrain and associated deep-sea corals in Jordan Basin. Higher resolution data (see Map 3, left panel, with 20-meter bathymetry) enables identification of terrain features that are not clearly visible in lower resolution charts (see Map 3, right panel, with 3 arc second bathymetry; 3 arc seconds represents approximately 67 meters at 43° 30' N). These features in Jordan Basin are sizeable and have approximately 20 to 25-meter relief above the basin floor. They support complex coral communities (black dots), and more sparsely distributed corals (grey dots). The Council's Deep-Sea Coral Amendment explores these data in detail. Other sites were surveyed but corals were not observed (white dots). We suggest that sites with documented corals, and those with similar terrain features, are incompatible with offshore energy development. At this time, only a small portion of Jordan Basin is mapped at this resolution, such that additional sites may exist but are not currently mapped. In general, the Council supports the development of high-resolution bathymetric maps for areas of the EEZ where seafloor terrain is poorly understood. The 2012 NOAA-BOEM ACUMEN project, for example, resulted in 25-meter resolution bathymetric maps of the canyons. These maps were fundamental to our development of coral management areas for the canyons south of Georges Bank, and similar mapping should be prioritized for the Gulf of Maine.

Cumulative impacts

Cumulative impacts and risks need to be evaluated across ecosystem components, fishing fleets, and other ocean uses. Climate change will also be an essential consideration in the cumulative effects analysis as the distributions and abundance of many species are changing due to climate change and other factors.

We continue to have significant concerns about the cumulative impacts of offshore wind development on fishery independent surveys. Major negative impacts to these surveys would translate into greater uncertainty in stock assessments, the potential for more conservative fisheries management measures, and resulting impacts on fishery participants and communities. We are encouraged by BOEM's commitment to working with NOAA on long term solutions to this challenge through the regional, programmatic, Federal Survey Mitigation Program, described in the Record of Decision for the Vineyard Wind 1 project.

Conclusion

A deliberate, open, and information-driven process for commercial wind leasing and development in the Gulf of Maine is essential. The wind energy area siting phase for any region, including the Gulf of Maine, represents a critical early opportunity for avoiding impacts through

[6] https://s3.us-east-1.amazonaws.com/nefmc.org/Fishing_Effects_Northeast_Report_edited-May-22-2020.pdf

scaling development appropriately and locating development areas in locations that will limit effects on resources and users. We appreciate the opportunity to provide comments to ensure that issues of social and ecological importance are considered during the Gulf of Maine commercial leasing process. We also look forward to working with BOEM to ensure that any wind development in the Gulf of Maine minimizes impacts on the marine environment and can be developed in a manner that ensures coexistence with our fisheries.

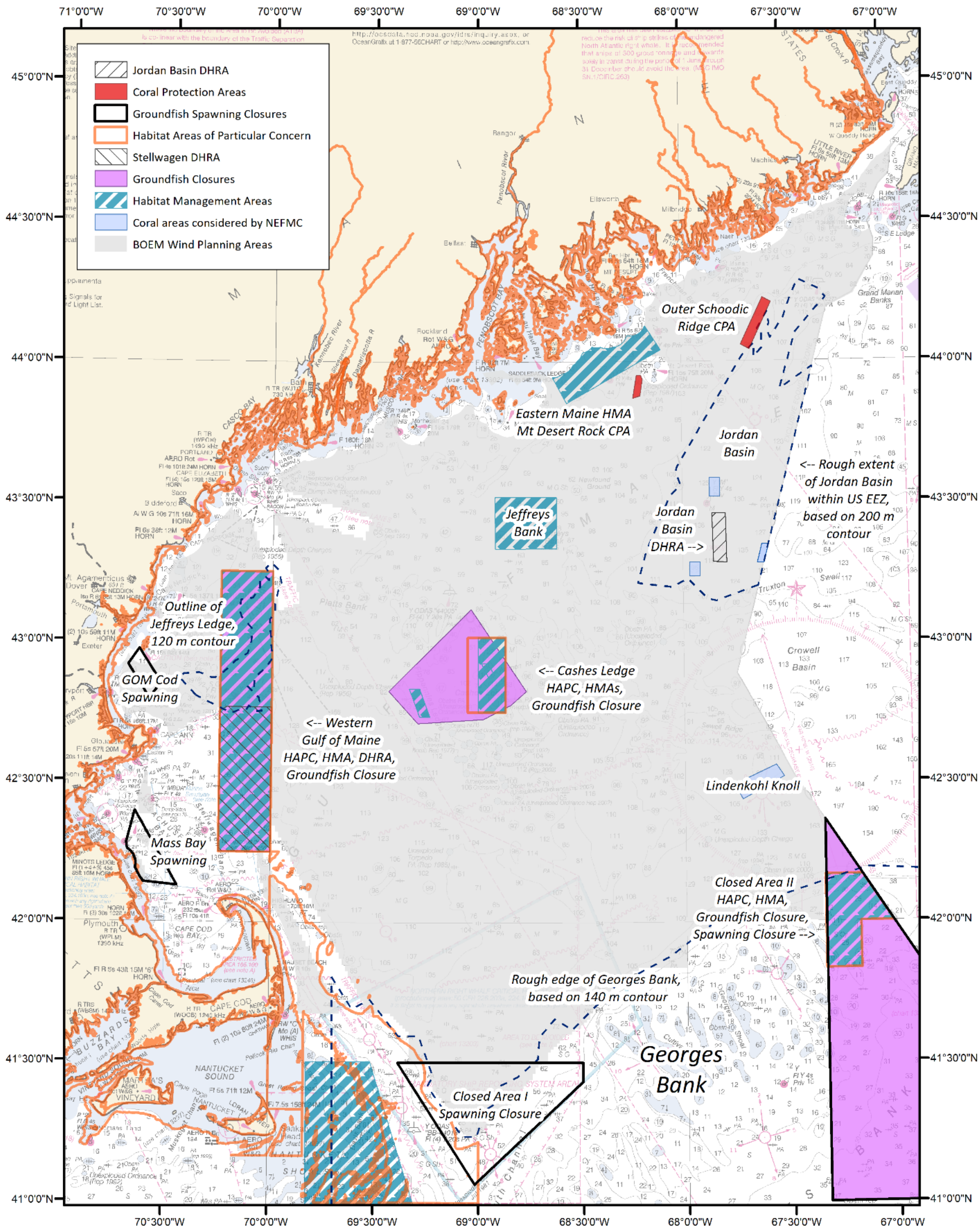
Please contact me if you have any questions.

Sincerely,

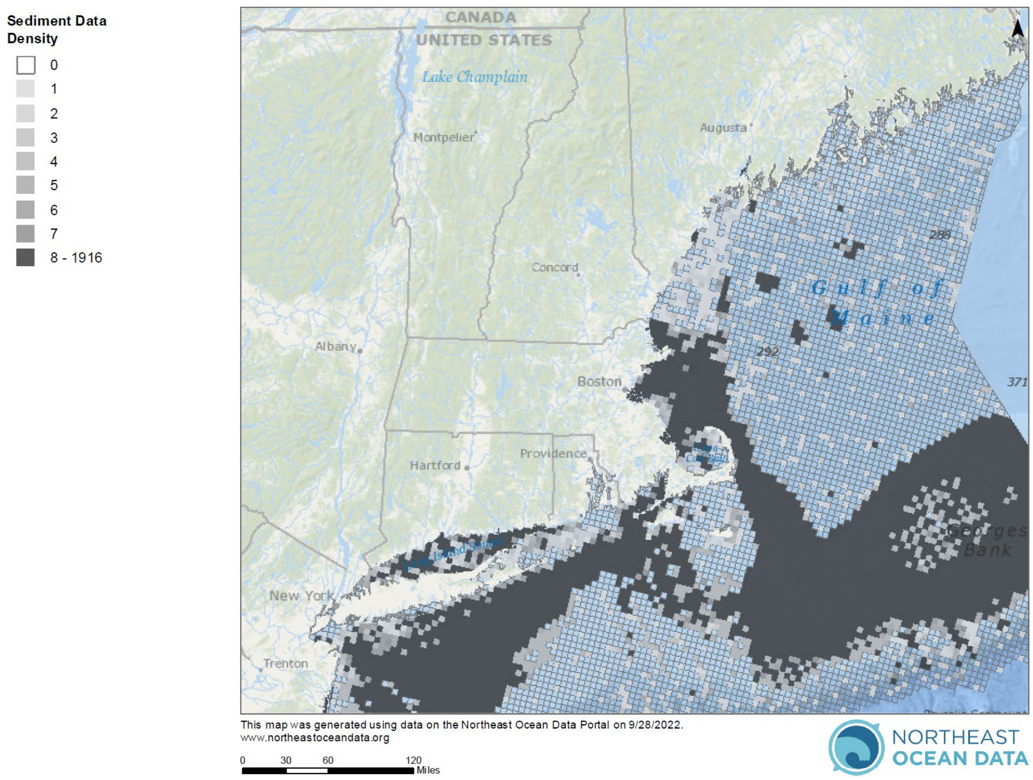
Thomas A. Nies

Thomas A. Nies
Executive Director

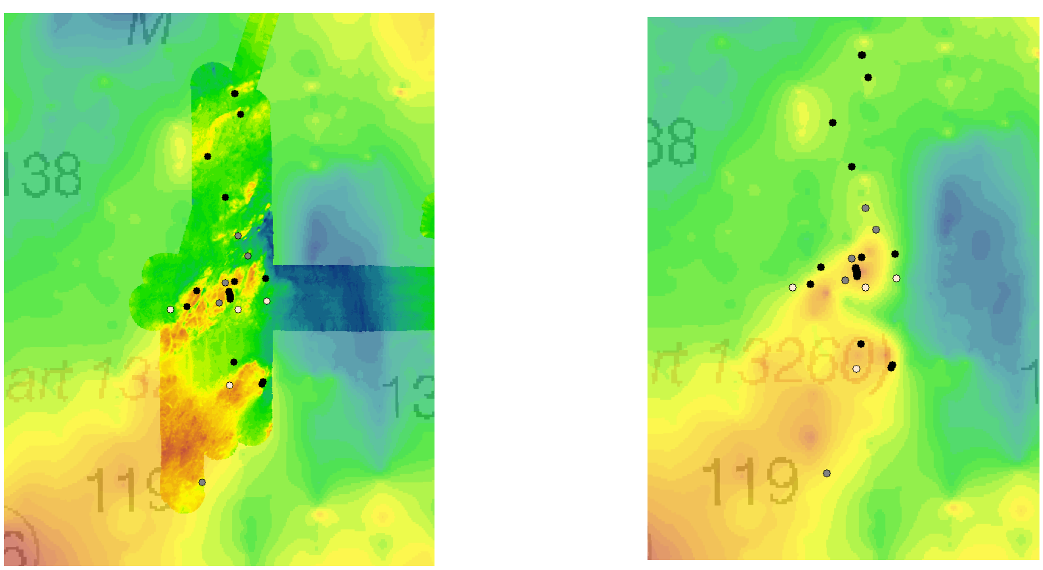
Map 1. NEFMC Habitat Management Areas, Groundfish Closure and Spawning Areas, Dedicated Habitat Research Areas, and Deep-Sea Coral Protection Areas in the Gulf of Maine.



Map 2. Sediment Data Density product developed for the Council's Northeast Fishing Effects Model. Many of the 5x5 km grids in the Gulf of Maine have no sediment point data, as indicated by the hollow grids in the figure below.



Map 3. Comparison of 20-meter and 3 arc second bathymetry data for Jordan Basin, with coral observations shown in black and grey.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

October 3, 2022

Ms. Karen J. Baker
Chief, Office of Renewable Energy Programs
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, VA, 20166

RE: Request for Competitive Interest (RFCI) and Request for Interest (RFI) for possible commercial wind energy leasing on the outer continental shelf (OCS) in the Gulf of Maine, Docket No. BOEM–2022–0041 and Docket No. BOEM–2022–0040

Dear Ms. Baker:

We have reviewed the August 19, 2022, *Federal Register* (FR) Notices requesting information related to possible commercial wind energy leasing in the Gulf of Maine, including a Request for Competitive Interest (RFCI; BOEM-2022-0041) and a Request for Interest (RFI; BOEM-2022-004). The RFCI was issued in response to the State of Maine's proposal for an Outer Continental Shelf (OCS) lease in the Gulf of Maine to conduct wind energy research activities. The RFI was issued to assess interest in, and solicit comments on, possible commercial wind energy leasing on the Gulf of Maine OCS. The comments herein and in the attached appendices are in response to both FR Notices. Please note that initial feedback on leasing in the Gulf of Maine was provided by NOAA's National Marine Fisheries Service (NMFS) at the May 19, 2022, interagency Task Force meeting. As stated at that meeting, we recommend that BOEM first conduct a comprehensive evaluation of all potential impacts to key resources from development of the research lease prior to pursuing any commercial leasing in the Gulf of Maine in order to inform that process.

We appreciate the opportunity to offer information related to NOAA trust resources in the Gulf of Maine, including habitat, protected species, fisheries, and NOAA scientific surveys. We note that there are at least three major differences between the proposed wind energy development in the Gulf of Maine relative to on-going and planned projects along the outer continental shelf south of Massachusetts. First, the ocean environment, habitats, and marine resources of the Gulf of Maine are unique and vary substantially from elsewhere on the East Coast of the United States. Second, the technology proposed for development in the Gulf of Maine -- "floating" wind turbines -- is new and relatively untested, with significant differences in structure, anchoring, and potential impacts on marine environments and resources. And, third, the entirety of the Gulf of Maine planning area is within designated Critical Habitat for the endangered North Atlantic right whale (81 FR 4837; January 27, 2016). Development of offshore wind in this area has the potential to result in significant conflicts with natural resources and existing ocean uses, and sufficient information or analysis does not yet exist to identify suitable areas for commercial development. NMFS recommends that BOEM gather and analyze information related to these issues *before* identifying and offering lease areas for commercial development. Developing the research lease and implementing a robust research and monitoring program prior to engaging the commercial leasing process would provide an opportunity to better inform a future leasing process. Taking advantage of the opportunities to evaluate impacts associated with the development of a research lease would allow BOEM to better understand potential impacts and conflicts and would facilitate a deliberative, science-based approach to identifying potential areas for future commercial leasing in the Gulf of Maine. BOEM's participation in NOAA's Northeast Integrated Ecosystem Assessment (IEA) project for the Gulf of Maine and BOEM's work with NOAA's National Centers for Coastal Ocean Science (NCCOS) to conduct spatial modeling in this region are both important steps to help identify areas suitable for commercial leasing. However, it will also be critical that BOEM consider information gained through the research lease prior to issuing commercial leases in the Gulf of Maine. We expect that this phased approach to development in the Gulf of Maine has the potential to minimize impacts on both our trust resources and existing ocean uses and streamline environmental reviews of future commercial leases.

Resources in the Gulf of Maine

The Gulf of Maine is one of the most diverse and ecologically important regions in the world due to its unique benthic features and oceanographic circulation patterns. Influenced by the Labrador Current and the Gulf Stream, the oceanographic circulation in the Gulf of Maine contributes to highly diverse and productive marine resources, supporting protected species and culturally significant fishery resources within the region. While we provide additional information specific to NOAA trust resources in the RFCI and RFI areas in the attached appendices, below is a list of areas we consider unsuitable for development due to their high ecological value and unique and irreplaceable qualities. It is for that reason that we recommend you consider the following areas for exclusion from commercial leasing:

- *Hard bottom and deep-sea coral habitats*: Sensitive habitats that are vulnerable to permanent impacts from development.
- *Habitat Management Areas*: Areas designated for habitat protection and conservation.
- *Fisheries Closed Areas*: Areas identified for conservation and spawning protection.
- *Deep-sea Coral Research and Protection Areas:* Areas designated for the protection and research of deep-sea corals.
- *Known sensitive habitat features*: There are several named features in the Gulf of Maine that support important high value fisheries, protected species, and sensitive habitats. These areas include, but are not limited to the following features: Cashes Ledge; Jeffreys Ledge; Georges Bank; Wilkinson Basin; Jordan Basin; Platt's Bank; and designated habitat research areas. We recommend BOEM work with NMFS to identify an appropriate set back from these benthic features to account for upwelling or other oceanographic processes that occur as a result of these features.
- *Habitat Areas of Particular Concern*: Designated subsets of Essential Fish Habitat (EFH) that exhibit one or more of the following traits: Rare; stressed by development; provide important ecological functions for federally managed species; or especially vulnerable to anthropogenic degradation.
- *Areas of Substantial Fishery Overlap*: Areas with high concentrations of fishing activity, including transit, should be avoided for future development, including east of Cape Cod,

the Great South Channel, the Northern Edge of Georges Bank, Ipswich Bay, Massachusetts Bay west of Stellwagen Bank, and within 12 miles of the Maine coast.
- *Areas of High Density or Frequent Occurrence of Protected Species*: Areas identified through spatial data to be frequently and consistently used by protected species, with particular consideration given to North Atlantic right whales.

We highlight that the areas identified in the RFCI and RFI almost completely overlap with designated critical habitat for North Atlantic right whales (81 FR 4837; January 27, 2016) but, without more information on the potential effects of offshore wind development on the essential features of the critical habitat, it is difficult to make recommendations regarding which areas could be leased without resulting in the destruction or adverse modification of this habitat. We expect that information from development of the research lease could inform considerations of how to develop other areas of the Gulf of Maine while minimizing effects to critical habitat.

In Appendix A of this letter we provide additional information on NOAA trust resources that may be affected by potential future development in the RFCI and RFI Areas, including habitat resources, protected species, fisheries and fishing communities, and NOAA scientific surveys. Appendix B also includes data collection and monitoring needs for the Gulf of Maine and research topics that we recommend be considered in the State of Maine's research plan for the proposed research array or as part of the conceptual research framework identified in the RFCI. Appendix C includes detailed socioeconomic impact reports for both commercial and party/charter vessel operations in the RFI area.

Recommended Approach for Offshore Wind Leasing in the GOM
As we originally stated in May, we recommend BOEM use the work conducted by the State of Maine through the Offshore Wind Initiative and prioritize issuing a research lease prior to any commercial leasing in the Gulf of Maine. As described above, the Gulf of Maine is a unique area that supports high biodiversity of resources, productive fisheries, and designated critical habitat for the North Atlantic right whale. Development in this area has the potential to result in substantial adverse impacts to marine resources and conflicts with existing ocean users and the communities that depend upon them. A measured and science-based planning approach would provide greater transparency and clarity to the process by better informing the public on potential adverse resource impacts and user conflicts and how to minimize those potential impacts. Further, it is anticipated that novel floating technology will be required for any and all development in this area. Given the significant uncertainty of the impacts this technology will have on fisheries and marine resources, including the North Atlantic right whale, we recommend that BOEM first issue a research lease consistent with the State of Maine's proposal. Through this research lease, BOEM could work with our agency, the states of Maine, New Hampshire, and Massachusetts, and affected stakeholders to develop a robust research plan that can be used to fill in data gaps and inform any future development in the Gulf of Maine prior to any commercial leasing. This approach would complement ongoing efforts by the Northeast Fisheries Science Center (NEFSC) to conduct an integrated ecosystem assessment (IEA) for this area and improve the information base upon which future commercial leasing decisions can be made. This information could then be considered through the preparation of a comprehensive Programmatic Environmental Impact Statement (PEIS) under the National Environmental Policy Act (NEPA) to better inform the process. Consistent with our presentation at the Task Force

meeting, our recommended science-based approach to offshore wind leasing in the Gulf of Maine is as follows:

1. Design and apply ecosystem-based management and marine spatial planning approaches to commercial leasing considerations in the Gulf of Maine;
2. Establish standardized monitoring requirements and collect region-wide baseline research and monitoring data;
3. Design and test performance of pilot-scale floating wind technologies and implement a robust research program to assess the impacts of floating wind technology;
4. Establish and implement a federal survey mitigation program with funds to mitigate impacts on existing and potential future survey efforts; and
5. Establish standardized regional requirements for avoiding, minimizing, and mitigating impacts of offshore wind development.

Appendix B includes additional information specific to each of these recommended steps. Given the uniquely valuable marine resources and potential ocean use conflicts present in this area, NMFS recommends that BOEM take a deliberative, ecosystem-based management approach based on sound science to evaluate and identify areas for leasing in the Gulf of Maine. NMFS and our partners have the capability to employ the highest quality science to help inform BOEM's process for offshore wind leasing. By engaging in that process now, through the execution of a research lease, collection of baseline data, and development of a programmatic analysis in advance of commercial leasing, we can work together to responsibly develop renewable energy in a way that also preserves the valuable resources and ocean uses in this unique environment.

As noted, we recommend BOEM prepare a comprehensive PEIS under NEPA in order to help achieve the objectives of an ecosystem approach to minimizing environmental impacts and ocean use conflicts. The PEIS would guide decision-making to ensure offshore wind development in the Gulf of Maine takes the ecological, cultural, and economic importance of the region into full account. A programmatic analysis would allow BOEM to take a comprehensive look at the region and engage in coordinated and strategic landscape-level planning to generate robust environmental information and alternatives for leasing to avoid or minimize natural resource and ocean use conflicts. BOEM has an early opportunity to broadly analyze a region through a PEIS before lease areas are identified and offered for award. NMFS supports and encourages this approach.

Early Engagement and Enhanced Coordination

The recommendations put forward in this letter and the enclosed appendices are intended to help inform BOEM's approach to commercial lease considerations in the Gulf of Maine. In addition to input from our agency, there are a number of critical stakeholders in the Gulf of Maine that are integral to informing the commercial offshore wind leasing process. NMFS recommends that BOEM engage and coordinate with stakeholders, particularly the fishing industry and affected communities, throughout BOEM's lease planning and accompanying NEPA process, and use their input to better inform the process in order to avoid, minimize, and mitigate impacts to resources and conflicts with ocean users. In addition to soliciting and considering input from affected stakeholders, NMFS recommends that BOEM provide a clear explanation of how that input was considered and incorporated into any decisions. Given the many ongoing and overlapping projects that are occurring in the Northeast region, each of which requires stakeholder engagement and comments, we recommend BOEM consider how these requests for feedback may overlap and the logistical and practical implications of how that may affect not only stakeholders' abilities to meaningfully engage, but also BOEM's ability to gain meaningful input from potentially affected parties. Taking the time for a deliberative, stakeholder-involved, science-based approach to offshore wind development in the Gulf of Maine will be critical to ensuring the success of future leasing and development activities.

Conclusion
As a science agency, we recognize the urgent need to mitigate climate change, and we support the Administration's goal of deploying offshore wind energy while also protecting biodiversity and promoting ocean co-use. It is crucial that we succeed in all elements of this goal and, thus, we need to fully evaluate and address the impacts associated with large scale development of the OCS. We must work to ensure planning and development is conducted in a responsible manner, with the benefit of scientific information to better inform decision makers and the public of how to avoid and minimize adverse impacts to marine resources and to reduce conflict with ocean uses and communities that rely on these areas for their livelihood. We recommend that BOEM conduct a robust and comprehensive scientific analysis for area identification and selection in consideration of the issues discussed above and prepare a PEIS to inform the commercial leasing process. The goal of such an effort would be to avoid and minimize adverse impacts on NOAA trust resources early in the process, and before developers are economically tied to specific locations.

We appreciate the opportunity to comment and look forward to seeing how you address the comments and recommendations put forward in this letter and the enclosed appendices. Should you have any questions regarding these comments, please contact Sue Tuxbury in our Habitat and Ecosystem Services Division at (978) 281-9176 or susan.tuxbury@noaa.gov.

Sincerely,

Michael Pentony
Regional Administrator

cc: Zachary Jylkka, BOEM
David Macduffee, BOEM
Brian Hooker, BOEM
Brian Krevor, BOEM
Jessica Stromberg, BOEM
Naomi Handell, USACE NAD
Tammy Turley, USACE NAE
Ruthann Brien, USACE, NAE
Christine, Jacek, USACE, NAE
David Simmons, FWS

Audrey Mayer, FWS
Tim Timmerman, EPA
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George Detweiler, USCG
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Dan Burgess, MEGEO
Meredith Mendelson, MEDMR
Mark Sanborn, NHDES
Cheri Patterson, NHFG
Dan McKiernan, MADMF
Lisa Engler, MACZM
Jeffery Willis, RICRMC
Julia Livermore, RIDEM

APPENDIX A
NOAA Trust Resources in the Gulf of Maine

Request for Competitive Interest (RFCI) Area

BOEM has published a Request for Competitive Interest (RFCI) in the Gulf of Maine in response to their receipt of an application for a renewable energy research lease (Research Array) in October 2021 from the State of Maine, Governor's Office of Policy Innovation and the Future. The application covers an area of approximately 9,700 acres about 20 nautical miles (nm) offshore the coast of Maine and would consist of up to 12 floating offshore wind turbines capable of generating up to 144 megawatts (MW) of energy. While the proposed RFCI area is larger than the proposed Research Array, BOEM has determined that only one project, approximately the size of the proposed Research Array, and no more than 12 floating turbines, could be accommodated in the RFCI area.

Comments provided below include information related to habitat, protected species, fisheries and scientific surveys within the RFCI area. Appendix B includes recommended research topics for consideration in the State of Maine's research plan for the proposed research array or as part of the conceptual research framework identified in the RFCI.

Habitat Resources

There are several benthic habitat types that may occur in the RFCI area, including rocky habitats, biogenic mud habitats, and deep-sea corals. The RFCI area is located in deep water (approximately 160-190 meters) in the central Gulf of Maine about 40 miles southeast of Portland, Maine, 15 miles northeast of Platts Bank, and 2-5 miles northwest of Three Dory Ridge. This area is generally characterized as flat with benthic features including depressions, flats and slopes. There is limited habitat data for this area, but based on the location of the RFCI and adjacent USeaBed point data, we would expect this area to include mud, gravel mixes, and other rocky habitats. These habitats may also support deep-sea corals and other epifauna that are highly vulnerable to disturbance, however there is currently no information available on the presence or absence of these habitat features within the RFCI. Habitats in the RFCI are designated as Essential Fish Habitat for several commercially important fish species including Atlantic cod, monkfish, haddock, witch flounder, white and silver hake, redfish, and American plaice.

Habitat mapping and characterization of the seafloor within the RFCI area will be necessary to determine what habitats are present and how the development of a research lease could be deployed in a manner that avoids impacts to vulnerable habitats, such as rocky habitats, slopes, or deep-sea corals. We have developed recommendations for mapping fish habitat[1] which focus on using acoustic survey data to identify benthic features (e.g., sand waves and areas of high vertical relief) and delineate areas based upon varying acoustic returns where targeted benthic sampling is needed to characterize the seafloor habitat within each acoustically derived

[1] Recommendations for Mapping Fish Habitat (March 2021) can be found on our website at https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null

delineation. These recommendations should be used to develop a site specific benthic habitat mapping plan and data should be collected prior to finalizing any development plan to ensure steps can be taken to properly site a research project that avoids and minimizes impacts to sensitive habitats. Site specific surveys will be necessary to locate and identify sensitive, complex habitats in the RFCI area. Benthic surveys should incorporate a substantial number of sampling stations and station sample replicates to help determine the presence or absence of deep-sea corals, as they are not detectable with acoustic data. In addition to the collection of still imagery, the benthic survey should include the use of video transects located throughout the RFCI to aid in identifying areas that support deep-sea corals. We recommend that the RFCI area be fully mapped and characterized at the early project planning stage to determine if rocky and/or coral habitats are present so they can be avoided.

The RFCI area extends beyond an area identified by the State of Maine through their Roadmap process. The expanded RFCI area, which encompasses the State of Maine's proposal and "narrowed area of interest", likely creates conflict with more vulnerable rocky habitats and benthic features. Due to the expansion, the western and northern extents of the RFCI area now overlap with areas of higher slope and rougher terrain and the southeast corner may include slopes and shallower rocky habitats extending to the northwest from Three Dory Ridge.[2] Locating the lease adjacent to Three Dory Ridge may also result in overlap with areas of upwelling and high biodiversity that occur due to the presence of these benthic features. The preferred site identified by the State of Maine's Roadmap process appears to reduce overlap with these features and we expect the further out in any direction the research lease is moved, the more likely it will conflict with more complex, vulnerable habitats. We recommend that BOEM reduce the size of the RFCI area to avoid sensitive habitats.

In summary, we recommend the following to help avoid impacts to sensitive habitats from development in the RFCI area:

- The RFCI area should be fully mapped and characterized at the early project planning stage to determine if rocky and/or coral habitats are present so they can be avoided.
- The size of the RFCI area should be reduced to be consistent with the State of Maine's "narrow area of interest" to avoid and minimize overlap with sensitive habitats.

Protected Resources

Please see comments provided below under the heading of *Protected Resources in the RFI Area* for complete information on the protected species and critical habitat that occur in the larger Gulf of Maine area. All of the same species may occur in the RFCI area. The entirety of the RFCI Area is used by a number of protected species and is designated as critical habitat for the endangered North Atlantic right whale. It is our view that issuing a research lease and the resulting development of a small project in this area and implementation of a robust monitoring program, provides a valuable opportunity to gather data to better inform the identification of areas for future commercial leasing. Information gathered at the research lease could facilitate identification of future lease areas that would avoid or minimize adverse effects to protected

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[2] See Figures 20-23 in the Maine Research Array Siting Information Report.pdf showing bathymetry, slope, and bottom roughness in and adjacent to the state's Narrowed Area of Interest.

species and designated critical habitat. We also note that, consistent with the conclusions reached by the State of Maine, the State's proposed research lease "avoids the areas of greater baleen whale abundance further southwest along ledge and bank, suggesting a likely lower potential risk in the narrowed area as compared to other areas of the AOI [Area of Interest]." We support identification of a research lease that is consistent with the geographic scope identified by the State of Maine.

Fisheries Resources

NMFS staff participated in the Maine's Offshore Wind Roadmap process, including providing information on fisheries that operate in the area and data sources that could help narrow the original area of interest considered by the State of Maine. NMFS staff did not have sufficient time to quantitatively evaluate fisheries resources within the proposed RFCI area. However, available vessel monitoring system (VMS) and survey data suggest that the northeast multispecies (groundfish) and herring fisheries primarily overlap with the RFCI area (see Figures 6 and 7 below). Communications with fishing industry representatives also suggest that this area overlaps with the bluefin tuna fishery. Due to the limited information on lobster and tuna fishery operations along the Maine coast available in federal vessel trip report (VTR) and VMS data, we recommend BOEM consult with staff from the State of Maine and fishing industry representatives. Information received directly from these stakeholders may provide for a more accurate characterization of those fisheries and their overlap with the RFCI area.

Request for Interest (RFI) Area

BOEM published the Request for Interest (RFI) as a preliminary step in determining potential interest in offshore wind development in the Gulf of Maine. The RFI Area consists of 13,713,825 acres located off the coasts of Massachusetts, New Hampshire, and Maine and covers most of the OCS within the Gulf of Maine with the exception of Stellwagen Bank National Marine Sanctuary, existing traffic separation schemes, and the RFCI area. BOEM is requesting comments and information from potential developers, interested and affected stakeholders and the public, including information related to commercial and recreational fishing, socioeconomics, protected species and habitat. Comments provided herein include information related to habitat, protected species, fisheries, and scientific surveys within the RFI area.

Habitat Resources

Overview

The Gulf of Maine is a glacially-derived enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotia (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank. It is characterized by relatively cold waters and deep basins, with a patchwork of various sediment types, topographically diverse from the rest of the continental border along the U.S. Atlantic coast. The geologic features of the Gulf of Maine, coupled with the vertical variation in water properties (e.g., salinity, depth, temperature), provide a great diversity of habitat types that support a rich biological community.

There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 250 m, with a maximum depth of 350 m in Georges Basin, just north of Georges Bank. High points include irregular hard bottom ridges, such as Cashes Ledge, which peaks at 9 m below the surface, and topographically high hard bottom "bumps" in western Jordan Basin. Benthic epifauna on these hard bottom areas includes deep-sea corals, sponges, attached anemones, tunicates, bryozoans, and hydroids. Very fine sediments occur in thick deposits over much of the seafloor, particularly in its deep basins. Unique epifaunal and infaunal invertebrate communities are found on and in the soft sediments, including, ophiuroids (brittlestars), tube building amphipods, burrowing anemones (cerianthids), sea pens, polychaete worms, and infaunal mollusks.

The coastal area includes eelgrass, shellfish habitats, and rocky habitats essential for the growth and survival of critical life history stages of fish. Eelgrass and rocky habitats are identified as habitats of particular concern for juvenile Atlantic cod between the high tide line and a depth of 20 meters along the entire coast (see Figure 4). Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a water depth of about 197 ft. (60 m). Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 66 - 131 ft. (20 - 40 m), except off eastern Maine where a gravel-covered plain exists to depths of at least 328 ft. (100 m). Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches. Stellwagen Bank offshore Massachusetts includes large areas of sand sediment, in addition to gravel sediments and boulder ridges.

The Northeast Channel between Georges Bank and Browns Bank leads into Georges Basin, and is one of the primary avenues for water exchange between the Gulf of Maine and Atlantic Ocean. The Gulf has a general counterclockwise nontidal surface current that flows around the margin of the Gulf along the shore. This current is primarily driven by fresh, cold Scotian shelf water that enters from the north and through the Northeast Channel, and freshwater runoff from coastal rivers, which is particularly important in the spring. Extreme tides along the coast diminish in strength from east to west along with increased vertical stratification of the water column. Dense, relatively warm and saline slope water entering at depth through the Northeast Channel from the continental slope also influences gyre formation and the formation of water masses in the gulf. Gulf circulation can vary significantly from year to year due to shelf-slope interactions such as the entrainment of shelf water by Gulf Stream rings, strong winds which can create fast moving currents, and annual and seasonal inflow variations. In the summer, the water in Jordan, Wilkinson, and Georges Basins becomes layered into warm, nutrient-poor surface water; cold, nutrient-rich intermediate water; and cool high-salinity bottom water.

Data Limitations

While many of these Gulf of Maine habitats, including structurally complex rocky habitats and habitat created by deep-sea corals, sponges, and other epifauna, are particularly vulnerable to anthropogenic disturbances, the data available to help protect these habitats from disturbance are lacking. The lack of both broad and fine scale habitat data and maps in the Gulf of Maine makes it difficult to identify suitable areas for development that would avoid or minimize any impacts to these vulnerable habitats. The USSeaBed sediment data and some limited drop camera data included on the Northeast Ocean Data Portal are the primary benthic habitat data for the Gulf of Maine. While detailed habitat maps have been produced for a few small areas, the substrate samples in these two data sets are sparse and widely spaced (see Figure 1). Available data on the distribution and extent of corals and other epifauna is very limited as only a few surveys to collect such data have been completed in the Gulf of Maine (see Figure 3). Appendix B provides more information on related habitat data needs for the Gulf of Maine. While additional habitat data are needed to inform commercial leasing decisions, there are some known habitat types and features in the Gulf of Maine that are particularly vulnerable to anthropogenic impacts and unsuitable for commercial development. More information on these areas are provided below.

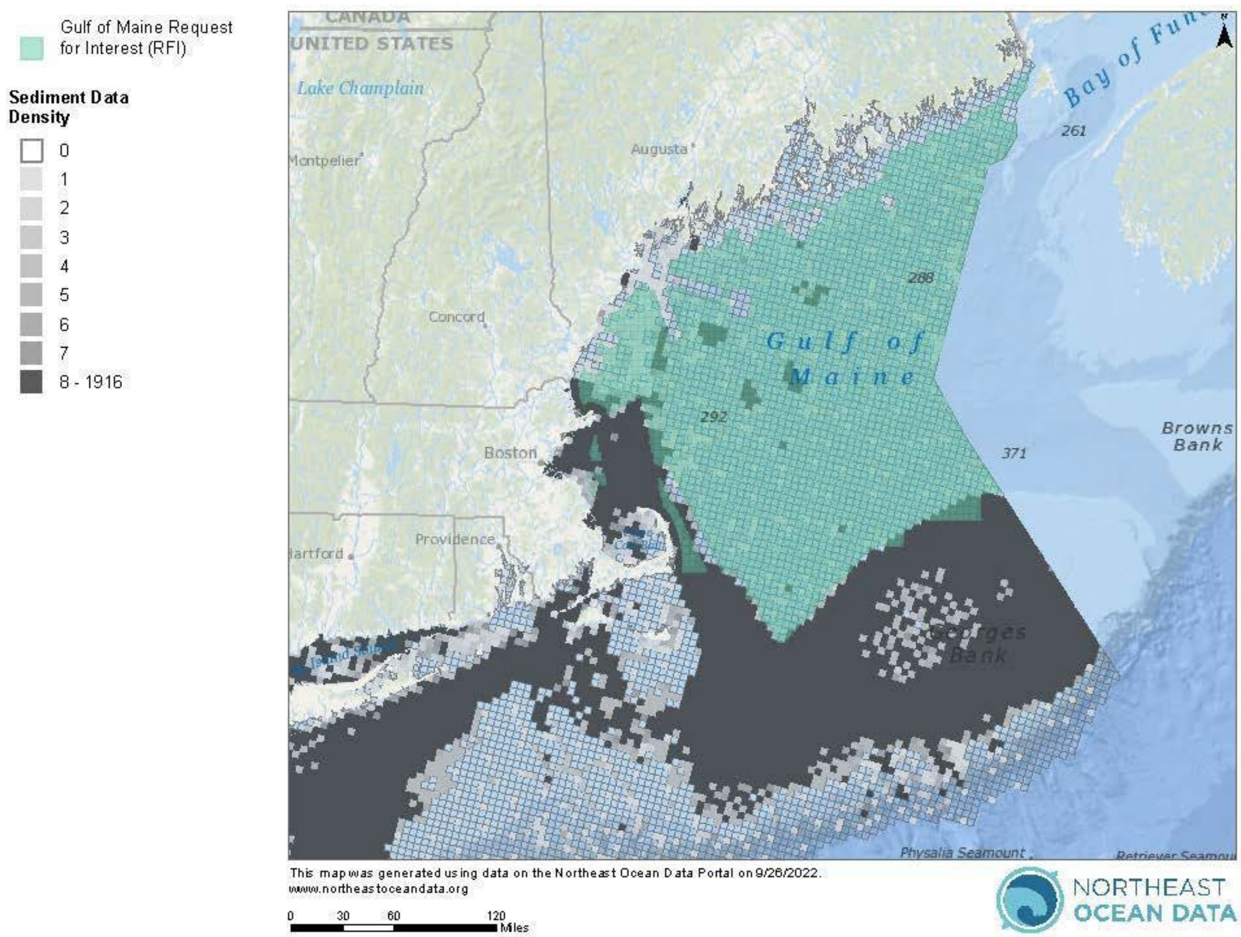

Figure 1: Habitat data density map and the RFI area. The density map shows how many point substrate samples have been collected in each 5x5 km grid cell. Empty cells (in blue) equal zero samples and the darkest cells equal 8 or more.

Habitat Areas Unsuitable for Leasing and Development

Hard bottom and deep-sea corals

Rocky substrates are composed of gravels (pebble, cobbles, boulders), and bedrock that create complex, three-dimensional structure and habitat for epifauna and where animals find food and refuge from predators. They are found on the tops and sides of banks, ridges, and ledges of various sizes that are scattered throughout the gulf in inshore and offshore waters and in flat, rocky/gravelly areas that are draped with fine sediment. It is important to note that many of the offshore banks and ridges in the Gulf of Maine are not mapped or not mapped accurately. Rocky substrates and the diverse benthic communities they support - which include corals, sponges, and other epifauna - provide structured habitat for many commercially important fish and shellfish species. Rocky habitats that support epifauna, and particularly those supporting deep-sea corals, are vulnerable to permanent anthropogenic impacts and are not suitable for development. Many deep-sea corals have a complex, branching form of growth that makes them very fragile. Because they are fragile and grow and reproduce at very slow rates (with some estimated to be hundreds of years old) they are highly susceptible to anthropogenic impacts that make mitigation impossible. We recommend BOEM avoid leasing areas for development that may overlap with, or otherwise impact these areas.

Habitat Management Areas and Fishery Closure Areas
NMFS, in conjunction with the New England Fishery Management Council, has implemented several habitat management areas (HMAs) and groundfish spawning and closure areas that should be avoided when considering future lease areas within the greater RFI area (see Figure 2). The HMAs were established to protect sensitive hard bottom habitats from the adverse effects of fishing and the groundfish closure areas are intended to reduce fishing mortality and/or protect spawning aggregations of species such as Atlantic cod. In both cases, unless an area is temporarily closed during a spawning season, they are closed year-round to certain bottom-tending fishing gears. Although these closures were not intended to restrict other activities, the habitats that are being protected are equally vulnerable to wind farm construction and operations as they are to fishing. Development within such areas could adversely impact sensitive marine resources and habitat, which could also lead to direct and indirect impacts to important trust resources and fisheries.

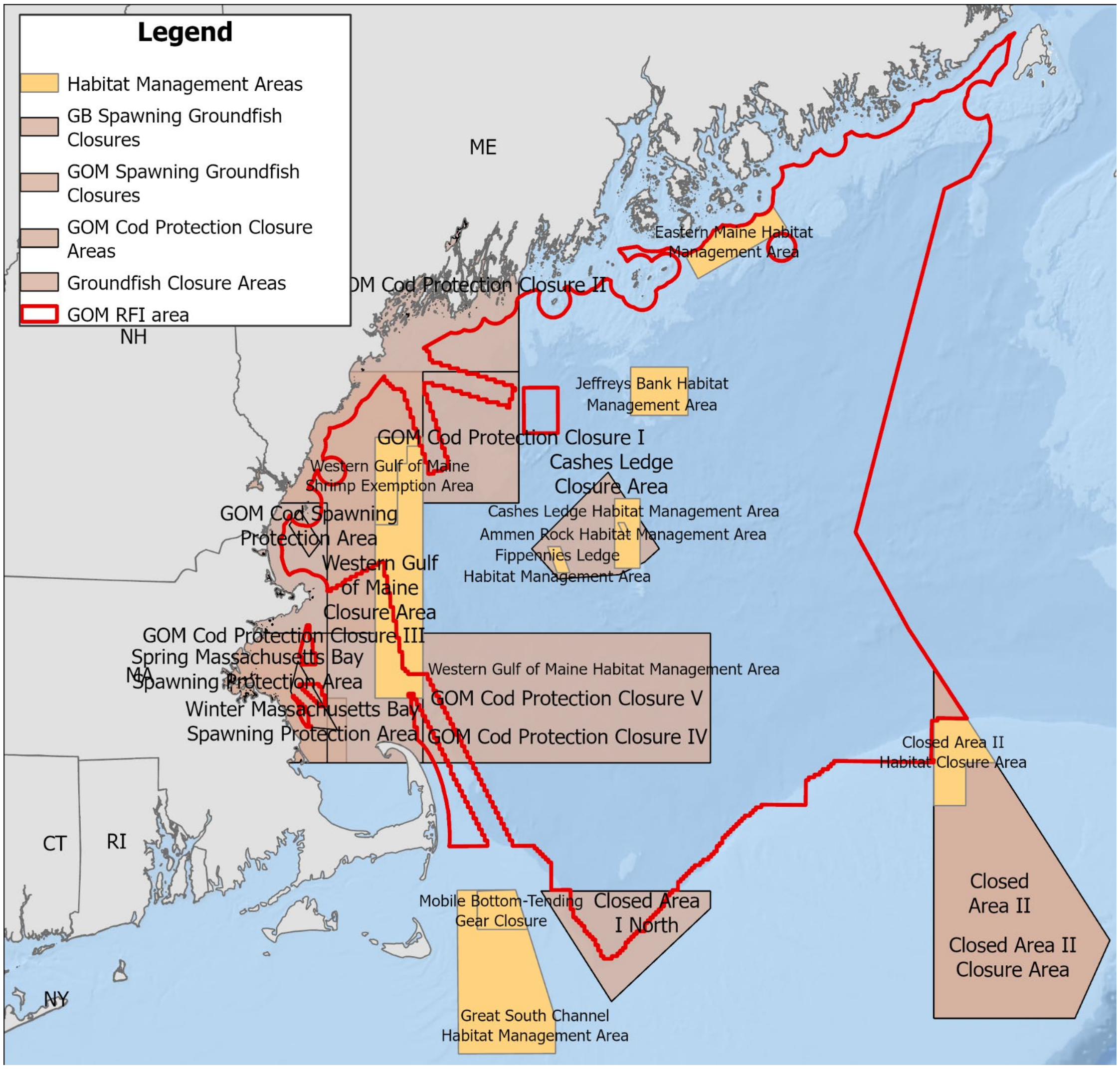

Figure 2: Habitat Management and Groundfish Spawning and Closure Areas[3] that overlap with the proposed RFI area.

Deep-sea Coral Research and Protection Areas

Due to the vulnerability of these habitats, deep-sea corals and their habits are not suitable for development. The RFI area overlaps with designated coral protection and research areas, as well as sites where corals and sponges have been observed through limited surveys. These areas include protection zones designated by the New England Fishery Management Council (Outer Schoodic Ridge, Mt. Desert Rock) and the deep-sea coral research area designated by the New England Fishery Management Council (Jordan Basin Dedicated Habitat Research Area (DHRA)). This also includes general areas with deep-sea coral and sponge observations/point data, some with dense concentrations of coral colonies and sponges (e.g., in central Jordan Basin, some "bumps" just outside of the Jordan Basin DHRA, and in Georges Basin/Lindenkohl Knoll). These designated areas and deep-sea coral observation areas (see Figure 3) should not be

[3] Generated using the Northeast Ocean Data Portal (www.northeastoceandata.org) on September 16, 2022.

considered for offshore wind development.

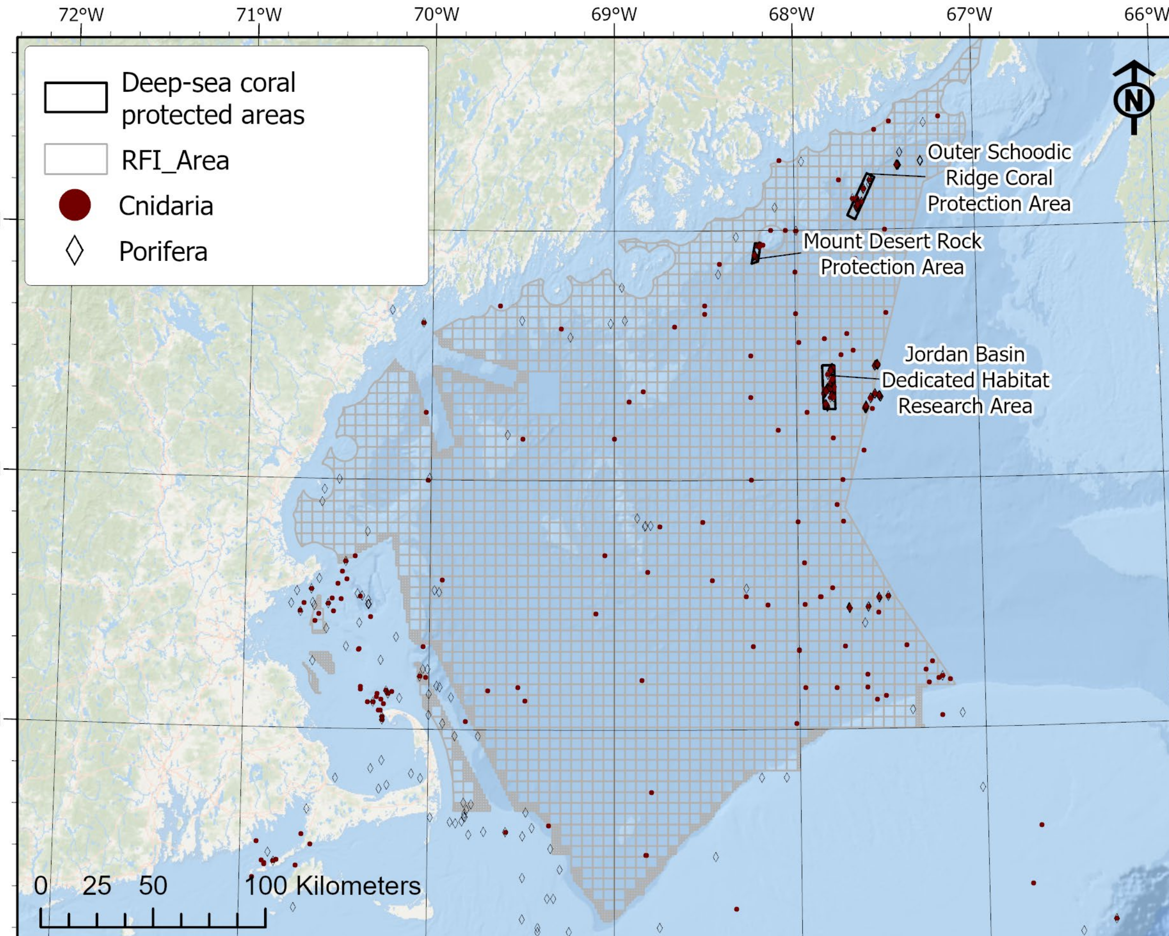

Figure 3. Coral and sponge point data, coral protection zones, and the habitat research area located within the RFI area. [4]

Known sensitive habitat features

There are several named features in the Gulf of Maine that support important high value fisheries, protected species, and sensitive habitats. These areas that overlap with the RFI include, but are not limited to the following features: Cashes Ledge, Jeffreys Ledge, the northern edge of Georges Bank, isolated areas of hard bottom in Jordan Basin, and Platts Bank. It should also be noted that the low flow velocities of the basins, including Wilkinson Basin and Jordan Basin allow for the aggregations of plankton that provide an important food source for protected species and several fish species with designated EFH in the area. BOEM should work with NMFS to identify an appropriate set back from these benthic features to account for upwelling or other oceanographic processes that occur as a result of these features. In addition to providing a set back from sensitive habitat features, BOEM should consult satellite oceanographic data to locate frontal regions that may occur in the Gulf of Maine. These areas provide important habitat for fisheries and protected species and should be removed from further consideration.

[4] NOAA National Database for Deep-Sea Corals and Sponges (version 20220801-0). https://deepseacoraldata.noaa.gov/; NOAA Deep Sea Coral Research & Technology Program.

Habitat Areas of Particular Concern (HAPCs)
HAPCs are designated subsets of EFH that exhibit one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic degradation. There are two HAPCs in the Gulf of Maine RFI area, one on Cashes Ledge and one on the northern portion of Jeffreys Ledge (Figure 4). Both of them were designated because of the diversity of ecologically important habitat types for a number of managed fish species. Other HAPCs that specify complex hard bottom or eelgrass habitats that are essential for juvenile cod and summer flounder are located in nearshore waters outside the RFI and are vulnerable to impacts from the installation of onshore export cables.

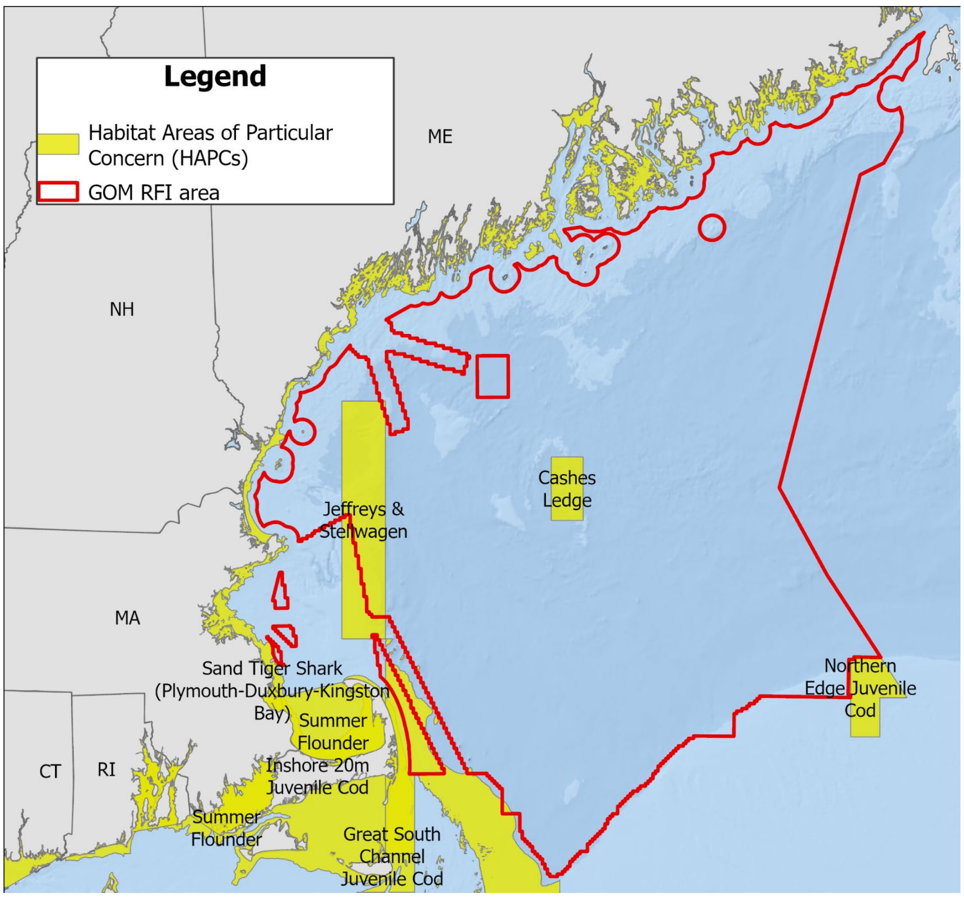

Figure 4. Habitat Areas of Particular Concern (HAPC) designated within the Gulf of Maine and RFI area.

Fisheries Resources

Overview
The entire RFI area is a rich ecological area important to many species (see total biomass distribution in Figure 5 below). The Gulf of Maine supports high value commercial and

party/charter fisheries including lobster, Northeast Multispecies (groundfish[5]), sea scallops, herring, monkfish, skates, and bluefin tuna, along with a small Maine mahogany quahog fishery. The Maine lobster fishery alone landed 108 million lb in 2021 worth $725 million[6], while other fisheries combined landed an average of over 108 million lb per year from the RFI area generating over $77 million in ex-vessel revenue annually from 2008-2020. Fishing vessels from ports in Maine to North Carolina operate in the Gulf of Maine, and many are reliant on the RFI areas for a substantial portion of their annual fishing revenue. Appendix C includes reports summarizing both commercial and for-hire fishing activity within the RFI area using the fishing footprint method[7] that is based on federal VTR data for vessels permitted to target species managed by the NMFS Greater Atlantic Regional Fisheries Office (GARFO).

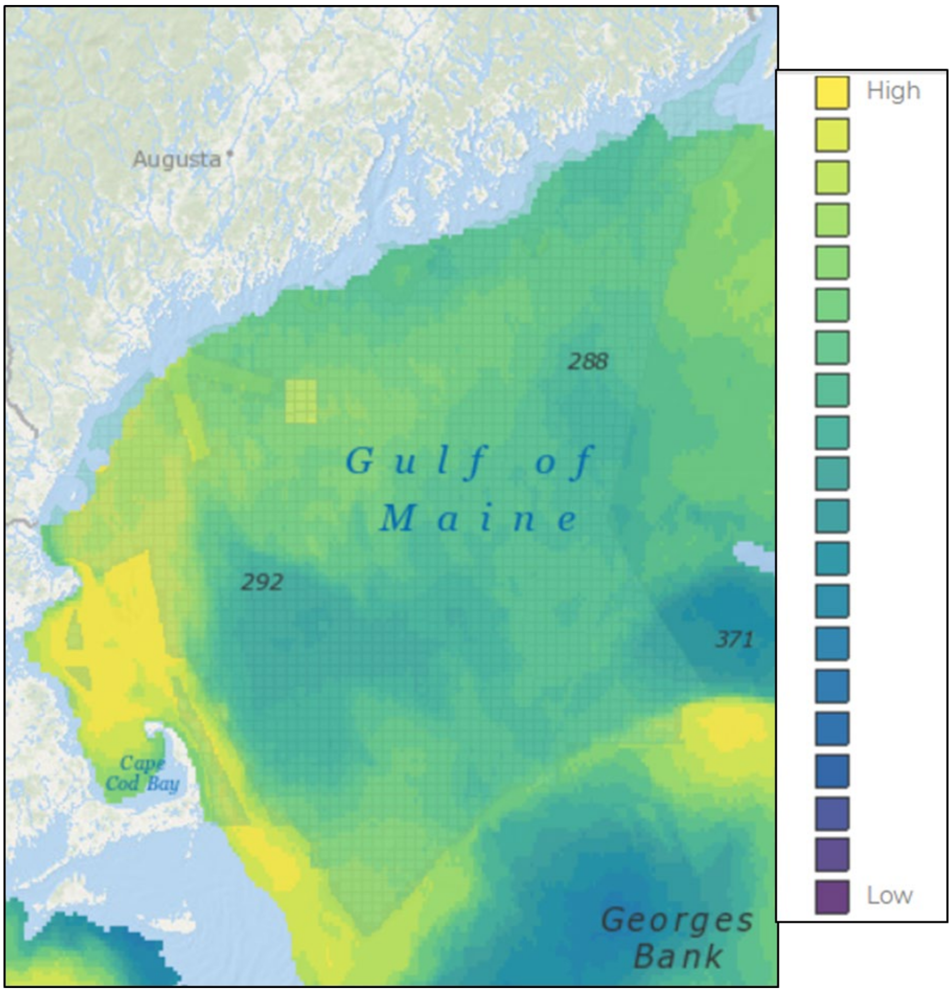

Figure 5: Historical Fall Biomass of All Species from 2015-2019[8]

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[5] The Northeast Multispecies (groundfish) fishery includes the following species: Acadian redfish, American plaice, Atlantic cod, Atlantic halibut, Atlantic pollock, Atlantic wolffish, haddock, ocean pout, red hake, silver hake, white hake, windowpane flounder, winter flounder, witch flounder, and yellowtail flounder.

[6] Press release, February 14, 2022: https://www.maine.gov/governor/mills/news/2021-maine-lobster-harvest-most-valuable-history-fishery-2022-02-14

[7] Available at: https://apps-nefsc.fisheries.noaa.gov/read/socialsci/fishing-footprints.php

[8] Marine Life Data and Analysis Team data accessed via the Northeast Ocean Data Portal

The RFI area is the epicenter of the historically and culturally significant lobster, groundfish, and herring fisheries, which represent the largest fisheries by volume and value within the RFI area. Since 2008, groundfish landings have remained steady, averaging about 30.7 million lb per year valued at an average of $40.6 million annually. Atlantic herring landings reached over 80 million lb worth $13 million in 2008, but have since declined to 7 million lb worth under $3 million in 2019 due to recent quota restrictions; landings averaged nearly 65 million lb valued at $11.7 million annually from 2008-2020. Other important fisheries within the RFI area include the scallop and monkfish fisheries, although much of the scallop fishery occurs outside of the proposed RFI area and most monkfish landings occur in conjunction with groundfish trips. For some species, fishing operations in the RFI area represent a substantial portion of annual landings and associated revenue.

Based on modeled VTR data, we estimate an average of 700 expected vessels took an average of just over 15,000 expected commercial fishing trips into the RFI area each year from 2008-2020[9]. Both the number of expected trips and vessels has declined from over 17,500 trips by 845 vessels in 2009 to 12,583 trips by 593 vessels in 2020[10]. Vessels from Maine through North Carolina operate within the RFI area. Primary ports used by such vessels to land their harvest include New Bedford and Gloucester, which average $22-23 million in ex-vessel revenue from trips within the RFI area each year, and Boston, Portland, and Rockland, which average $9-11 million in annual fishing revenue from trips within the RFI area. Due to the large size of the proposed RFI area, many vessels are heavily dependent on this area for a majority of their annual fishing income, with a median vessel revenue dependency of 12 percent and many dependent upon the RFI area for 50-100 percent of annual fishing revenue.

Commercial gear types that operate in the RFI area include bottom trawls, midwater trawls, gillnets, hook and line (longline and handline), dredge (clam and scallop), and purse seine gear. Purse seine, trawl (midwater and bottom), and pot gear are the predominant gear types used in the RFI area, although gillnets are also used in the groundfish and monkfish fisheries and harpoons are also used to target bluefin tuna. Based on existing regulations, the maximum length of lobster trawls is 1.5 miles in most of the Gulf of Maine, but can be as long as 1.75 miles in the offshore portions of the Gulf of Maine. This can affect the feasibility of fishing with lobster pots among floating turbine arrays, depending on the spacing of potential future floating wind turbine platforms. Vessels using trawl gear, gillnets, pot gear, and angling for tuna are likely unable to operate within and among floating wind turbine platforms given potential gear obstructions from anchor lines and inter array and export cables. Purse seine gear may also have difficulty operating within the RFI area, depending on gear length/depth and the ability to use spotter planes among wind turbines.

For-hire recreational fishing is dominated by vessels targeting groundfish species and mackerel, the latter of which are also used for bait to target other species including tuna. Overall fishing revenue by federally permitted for-hire vessels has declined since 2010, with revenue averaging

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(www.northeastoceandata.org) on September 16, 2022.

[9] The estimated counts of "expected" vessels and trips are derived by taking a count of trips and vessels reported in VTRs and weighting them by the probability of overlap with the area of interest (the RFI area).

[10] Fishing operations in 2020 may be uncharacteristically low due to the effects of the COVID-19 pandemic.

$4.3 million from 2008-2020, but $2.4 million within the last five years (2016-2020). From 2008-2020, for-hire vessels took an average of 1,880 trips per year, with an average of 38,269 angler trips per year. Both for-hire vessel trips and angler trips have declined since peaking in 2010. Most of these trips were initiated from New Hampshire ports. Similar to commercial operations, for-hire vessels are heavily dependent upon fishing within the large RFI area for a majority of fishing income, with the median dependence at 43 percent, and many individuals dependent upon the area for up to 100 percent of annual fishing revenue. Spatial data on private recreational angling is not available, but likely reflects the party/charter operations in terms of species targeted, along with striped bass and other important regional sportfish. Fishing for bluefin tuna is another important recreational fishery based on annual bluefin tuna tournaments held in Maine, New Hampshire, and Massachusetts ports. We recommend that BOEM consult with members of the recreational angling fishing community to ensure their fishing patterns and concerns are fully incorporated into offshore wind development decisions within the RFI area.

In general, VMS data represent a majority of vessel operations in most of the fisheries managed within federal waters. A preliminary evaluation suggests that over 95 percent of groundfish, herring, monkfish, and scallop landings from 2014-2019 were from vessels equipped with VMS, while less than 4 percent of lobster landings were from VMS vessels. Thus, with the exception of the lobster fishery, VMS data (see Figure 6) are a good indicator of the spatial distribution of fishery operations for primary fisheries within the RFI area. Such data should be considered when determining areas for offshore wind development in the RFI area that could avoid interfering with historical fishing operations. When interpreting the VMS data in Figure 6, please note that fishing operations using bottom tending mobile gear and by groundfish vessels are prohibited in certain areas, including habitat closure areas and groundfish spawning and protection areas depicted in Figure 2. Thus, VMS data indicate lower fishing effort in these areas, as shown in Figure 6.

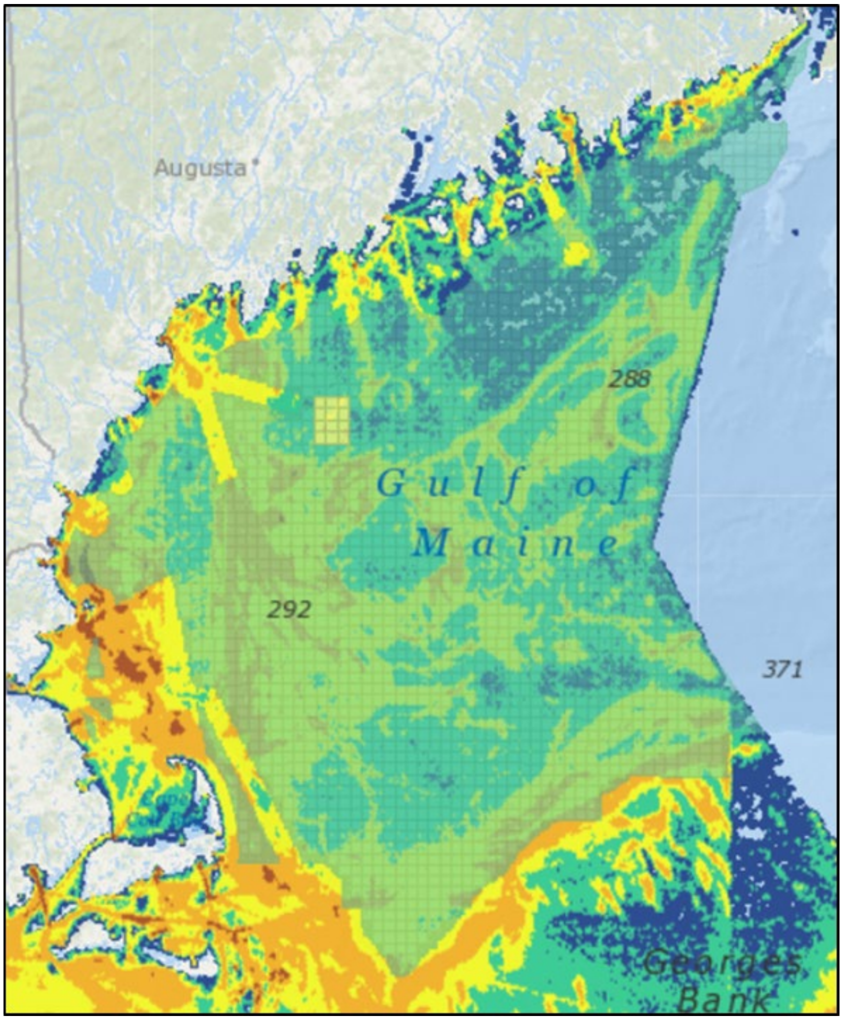

Figure 6: Vessel Monitoring System Data for All Fisheries During 2015-2019[11]

VMS data indicate where both fishing and transit activity is concentrated. For example, panel A in Figure 7, shows the that most scallop fishing within the RFI area occurs to the west of the RFI area, although there is substantial scallop vessel transit to/from New Bedford and fishing along the southern perimeter of the RFI area in the Great South Channel and the Northern Edge of Georges Bank. Similar patterns are evident for the surfclam and groundfish fisheries as well. Panel B of Figure 7 shows concentrations of herring fishing along the shoreward perimeter of the RFI area, including to the east of Cape Cod and on the Northern Edge of Georges Bank, and transit patterns to/from the ports of Portland, Gloucester, and New Bedford. Although Figure 6 above includes all VMS operations, most of the patterns reflect groundfish activities. This suggests the highest concentrations of groundfish effort occur in similar areas to both scallop and herring, but to a broader geographic extent within Massachusetts Bay to the west of the Western Gulf of Maine Closure Area (see Figure 2) and north of Cape Ann within Ipswich Bay. Groundfish activity within Wilkinson Basin and east to Cashes Ledge and the center of the RFI area is representative of the pollock gillnet fishery and the trawl fishery for redfish, respectively, along with a scattering of joint monkfish/groundfish operations.

[11] VMS data accessed via the Northeast Ocean Data Portal (www.northeastoceandata.org) on September 16, 2022.

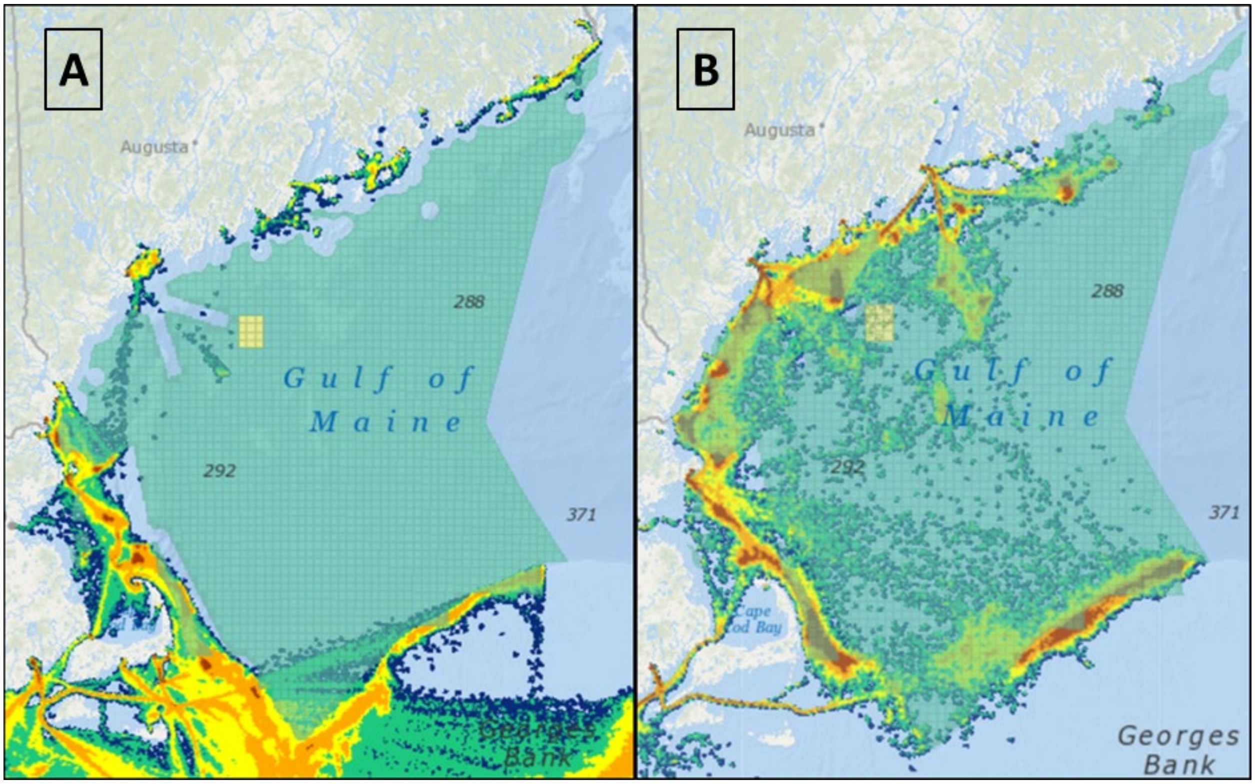

Figure 7: A) Scallop Vessel Monitoring System Data from April 2015 through March 2019. B) Atlantic herring Vessel Monitoring System Data from 2015-2019.

Data Limitations

The data described above do not adequately characterize all fishing that occurs within the RFI area, including commercial lobster fishing, private angling, and vessels targeting highly migratory species (HMS). The commercial and for hire reports included in Appendix C list important caveats and limitations that should be noted when interpreting the data presented. Because of existing reporting requirements, federal GARFO VTR data used for the commercial report do not include vessels targeting HMS and do not adequately reflect all lobster operations for vessels fishing in the Gulf of Maine, although offshore lobster operations in Lobster Management Area 3 are likely sufficiently documented. Catch of HMS are documented through separate logbook programs managed by the Southeast Fisheries Science Center, and only small amounts of bycatch of such species is included in the attached socioeconomic analyses instead of targeted fishing operations. While the commercial report in Appendix C includes landings by Maine, New Hampshire, and Massachusetts vessels, the majority of lobsters harvested within the RFI area are landed by Maine vessels which are particularly underrepresented in our VTR data compared to other states. Therefore, lobster fishery landings and revenue presented in these reports likely substantially underestimate realized landings and revenues for the entire RFI area and should not be used to characterize fishing effort distribution, volume, or value for this effort.

Available VMS data provide some very limited information indicative of potential lobster fishing activity by a subset of the fleet that is also issued other federal permits requiring the use of VMS. Such data show some level of vessel transits to/from ports along the coast of Downeast Maine (see Figure 6), although such data are not representative of the entire fleet's activity and cannot easily quantify fishing effort or the volume or value of landings on such trips, let alone the entire fishery. All lobster vessels could soon be required to submit VTRs, and future monitoring efforts for this fishery are likely to include spatial data akin to the resolution provided by VMS data for federally permitted fisheries or automatic information system units. While both of these efforts would improve the information available to evaluate spatial operational patterns for this fishery, such information sources will not be immediately available to inform this current effort.

We caution BOEM about reaching conclusions regarding the distribution of lobster fishing effort based on currently available data, including trawl survey data included in Figure 5 and on the Northeast Ocean Data Portal or our fishing footprint and VMS data discussed in this letter. Such data sources are incomplete regarding the depiction of lobster and need to be supplemented with other sources. Alternative data sources, including those being developed by the states of Maine, New Hampshire, and Massachusetts and for the Atlantic Large Whale Take Reduction Team (i.e., the decision support tool data), could provide greater detail regarding where and when lobster fishing activity takes place within the RFI area. For example, Maine's Department of Marine Resources has developed a website (DMR Open Data[12]) that includes a data layer depicting the distribution of lobster landings in 2019. Although decision support tool data were not available to contribute to this letter, we will endeavor to make that data available for future consideration. Additional considerations include utilizing bathymetric and habitat data to extrapolate existing limited data on lobster fishing across similar areas likely suitable for lobster fishing, as discussed during Maine's Offshore Wind Roadmap exercise. We strongly encourage BOEM to further explore alternative data sources to better describe the spatial distribution of lobster fishing effort throughout the RFI area and collaborate with the state and federal agencies, fishery participants and associated organizations, and fishery researchers to address this important information gap. This would help avoid inadvertently suggesting it is appropriate to develop offshore wind energy projects in areas where lobster effort occurs, but is difficult to document based on available data sources, especially along the coast of Maine where the majority of lobster fishing occurs.

Status of Important Fishery Stocks

Avoiding impacts to key fishery resources and habitats within the GOM and RFI area is important given the status of key fishery stocks. The GOM cod stock is in poor condition and measures to promote rebuilding (e.g., seasonal and annual closure areas, effort controls, gear requirements, and harvest limits) have been insufficient. Poor recruitment and climate impacts appear to be major factors in GOM cod's poor condition. Similarly, herring biomass is low despite substantial reductions in annual catch in recent years, but is not experiencing overfishing. The conditions contributing to herring's historically low recruitment and biomass are not well understood. The GOM contains spawning and harvesting areas important to the herring stock and fishery. Wind energy development in important GOM cod and herring habitat, spawning areas, and areas utilized by the fishery may negatively affect stock rebuilding and fishery operations and should be avoided.

Fishing Community Dependence and Environmental Justice

[12] Available at: https://dmr-maine.opendata.arcgis.com/

Fishing operations within the RFI area are important to existing fisheries and represent substantial contributions to the regional economy and communities dependent upon fishing operations (see NOAA's Fishing Community Profiles). The cumulative social effects to coastal communities that are dependent on fishing should be considered when considering future lease areas within the Gulf of Maine. NOAA Fisheries Community Social Vulnerability Indicator (CSVI) data can provide information that will help inform future decisions and can be found at: https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-coastal-communities, along with a data tool here: https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/. NOAA Fisheries' indices for poverty, population composition, and personal disruption can be used to better identify and understand Environmental Justice communities. The indicators show that fishing communities that are dependent upon commercial fishing are far more likely to have higher levels of poverty, have a larger percentage of minority and tribal populations, and/or have residents with less "personal capacity" to respond to change.

Conclusions

In conclusion, we recommend that BOEM consider the distribution of fishing activity and fishery resources when determining where future commercial scale offshore wind projects could be developed. To minimize interference with and impacts to high concentrations of fishing activities and fishery resources, future projects should avoid the following areas: Waters east of Cape Cod, within the Great South Channel, along the Northern Edge of Georges Bank, Ipswich Bay, Massachusetts Bay west of Stellwagen Bank, and within 12 miles of the Maine coast. However, additional information is needed regarding existing lobster, tuna, and private angling fishing operations to ensure future area identification does not inadvertently overlap with existing fishing activities that are not well captured in currently available data sources.

Protected Resources

Several species of marine mammals, sea turtles, and marine fish that are listed as threatened or endangered under the Endangered Species Act (ESA) of 1973, as amended, occur in the RFI area and surrounding waters. Note also that nearly all of the RFI area overlaps with critical habitat designated for the North Atlantic right whale (81 FR 4837; January 27, 2016). The process for commercial leasing in the Gulf of Maine should entail a comprehensive environmental review based in ecosystem-based management and marine spatial planning approaches. As potential areas for commercial leasing in the Gulf of Maine are identified, it will be critical to fully consider both project-specific and cumulative effects of offshore wind energy development (including activities that occur prior to construction) on all species listed under the ESA and protected by the MMPA and the habitats and ecosystems on which they depend. Throughout the lease area identification process and Construction and Operations Plan development phase, it is important to evaluate ways to avoid and minimize adverse impacts to these species and their habitats. We encourage you to consider all available options to minimize risk to these species and their habitats including limiting the extent of leasing and development in areas used by these species and in habitats that support processes on which these species depend. Additionally, before leases are issued (or at the latest, immediately after lease issuance), a robust monitoring program should be implemented to collect information to inform further development; please see our comments in Appendix B about recommended monitoring.

Protected Species Occurrence in the Gulf of Maine

Tables 1 through 3 detail the ESA-listed species whose range overlaps with at least some portion of the Gulf of Maine RFI Area. All ESA-listed marine mammals are also protected under the MMPA. More information on these species, including links to relevant regulatory and planning documents, are available on the NMFS webpage (https://www.fisheries.noaa.gov/species-directory/threatened-endangered). Note the abbreviations used in the following tables are: DPS = distinct population segment; E = an "endangered" listing under the ESA; FR = Federal Register; T = a "threatened" listing under the ESA.

Table 1. ESA-Listed Marine Mammals Occurring in the Gulf of Maine RFI Area

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date
Blue whale	E	35 FR 18319/December 2, 1970	November 2020
Fin whale	E	35 FR 12222/December 2, 1970	August 2010
North Atlantic right whale	E	35 FR 18319/December 2, 1970	June 2005
Sei whale	E	35 FR 12222/December 2, 1970	December 2011
Sperm whale	E	35 FR 12222/December 2, 1970	December 2010

Table 2. ESA-Listed Sea Turtles Occurring in the Gulf of Maine RFI Area

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date
Green sea turtle (North Atlantic DPS)	T	81 FR 20057/April 6, 2016	October 1991
Kemp's ridley sea turtle	E	35 FR 18319/December 2, 1970	September 2011
Leatherback sea turtle	E	35 FR 8491/June 2, 1970	April 1992
Loggerhead sea turtle (Northwest Atlantic DPS)	T	76 FR 58868/September 22, 2011	December 2008

Table 3. ESA-Listed Fishes Occurring in the Gulf of Maine RFI Area

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date
Atlantic sturgeon (New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs)	E	77 FR 5914/February 6, 2012	2018 (Recovery Outline)
Atlantic sturgeon (Gulf of Maine DPS)	T	77 FR 5914/February 6, 2012	2018 (Recovery Outline)

Shortnose sturgeon	E	32 FR 4001/March 11, 1967	1998
Gulf of Maine DPS of Atlantic salmon	E	74 FR 29344/June 19, 2009	2019

In addition to the five stocks of ESA-listed marine mammals, 15 protected cetacean species occur in the Gulf of Maine RFI Area, six of which are considered "strategic" under the MMPA (Table 4, grouped by hearing frequency). Descriptions of all marine mammal stocks under NMFS jurisdiction can be found in the final 2021 Stock Assessment Reports[13].

Table 4. MMPA-Protected Marine Mammal Species Occurring in the Gulf of Maine RFI Area

Common Name	Status	Occurrence[14]
Low Frequency Cetaceans (baleen whales)		
Blue whale	MMPA protected, ESA endangered	Low likelihood, potentially year round
Fin whale	MMPA depleted, MMPA strategic, ESA endangered	Year-round
Humpback whale (West Indies DPS); Gulf of Maine MMPA stock	MMPA protected	Year-round
Minke whale	MMPA protected	Year-round
North Atlantic right whale	MMPA depleted, MMPA strategic, ESA endangered	Year-round
Sei whale	MMPA depleted, MMPA strategic, ESA endangered	Spring/summer/fall, potentially year-round
Mid-frequency Cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)		
Atlantic white-sided dolphin	MMPA protected	Year-round

[13] https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments

[14] Habitat-based density models (https://seamap.env.duke.edu/models/Duke/EC/) have been developed for all marine mammals in the Atlantic. These models are updated periodically (most recently in 2022 for all marine mammals); therefore, NMFS recommends referencing these models for occurrence throughout the planning process.

Pilot whale, long-finned	MMPA protected	Spring/summer/fall
Pilot whale, short finned	MMPA protected	Low likelihood
Risso's dolphin	MMPA protected	Low likelihood
Short-beaked common dolphin	MMPA protected	Summer/fall, potentially year-round
Sperm whale	MMPA protected, ESA endangered	Summer/fall, potentially year-round
North Atlantic bottlenose dolphin, Western North Atlantic offshore stock	MMPA protected	Low likelihood
White-beaked dolphin	MMPA protected	Low likelihood
Mesoplodont beaked whales	MMPA protected	Low likelihood
Cuvier's beaked whale	MMPA protected	Low likelihood
High Frequency Cetaceans (true porpoises, Kogia)		
Harbor porpoise	MMPA protected	Fall/winter/spring[15], potentially year-round
Pygmy sperm whale	MMPA protected	Low likelihood
Dwarf sperm whale	MMPA protected	Low likelihood
Pinnipeds		
Gray seal	MMPA protected	Year-round
Harbor seal	MMPA protected	Year-round

15 Per the 2021 SAR, during summer (July to September), harbor porpoises are concentrated in the northern Gulf of Maine, southern Bay of Fundy, and around the southern tip of Nova Scotia, generally in waters less than 150 m deep (Gaskin, 1977; Kraus et al., 1983; Palka, 1995). During fall (October to December) and spring (April to June), harbor porpoises are widely distributed from New Jersey to Maine, with lower densities farther north and south. During winter (January to March), intermediate densities of harbor porpoises can be found in waters off New Jersey to North Carolina, and lower densities are found in waters off New York to New Brunswick, Canada.

Harp seal	MMPA protected	Winter
Hooded seal	MMPA protected	Low likelihood

Additional information on the protected species that occur in the Gulf of Maine RFI Area can be found at:

- Greater Atlantic Regional Fisheries Office (GARFO) Section 7 Mapper[16]
- Ocean Biodiversity Information System Spatial Ecological Analysis of Megavertebrate Populations[17]
- Habitat-based Marine Mammal Density Models for the US Atlantic[18]
- Passive Acoustic Cetacean Map[19]
- WhaleMap[20]
- Atlantic Marine Assessment Program for Protected Species (AMAPPS)
    - AMAPPS reports[21]
    - AMAPPS Mammal Mammal Model Viewer[22]
- Marine Mammal Stock Assessments[23]

Overall, information on the fine scale distribution, abundance, and habitat use of protected species in the RFI Area is limited. Broad-scale distribution data for these species is available; however, continued data collection on seasonal distribution, density, abundance, behavior, movements, and habitat use for these species is needed to better understand the consequences of leasing and development in the RFI Area. Many protected species have wide ranging distributions along the East Coast and thus are likely to be exposed to stressors of multiple offshore wind projects. Leasing in the Gulf of Maine should be informed by an assessment of the anticipated effects on protected species that occur in the area, including consideration of operational impacts (e.g., turbine noise, physical presence of turbines, vessel traffic, habitat modifications); this analysis should consider project-specific and cumulative effects that may occur before, during and after construction. It is also important to consider how development in this area may affect the availability and quality of habitat as well as vessel traffic and fishing use patterns which may affect the risk that these activities pose to protected species.

Atlantic salmon and Atlantic sturgeon

The Gulf of Maine DPS of Atlantic salmon has critically low abundance and is continuing to decline. Decreased marine survival is the primary factor driving the decline of Atlantic salmon

[16] https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper

[17] https://seamap.env.duke.edu/

[18] https://seamap.env.duke.edu/models/Duke/EC/

[19] https://apps-nefsc.fisheries.noaa.gov/pacm/#/

[20] http://whalemap.org

[21] https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/atlantic-marine-assessment-program-protected

[22] https://apps-nefsc.fisheries.noaa.gov/AMAPPSviewer/

[23] www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments

populations throughout their southern range and impedes recovery of the DPS. The marine habitat of U.S. salmon extends from the Maine coast though Canada to Greenland. The potential impacts of offshore wind development in this marine range should be carefully considered to ensure that development does not further exacerbate poor marine survival. We also note that critical habitat for the Gulf of Maine DPS of Atlantic salmon is designated in river, stream, and estuary habitat within the range of the DPS (74 FR 29300; June 19, 2009), including potential cable corridors and vessel transit areas (Figure 8). Additional river and estuarine waters of the Gulf of Maine are designated as critical habitat for the Gulf of Maine DPS of Atlantic sturgeon (82 FR 39160; August 17, 2017) (Figure 9). Potential impacts to these areas from cables and shoreside infrastructure should be considered when determining areas suitable for commercial leasing.

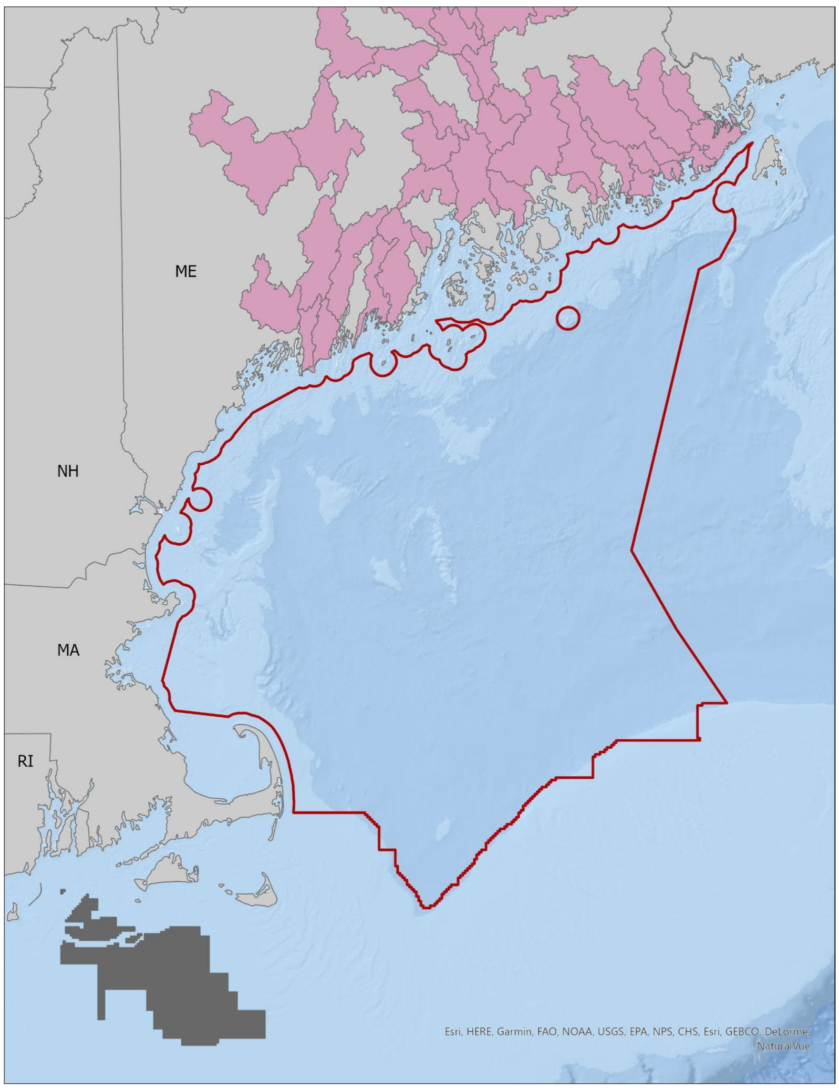

Figure 8: Critical habitat designated for the Gulf of Maine DPS of Atlantic salmon shown in pink. RFI area outlined in red. Existing OCS leases shaded in gray.

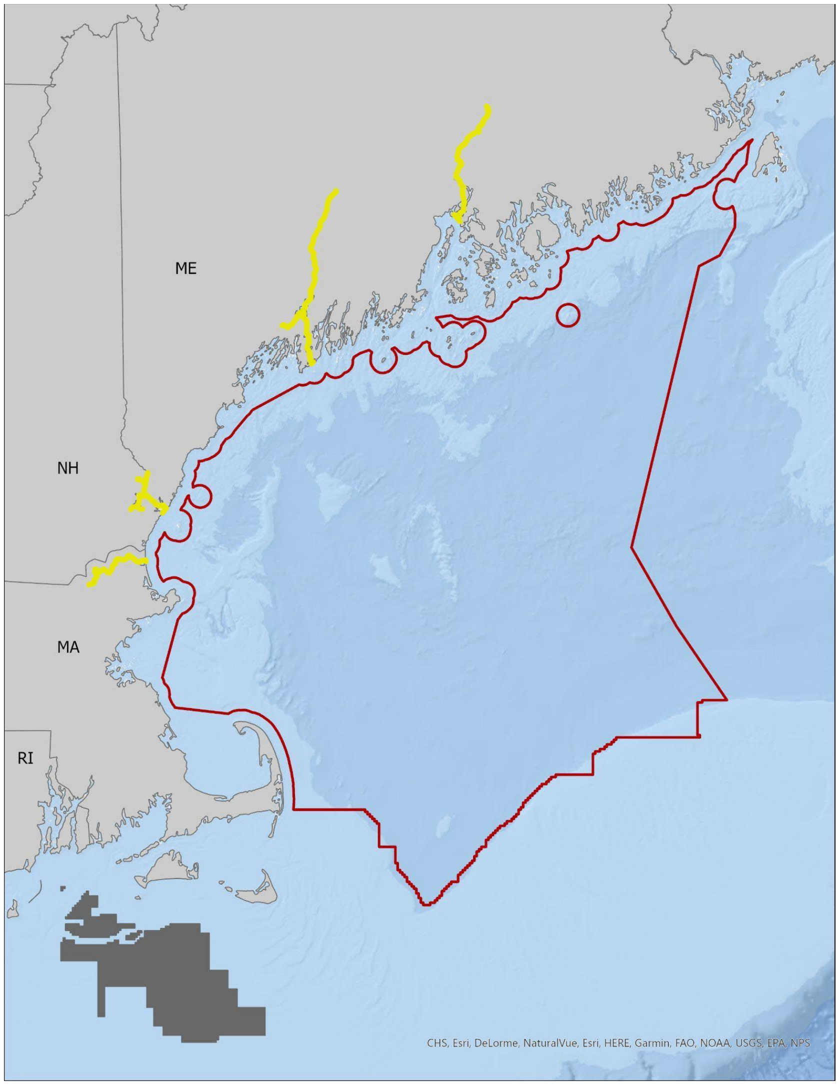

Figure 9: Critical habitat designated for the Gulf of Maine DPS of Atlantic sturgeon shown in yellow. RFI area outlined in red. Existing OCS leases shaded in gray.

North Atlantic Right Whales

Endangered North Atlantic right whales occur year round, albeit in varying densities, in the RFI Area, as well as along potential cable corridors and anticipated vessel transit routes. The status of this species is extremely poor. The identification of any areas eligible for leasing, pre-construction activities, and ultimate development of wind energy facilities should be done in a way that avoids and minimizes effects to North Atlantic right whales and their habitat. This species will be exposed to effects of offshore wind development in every lease area identified on the Atlantic OCS to date. The lack of a cumulative assessment of development of these lease areas on North Atlantic right whales, their designated critical habitat, and the areas in between, severely limits full consideration of the consequences to this severely depleted and sensitive species. As the population continues to decline[24] and in the midst of a protracted Unusual

[24] Pace, R. M. 2021. Revisions and Further Evaluations of the Right Whale Abundance Model:

Mortality Event,[25] development of fixed and floating offshore wind facilities presents additional risk to the species from stressors such as noise exposure, vessel traffic, increased energy expenditure by individuals due to displacement, habitat changes, and displaced fishing effort. Of particular concern is the potential for floating turbine infrastructure to create new entanglement risks in buoy lines and/or in the accumulation of abandoned, lost, or otherwise discarded fishing gear and other marine debris.

Nearly all of the RFI Area is designated critical habitat for North Atlantic right whales (81 FR 4837; January 27, 2016) (Figure 10). Critical habitat includes two areas (Units) located in the Gulf of Maine and Georges Bank Region (Unit 1) and off the coast of North Carolina, South Carolina, Georgia and Florida (Unit 2). As identified in the final rule (81 FR 4837), the physical and biological features essential to the conservation of the North Atlantic right whale that provide foraging area functions in Unit 1 are: "The physical oceanographic conditions and structures of the Gulf of Maine and Georges Bank region that combine to distribute and aggregate *C. finmarchicus* for right whale foraging, namely prevailing currents and circulation patterns, bathymetric features (basins, banks, and channels), oceanic fronts, density gradients, and temperature regimes; low flow velocities in Jordan, Wilkinson, and Georges Basins that allow diapausing *C. finmarchicus* to aggregate passively below the convective layer so that the copepods are retained in the basins; late stage *C. finmarchicus* in dense aggregations in the Gulf of Maine and Georges Bank region; and diapausing *C. finmarchicus* in aggregations in the Gulf of Maine and Georges Bank region." In addition, the Gulf of Maine region supplies *C. finmarchicus* to critical North Atlantic right whales foraging areas to the south (e.g. Cape Cod Bay, southern New England)[26], and disruption of those advective processes poses significant risk to the species.

Consistent with the requirements of section 7 of the ESA, BOEM must ensure that any action they take related to leasing in the Gulf of Maine is not likely to result in the destruction or adverse modification of critical habitat designated for the North Atlantic right whale. It will be essential to carefully consider the potential for commercial leasing in this area to affect the physical and biological features of North Atlantic right whale critical habitat, including physical or oceanographic conditions that serve to aggregate copepods. Emerging information indicates that offshore wind facilities can reduce wind speed and wind stress which can lead to less mixing, lower current speeds, and higher surface water temperature (Afsharian et al. 2019), cause wakes that will result in detectable changes in vertical motion and/or structure in the water column (e.g. Christiansen & Hasager 2005, Broström 2008), as well as detectable wakes downstream from a wind farm by increased turbidity (Vanhellemont and Ruddick, 2014). At this time, there is not sufficient information to inform decisions about how commercial leases could be sited in the Gulf of Maine in a way that would avoid adverse effects to the physical features of critical habitat or to inform the development of lease conditions that would result in avoiding, minimizing, or mitigating such impacts. Considering this issue will require additional information gathering, assessment, and coordination between NMFS, BOEM, and other partners. We encourage the development of a research framework for a research lease that could help

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Improvements for Hypothesis Testing. NOAA Technical Memorandum NMFS-NE-269.
National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. April 2021.

[25] https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2022-north-atlantic-right-whale-unusual-mortality-event

[26] Rubao Ji, ICES Journal of Marine Science (2017), 74(7), 1865–1874. doi:10.1093/icesjms/fsw253

provide answers to these critical questions and further encourage BOEM to delay the identification of areas for commercial leasing until a comprehensive evaluation of potential effects of commercial leasing in the Gulf of Maine on North Atlantic right whales and their designated critical habitat is carried out.

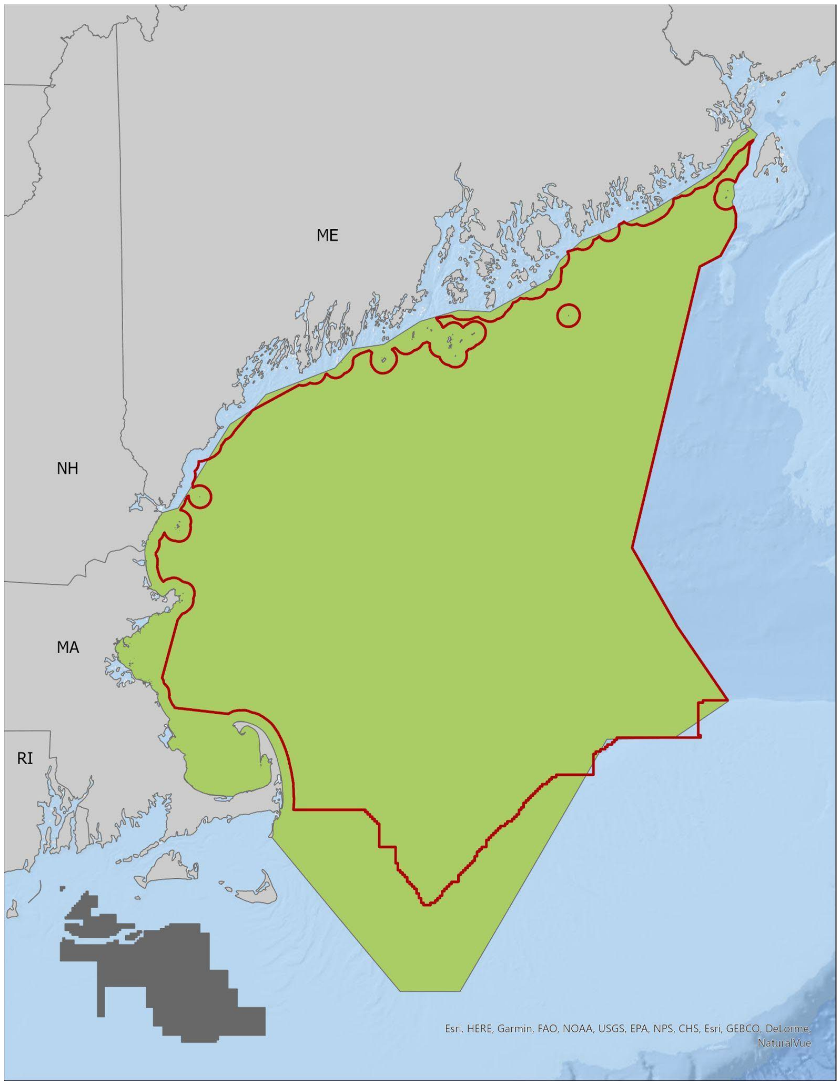


Figure 10: Critical habitat (Unit 1) designated for the North Atlantic right whale shown in green. RFI area outlined in red. Existing OCS leases shaded in gray.

Additional Information Related to Protected Species

In addition to the concerns regarding North Atlantic right whales highlighted above, note that both minke and humpback whales are currently experiencing Unusual Mortality Events (UME). Since January 2017, elevated minke whale mortalities have occurred along the Atlantic coast from Maine through South Carolina with 123 strandings recorded through June 2022.[27] Full or

[27] https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2022-minke-whale-unusual-mortality-event-along-atlantic-coast

partial necropsy examinations were conducted on more than 60% of the whales. Preliminary findings in several of the whales have shown evidence of human interactions or infectious diseases. These findings are not consistent across all of the whales examined, so more research is needed. Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida with 161 strandings recorded through June 2022. Partial or full necropsy examinations were conducted on approximately half of the whales. Of the whales examined, about 50 percent had evidence of human interaction, either ship strike or entanglement. It is important to consider how development in the Gulf of Maine can be carried out in a way that would not exacerbate the conditions being experienced by these species.

We would also like to bring your attention to two other NOAA efforts related to protected species: The Biologically Important Areas (BIAs)[28] effort and updates to the North Atlantic right whale vessel speed rule (50 CFR § 224.105).

BIAs identify areas and times within which cetacean species or populations are known to concentrate for specific behaviors, or be range-limited, and provide additional context within which to examine potential interactions between cetaceans and human activities. Specific to anthropogenic sound and marine mammals, there is compelling evidence indicating that a variety of contextual factors, including behavioral state and life stage, can influence the probability, nature, and extent of a marine mammal's response to noise. The BIAs provide some of this important contextual information for cetaceans and can augment the cetacean density, distribution, and occurrence data typically used in marine mammal impact assessments. BIAs are compilations of the best available science and have no inherent or direct regulatory power. They have been used by NOAA, other federal agencies, and the public to support planning and marine mammal impact assessments, and to inform the development of conservation measures for cetaceans. Importantly, NOAA, with the support of the U.S. Navy, has convened a working group of regional cetacean experts who have begun updating and revising the BIAs identified in Van Parijs et al. (2015), identifying the full extent of any BIAs that overlap U.S. waters, adding new BIAs where appropriate, and scoring each BIA. The use of a new BIA scoring and labeling system will improve the utility and interpretability of the BIAs by designating an overall Importance Score for each BIA. Finalization of the updated website and database is scheduled for December 2022. The locations, timing, and Importance Scores of the updated and revised BIAs in the Gulf of Maine, once this information becomes available, should be used by BOEM, in combination with other relevant marine mammal data, to inform final lease areas. Until then, the currently recognized BIAs that overlap with the Gulf of Maine should be considered.

On August 1, 2022 NMFS published a proposed rule (87 FR 46921) regarding changes to the North Atlantic right whale vessel speed regulations to further reduce the likelihood of mortalities and serious injuries to endangered right whales from vessel collisions, which are a leading cause of the species' decline and a primary factor in an ongoing Unusual Mortality Event. The proposed rule would: 1) modify the spatial and temporal boundaries of current speed restriction areas, currently referred to as Seasonal Management Areas (SMAs), 2) include most vessels greater than or equal to 35 ft (10.7 m) and less than 65 ft (19.8 m) in length in the vessel size class subject to speed restriction, 3) create a Dynamic Speed Zone framework to implement mandatory speed restrictions when whales are known to be present outside active SMAs, and 4)

[28] https://oceannoise.noaa.gov/biologically-important-areas

update the speed rule's safety deviation provision. Changes to the speed regulations are proposed to reduce vessel strike risk based on a coast wide collision mortality risk assessment and updated information on right whale distribution, vessel traffic patterns, and vessel strike mortality and serious injury events. Changes to the existing vessel speed regulation are essential to stabilize the ongoing North Atlantic right whale population decline and prevent the species' extinction. All potential measures to further reduce the risk of vessel strike for North Atlantic right whales, including those identified in the August 2022 proposed rule, should be considered as potential lease areas and lease conditions are identified.

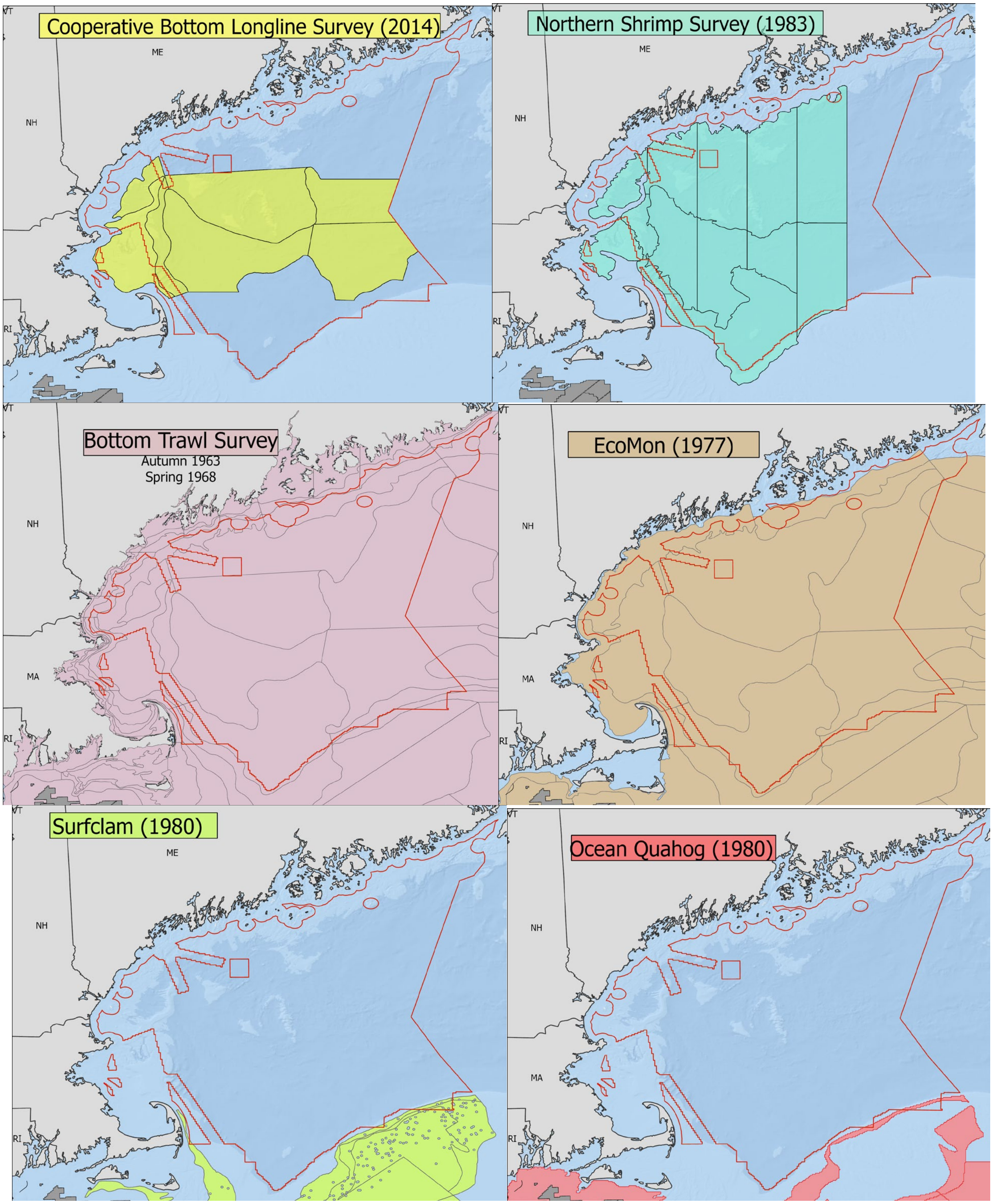
Conclusions

The Gulf of Maine is a dynamic habitat that is host to many protected species. Given the rapidly changing environment and uncertainty regarding impacts of offshore wind energy development, specifically floating infrastructure, we have identified a number of key habitat features and areas of high North Atlantic right whale use including the Maine Coastal Current, Wilkinson Basin, Jordan Basin, and output from the Duke University North Atlantic right whale habitat density model. The Passive Acoustic Cetacean Map should also be utilized as a data source to refine the RFI area for consideration of habitat use of marine mammals, specifically the North Atlantic right whale, in the Gulf of Maine. These areas are of particular concern and require additional information to inform if they should be excluded from leasing or how.

NOAA Scientific Surveys

In addition to seven regional NOAA scientific surveys,[29] two other NOAA surveys specific to the Gulf of Maine (Gulf of Maine Cooperative Research Bottom Longline Survey and Northern Shrimp Survey) will also be affected by potential offshore wind development in the RFI area (see Figure 11). Impacts to these surveys from future offshore wind development could potentially affect fisheries management through lower quotas for commercial and recreational fishermen due to increased uncertainty in the surveys' measures of abundance. Effects to NMFS scientific surveys would also result in adverse effects on monitoring and assessment activities associated with recovery and conservation programs for protected species, including the North Atlantic right whale.

[29] Affected regional surveys include the Autumn and Spring Bottom Trawl Survey, Ecosystem Monitoring Survey, Marine Mammal and Sea Turtle Aerial Survey, North Atlantic Right Whale Aerial Surveys, Atlantic Surfclam Survey, Ocean Quahog Survey, and the Atlantic Sea Scallop Survey.


Cooperative Bottom Longline Survey (2014)
ME
NH
RI
Northern Shrimp Survey (1983)
ME
NH
RI
Bottom Trawl Survey
Autumn 1963
Spring 1968
NH
MA
RI
EcoMon (1977)
NH
MA
RI
Surfclam (1980)
ME
NH
RI
Ocean Quahog (1980)
NH
MA
RI

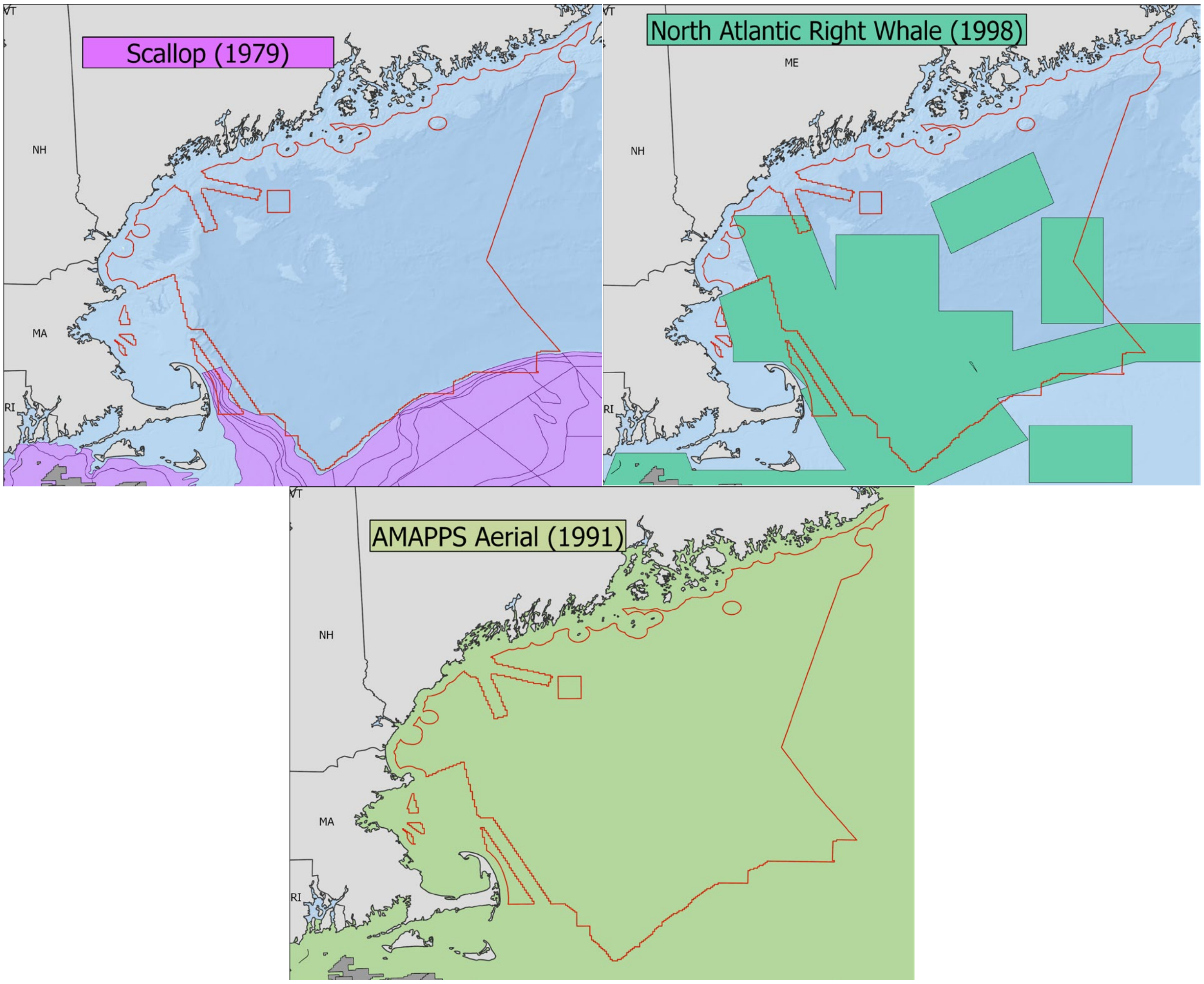


Figure 11: NOAA Scientific Surveys in the RFI Area

APPENDIX B
Scientific Research and Monitoring Recommendations

Here we provide recommendations for steps to carry out at the earliest stages of planning to help fill data gaps and inform potential development in the Gulf of Maine. We also provide recommendations regarding research, monitoring, and mitigation for the RFI area and outline recommended topics for study for any research lease in the RFCI area.

Recommendations for a Science Based Approach to Area Identification

Given the important marine resources and potential user conflicts in the Gulf of Maine, we recommend BOEM take a deliberative ecosystem-based management approach to evaluating and identifying areas that may be eligible for future commercial leasing. A measured and science-based planning approach would provide greater transparency and clarity to the process by better informing the public on potential resource impacts and user conflicts and how to minimize adverse impacts. It would also recognize the need for additional information to address known data gaps to fully inform future lease decisions. Below we outline recommended steps that should be taken prior to issuing additional leases on the OCS, including the Gulf of Maine.

1. **Design and apply ecosystem-based management and marine spatial planning approaches to considering commercial leasing in the Gulf of Maine**

   The Gulf of Maine RFI area covers over 13.7 million acres of the Atlantic OCS; this is in addition to the 2.5 million acres already leased and up to 4 million acres under consideration as part of the Central Atlantic Call Areas. Given the extensive area proposed for development on the Atlantic OCS, we request that you take this opportunity to establish a method for assessing cumulative impacts upfront in the planning process. This should include the development of decision-support tools to analyze and predict the aggregated and cumulative impacts from multiple stressors, including offshore wind development and associated activities in the context of climate change. Such modeling exercises and tool development are reliant on rigorous and sustained systematic data collection of various ecosystem parameters and are important to help inform the identification of future lease areas. This approach would include an integrated ecosystem assessment or application of best available ecosystem based management tools to incorporate a cumulative impact analysis to inform the planning process, rather than waiting to consider such effects on a project by project basis. This analysis should include the evaluation of potential transmission corridors rather than simply focusing on the lease areas alone. Such an approach can help inform the wind energy area identification process and help minimize impacts and user conflicts, while providing more transparency to the process.

   We understand BOEM is working with NOAA's National Centers for Coastal Ocean Science (NCCOS) to conduct marine spatial planning in the Gulf of Maine to inform your decision on area identification for future leasing. This is an important step to better inform the process and we are working to provide technical assistance to NCCOS in this process. However, we are concerned that the short timeline to conduct this process will limit our ability to provide a comprehensive suite of available data for various marine resource issues (protected species, habitat, fishing operations, etc.) to most effectively identify areas where development may be more suitable. We encourage you to work with NCCOS to take a comprehensive approach and incorporate the best available data and consider existing data gaps to inform any marine spatial model. This effort and future marine spatial planning approaches needed for the Gulf of Maine should also incorporate independent scientific peer review to ensure transparency and that the best available science is being used for decision-making. There are substantial data gaps in the Gulf of Maine, as further described in Appendix A and below, that will be important to consider in any spatial modeling process and address prior to identifying areas suitable for commercial leasing. We welcome the opportunity to work with you and NCCOS to help inform any marine spatial planning efforts.

In addition to this spatial modeling effort, we recommend that BOEM continue participating in and make use of the results of NOAA's Northeast Integrated Ecosystem Assessment (IEA) project focused on the Gulf of Maine to help inform the leasing process. IEAs are designed to help inform managers of the inherent trade-offs between ocean uses. They are a six step collaborative process between stakeholders, managers, and researchers designed to be conducted in an iterative fashion. Such ecosystem-based management approaches also constitute the best available scientific methods for addressing multi-use planning exercises in complex marine ecosystems. The Northeast IEA program led by the NEFSC has partnered with Responsible Offshore Development Alliance (RODA) and NOAA Sea Grant to conduct an IEA around offshore wind and fisheries interactions. Scoping steps are already underway with plans for a participatory modeling workshop to develop a conceptual model to help identify critical indicators and data gaps planned for spring of next year. The IEA will culminate in an indicator-based risk assessment that will be able to inform cumulative effects of offshore wind energy development on marine resources and fisheries. NOAA recommends enhanced coordination between the NOAA- led IEA program and the BOEM-led Standardizing IEA project to ensure maximum benefits from both projects can be applied to the Gulf of Maine offshore wind decision-making. While NEFSC has included BOEM staff on our Gulf of Maine IEA steering committee, we may need to identify other mechanisms to allow for the most effective collaboration.

2. Establish standardized monitoring requirements and collect region-wide baseline research and monitoring data

In order to effectively perform environmental assessments of future project impacts on the marine environment, it is critical to understand resource and human use conditions of areas being considered for development. No standardized baseline monitoring requirements exist that allow sufficient resolution for assessing the resource conditions of proposed development areas. While guidelines and best practices have been developed, without consistent standardized approaches, it is not possible to effectively evaluate project impacts. It is important to establish and begin a baseline region-wide monitoring program to help inform wind energy area identification and provide more certainty to future regulatory processes. Such an approach is particularly important for the Gulf of Maine where substantial regional scale data gaps still exist in our understanding of habitat conditions, fisheries use patterns, protected species and habitat use, and ecosystem conditions. These data gaps are noted here and in Appendix A. A science based regional monitoring program should be implemented and standardized baseline data collected to help inform any future commercial leasing. This program should be comprehensive: physical, chemical, biological, and human components of the ecosystem. Monitoring efforts should include passive acoustic monitoring (PAM), habitat surveys of sufficient spatial and temporal resolution, and improved fisheries operational monitoring, particularly for the underreported lobster fishery. Additional information and details are provided below. We recommend this program be established prior to commercial scale leasing to avoid and minimize impacts and conflicts with existing resources and ocean users in the Gulf of Maine. Then we recommend that this program be continued through the operation of wind energy development to inform rectifying, reducing or eliminating impact over time, and compensating for impact by replacing or providing substitute resources or environments.

Prior to any commercial leasing in the Gulf of Maine, it is critical to establish certainty for all parties with regards to scientific needs and regulatory requirements for monitoring fisheries, wildlife, and ecosystem conditions. In the absence of monitoring requirements, individual projects will continue to implement narrowly defined monitoring strategies that do not follow standardized protocols, procedures, methods, and data sharing arrangements. A regionally integrated research and monitoring framework is needed to assess and understand the interactions of offshore wind development. Development of such a framework requires clearly defined research questions and hypotheses, scientifically robust experimental designs capable of addressing stated hypotheses and detecting change, standardized data collection methods, and transparency in data sharing and accessibility. As part of the development of uniform monitoring methods, we encourage early collaboration with NMFS scientists to maximize the utility of any monitoring efforts.

Recommendations for Data Collection and Monitoring to Inform Area Identification

Habitat

Extensive benthic and pelagic habitat mapping and characterization in the Gulf of Maine is necessary prior to issuance of any commercial leases. We are concerned that there is so little information available regarding the distribution of pelagic and benthic habitats in the Gulf of Maine. In offshore waters, detailed habitat maps have only been produced for a few small areas and the associated substrate samples (USSeaBed) are few and widely spaced. There is, therefore, not nearly enough information needed to identify and locate sensitive habitat types found in the RFI area. It is important to note that any spatial model used to aid in planning will be limited by the available habitat data. Substantially more mapping and characterization is necessary to ensure that these vulnerable habitats are identified and used to inform future lease planning so they can be avoided. To reduce potential conflict later in the process, we recommend BOEM initiate large-scale habitat mapping and characterization in the RFI area, in consultation with our agency, at this early planning stage and prior to the identification of wind energy areas. This will help identify sensitive areas early in the planning process and provide more certainty and efficiencies for the regulatory process.

As described in Appendix A, there is limited point data for deep-sea corals in the Gulf of Maine and only a small portion of the Gulf of Maine has actually been surveyed for deep-sea corals. Absence of coral data does not mean absence of corals; thus, extensive and full coverage habitat mapping and characterization – far more extensive than currently conducted in existing lease areas – would be necessary to determine the extent to which corals could be impacted by future development in the Gulf of Maine. Deep-sea corals provide important three-dimensional structure for many deep-water bottom communities and have been identified as habitat for certain commercially important fish and shellfish species. The vulnerability of corals has stimulated intensive research, monitoring, mapping, and conservation efforts to protect deep-sea corals and their habitats. There are ongoing and future (next 2-3 years) initiatives to try to further survey and characterize the extent of corals in the Gulf of Maine, but support for these efforts are necessary. We recommend BOEM invest in mapping and characterization of corals in the Gulf of Maine as soon as possible and prior to issuing any commercial leases.

The oceanographic features unique to the Gulf of Maine contribute to the biodiversity of this area and we recommend BOEM prioritize monitoring and research to understand potential impacts of large scale development on this system. This should include both modeling efforts and field data collection. Prior to establishing wind energy areas, we recommend regular physical and biological sampling be conducted in the Gulf of Maine to collect baseline data on the pelagic environment. BOEM should use this information to provide a baseline for assessing the impacts of offshore wind development on the pelagic environment. Sampling methodologies should be developed so that results can be used to assess effects of floating wind turbines on the oceanographic and atmospheric environment. Information from these studies should be used to identify lease areas that will minimize the adverse effects of offshore wind development on NOAA trust resources and fisheries.

Fisheries

A better understanding of the distribution of private recreational angling and fishing effort targeting lobsters and highly migratory species such as bluefin tuna is necessary to inform future area identification within the Gulf of Maine. Existing data sources are inadequate to accurately estimate where and when these fishing activities occur. Higher resolution spatial and temporal data could be collected to address this deficiency for these fisheries. Given anticipated additional restrictions on lobster fishing, more detailed data on the gear that is used and the manner in which gear is deployed would help assess future operational trends and the impacts of and the ability of the fishery to adapt to potential floating wind turbine platforms within the Gulf of Maine. Unless and until more systematic data collections are developed, exploration of fisheries ecological knowledge (i.e., stakeholder-driven understandings of the marine environment) could help fill existing data gaps regarding operations within these fisheries and the potential biological, social, and ecological implications resulting from the development of future offshore wind projects within the Gulf of Maine. This could enhance existing and planned efforts by NMFS, BOEM, and others to conduct IEAs and investigate ecosystem effects of potential future development.

Additional socioeconomic and sociocultural research can help establish baseline information that could inform future wind lease decisions within the Gulf of Maine. Such research topics include fisheries resilience, community dependence upon fishing, port and space use conflicts, cultural and traditional values, equity and environmental justice, and seafood supply function. Ongoing efforts by the Northeast Sea Grant Consortium could help address some of these research topics, but additional work may be necessary.

Protected Species

To inform the further refinement of the RFI area and in respect to our suggestion of taking a comprehensive ecosystem approach to identifying areas and conducting a cumulative impact analysis, we recommend the following monitoring efforts below be completed before leases are issued (or at the latest, before construction). Additionally, NMFS recommends that BOEM first move forward with the development of the research lease and implement a robust research and monitoring program prior to pursuing any commercial leasing in the Gulf of Maine. This approach would greatly benefit protected species by informing data gaps to better understand potential impacts and conflicts and help to inform and facilitate environmental reviews of future commercial leases.

Continuous archival Passive Acoustic Monitoring (PAM) and acoustic and telemetry studies, as appropriate for the target species, should be conducted in the Gulf of Maine prior to leasing to collect baseline information on the presence, distribution, and seasonality of North Atlantic right whales, other marine mammals, and acoustically tagged species (e.g., highly migratory species such as tunas and sharks, sturgeon, and sea turtles). Additionally, both archival and real-time PAM should be used to collect baseline information on the presence, distribution, and seasonality of marine mammals located in the potential transit routes from ports that may be used to support offshore construction and operations. Archival PAM should also be used to establish baseline noise levels and habitat conditions in the Gulf of Maine. A coordinated regional PAM approach should be taken which follows the recommendations in Van Parijs et al. 2021.[30] Monitoring using continuous PAM archival recorders should occur three to five years prior to the identification of lease areas, or at least a minimum of three to five years before construction. If conducted prior to leasing, the information from the PAM should be used to inform the location and size of potential lease areas by removing areas which overlap with identified locations with high species diversity, biological importance (i.e. migratory routes), or high individual species presence (i.e. hotspot). If PAM is conducted after leasing, but prior to construction, the information should be used to inform the development of lease areas to minimize effects to protected species by limiting activities, such as construction or placement of structures, which may overlap with identified locations with high species diversity, biological importance (i.e. migratory routes), or high individual species presence (i.e. hotspots). Both archival and real-time PAM should be used throughout the construction and operations phases as a monitoring tool to inform mitigation measures and to assess effects of offshore wind energy development on marine mammals.

Systematic aerial surveys should be conducted in the Gulf of Maine to collect baseline data on the presence, abundance, distribution, and seasonality of marine megafauna prior to leasing and construction. Surveys should follow a similar protocol to the aerial surveys conducted in the

[30] Van Parijs, S.M., Baker, K., Carduner, J., Daly, J., Davis, G.E., Esch, C., Guan, S., Scholik-Schlomer, A., Sisson, N.B. and Staaterman, E., 2021. NOAA and BOEM Minimum Recommendations for Use of Passive Acoustic Listening Systems in Offshore Wind Energy Development Monitoring and Mitigation Programs. *Frontiers in Marine Science*, *8*, p.760840.

Massachusetts/Rhode Island Wind Energy Areas[31] and should be flown on a regular basis. Aerial surveys should occur three to five years prior to the identification of lease areas, or at least a minimum of three to five years before construction. If conducted prior to leasing, the information from the aerial surveys should be used to inform the location and size of potential lease areas by removing areas which overlap with identified locations with high species diversity, biological importance (i.e. migratory routes), or high individual species presence (i.e. hotspot). If aerial surveys are conducted after leasing, but prior to construction, the information should be used to inform the development of lease areas to minimize effects to protected species by limiting activities, such as the construction or placement of structures, which may overlap with identified locations of high species diversity, biological importance (i.e. migratory routes), or high individual species presence (i.e. hotspots). Studies that provide a better understanding of behavioral impacts to marine mammals from noise sources such as pile driving and concentrated vessel traffic, with particular attention to baleen whales, should also be undertaken. Aerial surveys should be used throughout the construction and operations phases as a monitoring tool to inform mitigation measures and to assess effects of offshore wind energy development on marine mammals.

As discussed in the habitat section above, regular physical and biological oceanographic sampling should be conducted prior to the identification of lease areas and surrounding waters, or at least a minimum of three to five years before construction, to collect baseline data on the pelagic environment. Surveys should be designed to assess seasonal characteristics of the water column, oceanographic processes, and prey resources (i.e., plankton, forage fish). Sampling should occur such that results can be used to assess effects of the physical structure of wind turbines and their operation on the oceanographic and atmospheric environment.

Recommendations for Research Topics for the Proposed Research Array

As discussed in our comment letter, we recommend a research program be designed and implemented to assess impacts of floating wind technology and development in the Gulf of Maine. The State of Maine's proposal to conduct a pilot study of potential floating wind turbine technologies within the proposed RFCI Area is consistent with this recommendation. It is important that the results and information gained from a research lease in the RFCI area be used to inform future development and, therefore, we recommend BOEM consider the results of this study before identifying areas eligible for commercial leasing in the Gulf of Maine.

The evaluation of the potential effects of floating wind turbine platforms and associated cables on marine resources and fisheries should be a priority for this study. A well developed research program can help provide the science needed to inform the commercial leasing process; identify measures to reduce impacts of marine resources, fisheries, and coastal communities; and provide increased predictability of development opportunities associated with this novel technology. This is particularly important given the overlap of the RFI area with the distribution of North Atlantic right whale critical habitat, and ongoing efforts to reduce vertical lines in the water to minimize the risk of entanglement to this and other protected species.

A robust research design should be developed for the RFCI and examine various floating wind

[31] https://www.masscec.com/resources/marine-mammal-and-sea-turtle-surveys

turbine technologies and platform designs, along with inter-array/export cable and platform mooring system effects on the marine environment including benthic and pelagic habitats, corals, protected species, and a full range of fishing operations. It is important to note that the development of any research plan should start by identifying research questions and hypotheses to be addressed along with the study design and sampling methodologies that will be used to address those questions. Study designs should be informed by power analyses to ensure that replication is sufficient to detect significant changes. Below we identify an initial list of recommended research topics to address in a research plan. The following list is a starting point of research topics and should not be considered an exhaustive list:

- *Construction/installation and operational noise*: Evaluation of the effects of noise on marine resources and studies to evaluate options to reduce such noise.
- *Entanglement risk*: Studies to assess entanglement risk for protected species in various mooring and cable configurations, including the potential for accumulation of abandoned, lost, or otherwise discarded fishing gear and other marine debris on project infrastructure as a risk for entrapment, ingestion, or secondary entanglement.
- *Fisheries interactions*: Research on cable and mooring system types, spacing, depth, and movement along the bottom and within the water column to help inform whether it is feasible to operate fixed or mobile gear among floating wind turbine platforms.
- *Benthic habitat impacts*: Studies examining effects to benthic habitats and associated epifauna and infauna from mooring systems and transmission cables, including effects from anchors, and associated cable sweep and required scour protection.
- *Hydrodynamic and oceanographic effects*: Studies to understand hydrodynamic changes as a result of such structures and associated impacts to biological resources, including plankton and egg and larval distribution, and associated primary productivity and recruitment, as well as potential physical effects to mixing and fronts in the Gulf of Maine from atmospheric energy extraction. This should include studies to fill data gaps and increase understanding of effects of floating wind technology on North Atlantic right whale critical habitat, including the identified physical and biological features of this habitat (see below).
- *Habitat alteration and community structure changes*: Studies to evaluate effect of habitat conversion including changes in community structure within and adjacent to the floating structures and associated anchors and cables, including epifaunal growth, invasive species distribution, changes in benthic and macrobenthic communities and fish abundance and distribution, as well as changes to electromagnetic fields due to the use of potentially suspended inter-array cables.
- *Energy transmission*: A full evaluation of the transmission of energy from floating wind to shore should be incorporated into these studies, including how the cables will be oriented in the water column or fully/partially buried and the resources that would be affected, as well as how impacts to resources could be minimized through the evaluation and identification of landfall locations and cable routes.
- *Port infrastructure modifications*: Evaluate and plan for potential port infrastructure needs for floating wind and consider how the location of potential lease areas and associated shoreside support operations may impact coastal and marine resources and coastal/fishing communities.

In Appendix A, we provide information on the physical and biological features of critical habitat designated for the North Atlantic right whale. Studies should be designed and carried out to fill gaps related to the understanding of the effects of floating wind turbines and associated components on the features of critical habitat and how effects to these features may affect foraging behavior and the distribution and health of North Atlantic right whales. We anticipate that this research could then help inform decisions about how commercial leases could be sited in the Gulf of Maine in a way that would avoid adverse effects to the physical and biological features of designated critical habitat or to inform the development of lease conditions that would result in avoiding, minimizing, or mitigating such impacts.

We recommend you use ongoing and planned efforts to inform research plan development and work with our agency prior to finalizing any research plan. Additional research study topics can be informed by recent efforts such as Maine's Offshore Wind Roadmap, RODA's Synthesis of the Science Report, Responsible Offshore Science Alliance priority research needs discussions, and the National Renewable Energy Laboratory's data needs recommendations. RODA is currently developing a second Synthesis of the Science workshop focused on floating offshore wind which will identify data gaps and research needs. We look forward to continuing to work with BOEM, state agencies, research institutions, and affected stakeholders to discuss research and data needs that could be addressed through the proposed research array.

<u>Other NMFS Recommendations to Consider Prior to Commercial Leasing</u>

In addition to the above considerations for identifying areas that are suitable for commercial wind leasing, we recommend implementation of the following measures in association with any commercial wind leasing in the Gulf of Maine.

1. **Establish and implement a federal survey mitigation program with funds to mitigate impacts on existing and potential future survey efforts.**

   In March 2022, NOAA and BOEM released a draft Federal Survey Mitigation Implementation Strategy to address our agencies' efforts to mitigate the impacts on NMFS scientific surveys and the risks posed to living marine resource management. The strategy outlines actions that need to be taken in order to develop and implement regional survey mitigation programs, including identifying and securing the necessary resources to implement mitigation activities. Prior to leasing in the Gulf of Maine, key elements of the strategy should be completed, including developing and resourcing Northeast Regional Federal Survey Mitigation Programs, noting that survey mitigation strategies for floating turbine platforms may differ from those implemented for fixed turbine foundations in other areas. This will provide certainty to developers, NMFS, and others who depend on the NMFS scientific survey enterprise.

2. **Establish standardized regional requirements for avoiding, minimizing, and mitigating impacts of offshore wind development.**

   Consistent with the Council on Environmental Quality regulations and NOAA's

Mitigation Policy[32], we encourage BOEM to avoid and minimize impacts to existing users and marine resources at all stages in the process and mitigate adverse impacts that cannot be avoided. We encourage the development of standard avoidance, minimization, and monitoring measures for future leases in the Gulf of Maine, including pre-construction, construction, and post-construction fisheries and wildlife monitoring requirements. Please reference our August 30, 2022, scoping letter regarding development in the New York Bight for an initial list of suggested measures; we anticipate that most of these measures would also be relevant to the Gulf of Maine.

Given the importance of the Gulf of Maine to marine trust resources and regional fisheries, BOEM, in partnership with state and federal agencies and affected stakeholders, should develop a consistent, equitable, and science-based mitigation process to address unavoidable impacts on wildlife, including protected species, habitats, and fishing industries and communities. Such a process should be required as a lease stipulation for any future leasing, but also employed throughout project development. Developing consistent and equitable regional mitigation standards following transparent scientific-based processes are an essential element in increasing the certainty and predictability for developers, conservation interests, and fishing communities. It is critical that fair and equitable processes are established to address any foreseeable or unforeseen impacts of offshore wind development on the marine ecosystem prior to additional leasing. NMFS recommends that the foregoing objectives be achieved through preparation of programmatic environmental analyses to inform the identification of future leases in the Gulf of Maine and develop avoidance, minimization and mitigation measures that could be incorporated and applied in future decision making such as disclosure of proposed lease stipulations prior to lease issuance.

3. Consider energy transmission and shoreside capacities in development planning.

We recommend BOEM consider all components of future development and associated impacts to NOAA trust resources prior to identifying areas for commercial leasing in the Gulf of Maine, including potential transmission corridors and shoreside facilities. A comprehensive evaluation of potential cable routes and available onshore connection locations should be conducted prior to finalizing the designation of wind energy areas so measures to help minimize impacts to marine resources, fishing operations and communities can be considered at the early planning stage. It would be useful for this evaluation to be conducted as a component of a larger programmatic analysis and include the evaluation of potential connection sites, grid capacities, export cable corridor routes, energy transmission requirements (i.e., HVDC cooling systems), available shoreside facilities, and port modification needs to accommodate commercial development of floating technology. This evaluation is consistent with our recommended ecosystem approach to lease planning. Impacts to NOAA trust resources from offshore wind development are not confined to the lease area, thus responsible planning for cable transmission and shoreside facilities should be a component development planning for

[32] https://www.noaa.gov/organization/administration/noaa-administrative-orders-chapter-216-program-management/nao-216-123-noaa-mitigation-policy-for-trust-resources

the Gulf of Maine.

4. **Develop a Programmatic Environmental Impact Statement (PEIS)**
As we have noted, we strongly recommend a science based, ecosystem approach to future leasing in the Gulf of Maine. The preparation of a Programmatic Environmental Impact Statement (PEIS) under the National Environmental Policy Act (NEPA) could help achieve this objective while providing transparency and additional public engagement to the process. A programmatic analysis would allow BOEM to take a comprehensive look at the region and engage in coordinated and strategic landscape-level planning to generate robust environmental information and alternatives for leasing to avoid or minimize natural resource and ocean use conflicts.

APPENDIX C

Greater Atlantic Regional Fisheries Office

Commercial Fishing Vessel Permit Historic Operations within the RFI Area

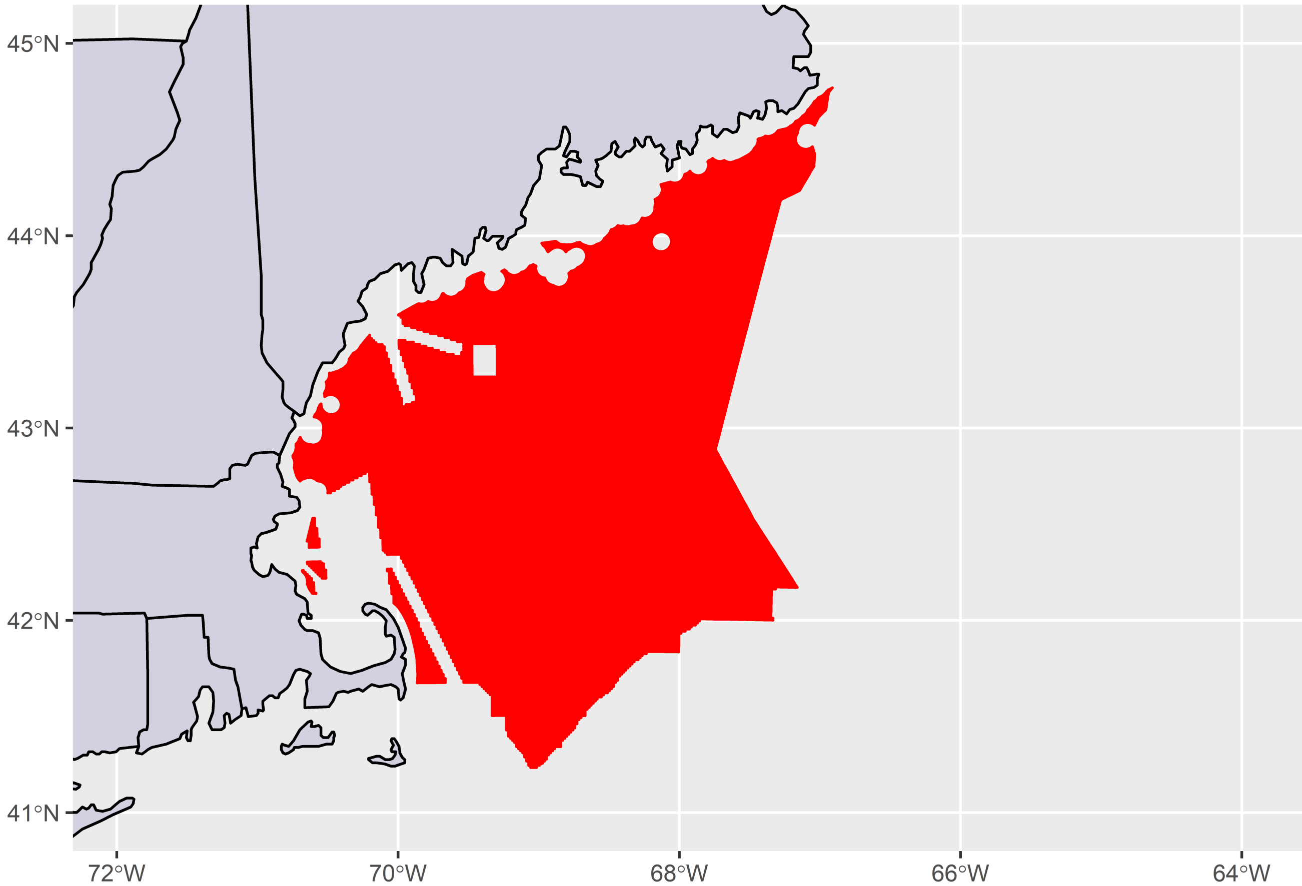
Back (https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development)

Descriptions of Selected Fishery Landings and Estimates of Vessel Revenue from Areas: A Planning-level Assessment

Prepared by:
National Marine Fisheries Service

September 13, 2022

Gulf of Maine RFI



Data sources:
Commercial Fisheries landings data, Vessel Trip Reports, and Surfclam/OceanQuahog Logbooks

In order to meet requirements of maintaining data confidentiality, these strata are presented individually. In addition, records that did not meet the rule of three (>=3 unique dealers and >= 3 unique permits), values were summarized as 'ALL OTHERS'.

Some caveats/notes:

- Values are reported in real 2020 dollars.
- Pounds are reported in landed (dressed) pounds.
- Data summarized here is based on vessels that are required to provide federal VTRs.
- Federal lobster vessels, with only lobster permits, do not have a VTR requirement. Many Atlantic Highly Migratory Species permitted vessels also do not have a VTR requirement. Trips with no VTR are not reflected in this summary.
- The ASMFC FMP includes the following species: American Lobster, Cobia, Atlantic Croaker, Black Drum, Red Drum, Menhaden, NK Sea Bass, NK Seatrout, Spot, Striped Bass, Tautog, Jonah Crab, and Pandalid Shrimp.
- The SERO FMP includes the following species: Amber Jack, Brown Shrimp, Dolphinfish, Greater Amberjack, Grouper, Grunts, Hogfish, King Mackerel, Long Tail Grouper, NK Porgy, Penaeid Shrimp, Red Grouper, Red Hind, Red Porgy, Red Snapper, Rock Hind, Sand Tilefish, Scamp Grouper,

Snapper, Snowy Grouper, Spadefish, Spanish Mackerel, Speckled Hind, Spiny American Lobster, Triggerfish, Vermillion Snapper, Wahoo, Wreckfish, Yellowedge Grouper.

- There exist other fisheries in State waters that may not be reflected in data from federal sources (e.g. whelk, bluefish). It is recommended to query state agencies for additional data within state waters.
- All summaries presented here are built from percentages of a trip that overlapped spatially with the WEAs. These percentages were applied to landings and values for that trip and summed. This differs from simply using the self-reported VTR/clam logbook locations as those place all value from that trip at a single point. Use of the VTR raster model is more representative as smoothing reported locations reduces the effect of location inaccuracy.
- The information reported for 2020 should be interpreted with caution due to the generalized impacts the COVID-19 pandemic had across many fisheries in the Greater Atlantic Region resulting in reduced landings and lower prices; hence lower revenues as well as unusually low numbers of vessels that fished during the year.

References

DePiper GS (2014) Statistically assessing the precision of self-reported VTR fishing locations. (https://repository.library.noaa.gov/view/noaa/4806)

Benjamin S, Lee MY, DePiper G. 2018. Visualizing fishing data as rasters. NEFSC Ref Doc 18-12; 24 p. (https://repository.library.noaa.gov/view/noaa/23030)

Most Impacted FMPs

We define “most impacted” as the FMPs deriving the most revenue from thearea over the thirteen year analysis period of 2008 to 2020, indicating the highest potential for impact to industry from a reduction in fishing area.The top 5 FMPs by revenue in Gulf of Maine RFI were Northeast Multispecies, ASMFC FMP, Atlantic Herring, Sea Scallop and Monkfish. Revenue values have been deflated to 2020 dollars. All numbers have been rounded to the nearest thousand. Specific figures on these FMPs within the area follow. See Table 5.1 for area totals for all FMPs and species.

Figure 1.1 Landings from Most Impacted FMPs, Gulf of Maine RFI

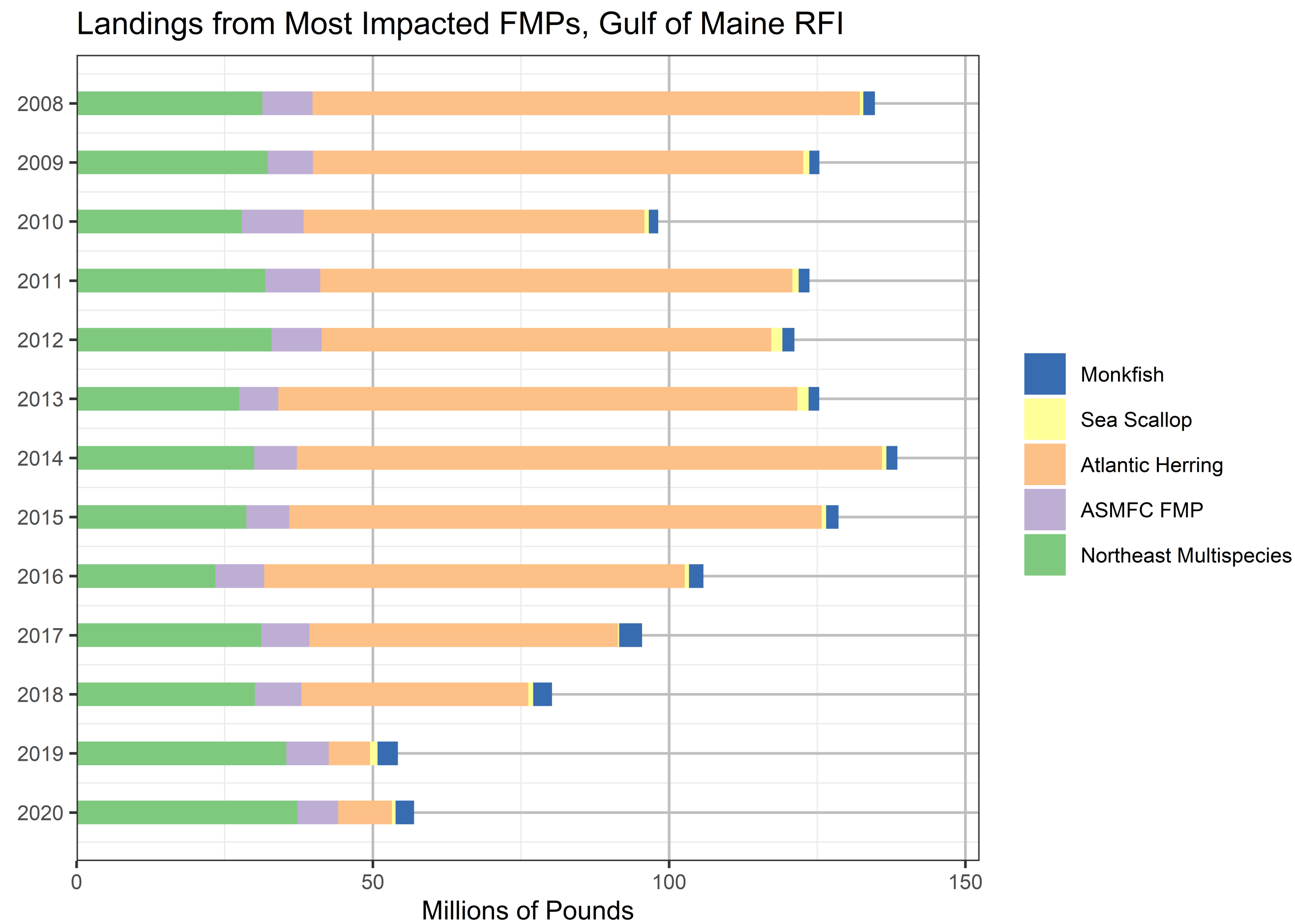


Table 1.1 Thirteen Year Total Landings (Pounds), Most Impacted FMPs, Gulf of Maine RFI

FMP	Thirteen Year Landings
Atlantic Herring	841,900,000
Northeast Multispecies	399,749,000
ASMFC FMP	103,567,000
Monkfish	30,865,000
Sea Scallop	12,272,000
Total	**1,388,353,000**

Figure 1.2 Revenue from Most Impacted FMPs, Gulf of Maine RFI

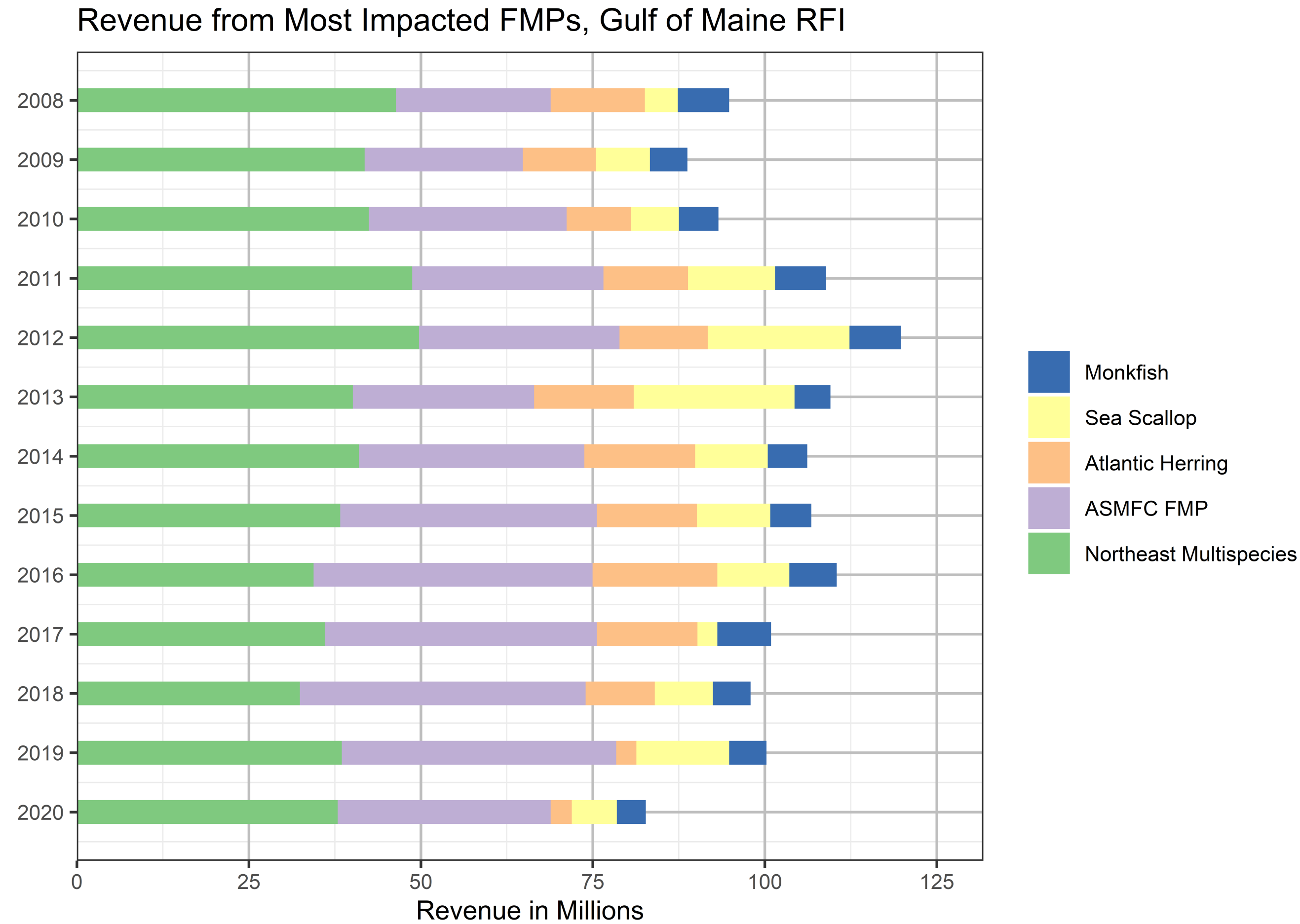


Table 1.2 Thirteen Year Total Revenue for Most Impacted FMPs, Gulf of Maine RFI

FMP	Thirteen Year Revenue
Northeast Multispecies	$527,858,000
ASMFC FMP	$420,138,000
Atlantic Herring	$152,742,000
Sea Scallop	$139,231,000
Monkfish	$80,326,000
Total	**$1,320,295,000**

Other Impacted FMPs

We analyzed other impacted FMPs separately in order to better visualize the estimated landings and revenues. The other impacted FMPs are: All Others, Bluefish, Highly Migratory Species, Mackerel, Squid, And Butterfish, No Federal Fmp, Sero Fmp, Skates, Small-Mesh Multispecies, Spiny Dogfish, Summer Flounder, Scup, Black Sea Bass, Surfclam, Ocean Quahog and Tilefish . The category “All Others” refers to FMPs with less than three permits or dealers impacted to protect data confidentiality. Revenue values have been deflated to 2020 dollars. All numbers have been rounded to the nearest thousand. See Table 5.1 for area totals for all FMPs and species

Figure 2.1 Landings from Other Impacted FMPs, Gulf of Maine RFI

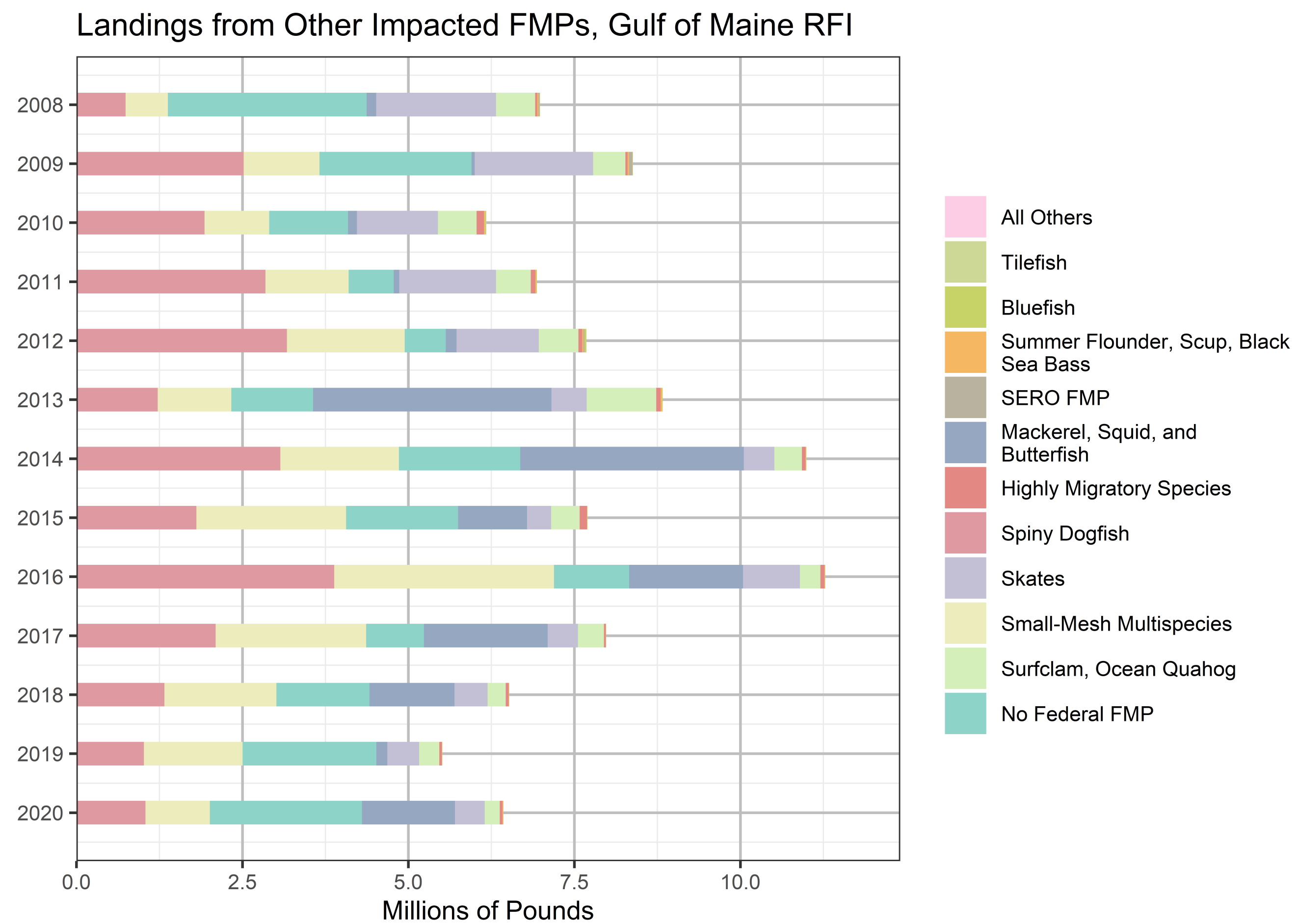


Table 2.1 Thirteen Year Total Landings (Pounds), Other Impacted FMP, Gulf of Maine RFI

FMP	Thirteen Year Landings
Spiny Dogfish	26,674,000
Small-Mesh Multispecies	20,650,000
No Federal FMP	20,223,000
Mackerel, Squid, and Butterfish	14,993,000
Skates	11,597,000
Surfclam, Ocean Quahog	6,173,000
Highly Migratory Species	739,000
Summer Flounder, Scup, Black Sea Bass	164,000
Bluefish	92,000
SERO FMP	89,000

FMP	Thirteen Year Landings
Tilefish	1,000
All Others	1,000
Total	**101,395,000**

Figure 2.2 Revenue from Other Impacted FMPs, Gulf of Maine RFI

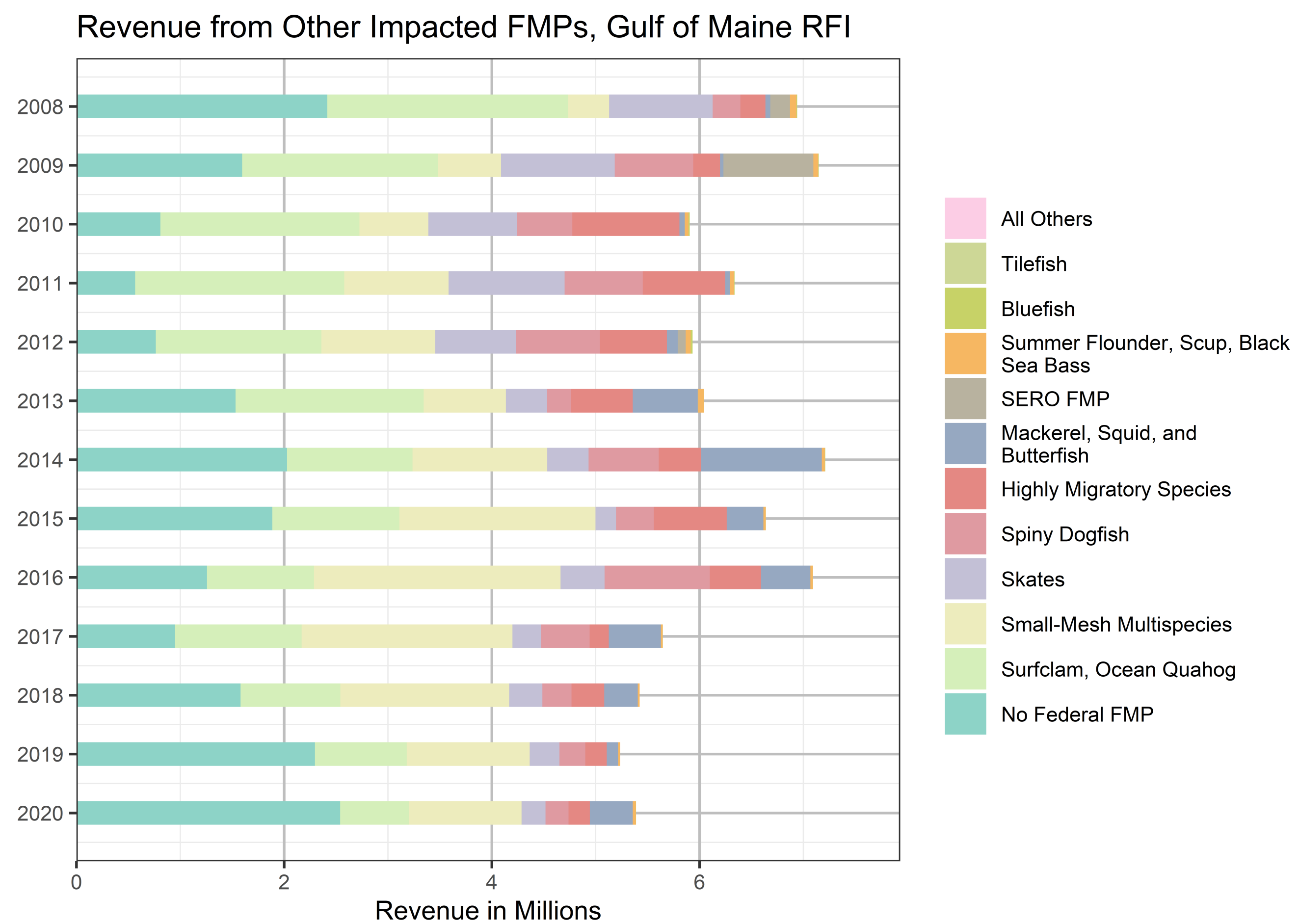


Table 2.2 Thirteen Year Total Revenue for Other Impacted FMPs, Gulf of Maine RFI

FMP	Thirteen Year Revenue
No Federal FMP	$20,224,000
Surfclam, Ocean Quahog	$18,725,000
Small-Mesh Multispecies	$16,047,000
Skates	$7,363,000
Spiny Dogfish	$6,623,000
Highly Migratory Species	$6,079,000
Mackerel, Squid, and Butterfish	$4,245,000
SERO FMP	$1,139,000

FMP	Thirteen Year Revenue
Summer Flounder, Scup, Black Sea Bass	$444,000
Bluefish	$60,000
Tilefish	$2,000
All Others	$1,000
Total	**$80,953,000**

Most Impacted Species

We analyzed the top 10 species due to their economic importance in the area and to isolate them from combined FMPs. The top 10 species by revenue are: American Lobster, Atlantic Herring, Sea Scallop, Pollock, Haddock, Cod, Angler, White Hake, Redfish and Am. Plaice Flounder . The category "All Others" refers to species with less than three permits or dealers impacted to protect data confidentiality. Revenue values have been deflated to 2020 dollars. All numbers have been rounded to the nearest thousand. See Table 5.1 for area totals for all FMPs and species

Figure 3.1 Landings of Most Impacted Species, Gulf of Maine RFI

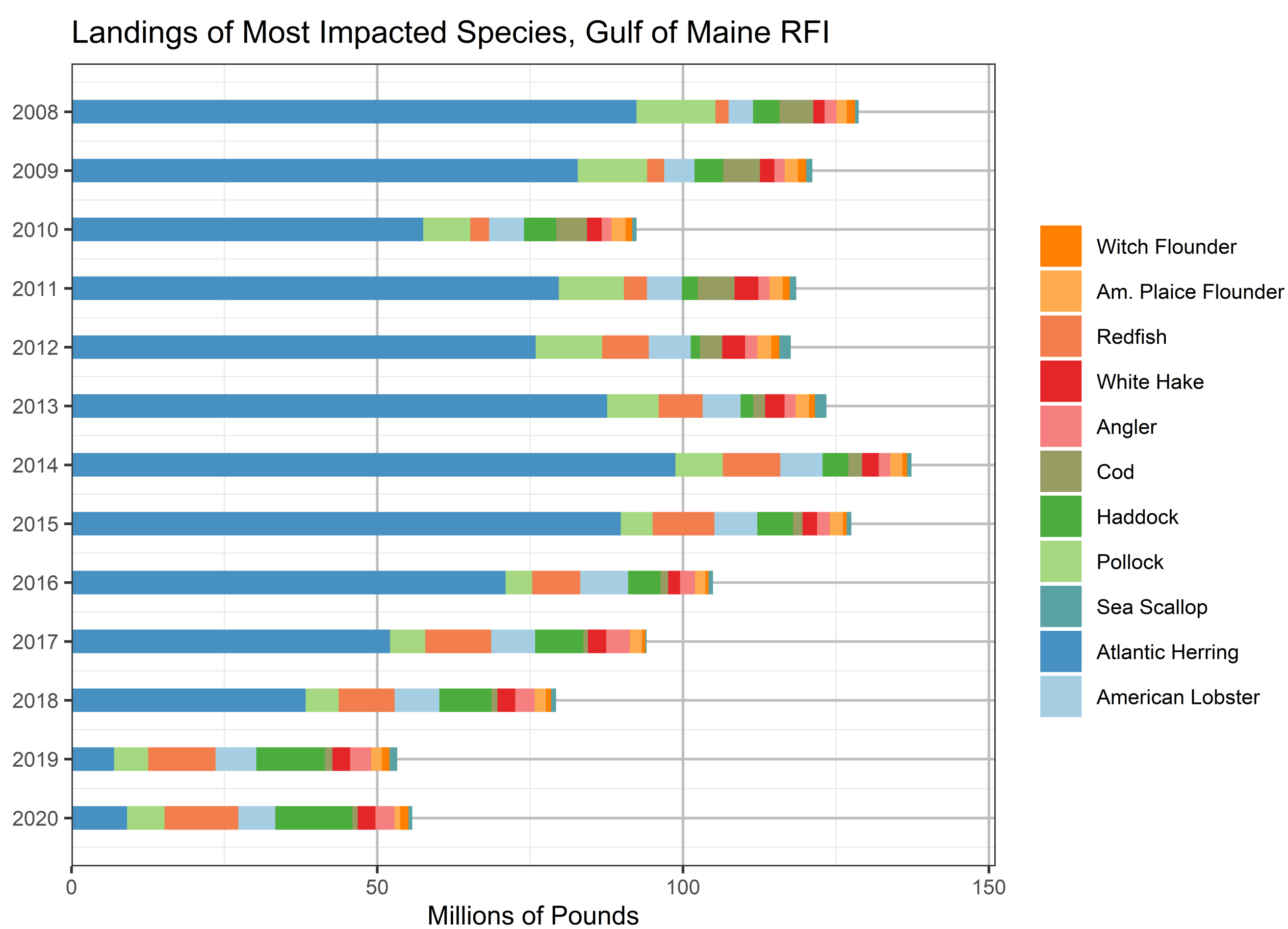


Table 3.1 Thirteen Year Total Landings (Pounds), Most Impacted Species, Gulf of Maine RFI

Species	Thirteen Year Landings
Atlantic Herring	841,900,000
Pollock	102,189,000
Redfish	96,954,000
American Lobster	82,351,000
Haddock	76,041,000
Cod	37,046,000
White Hake	36,201,000
Angler	30,865,000
Am. Plaice Flounder	25,192,000
Witch Flounder	13,067,000
Sea Scallop	12,272,000
Total	**1,354,079,000**

Figure 3.2 Revenue of Most Impacted Species, Gulf of Maine RFI

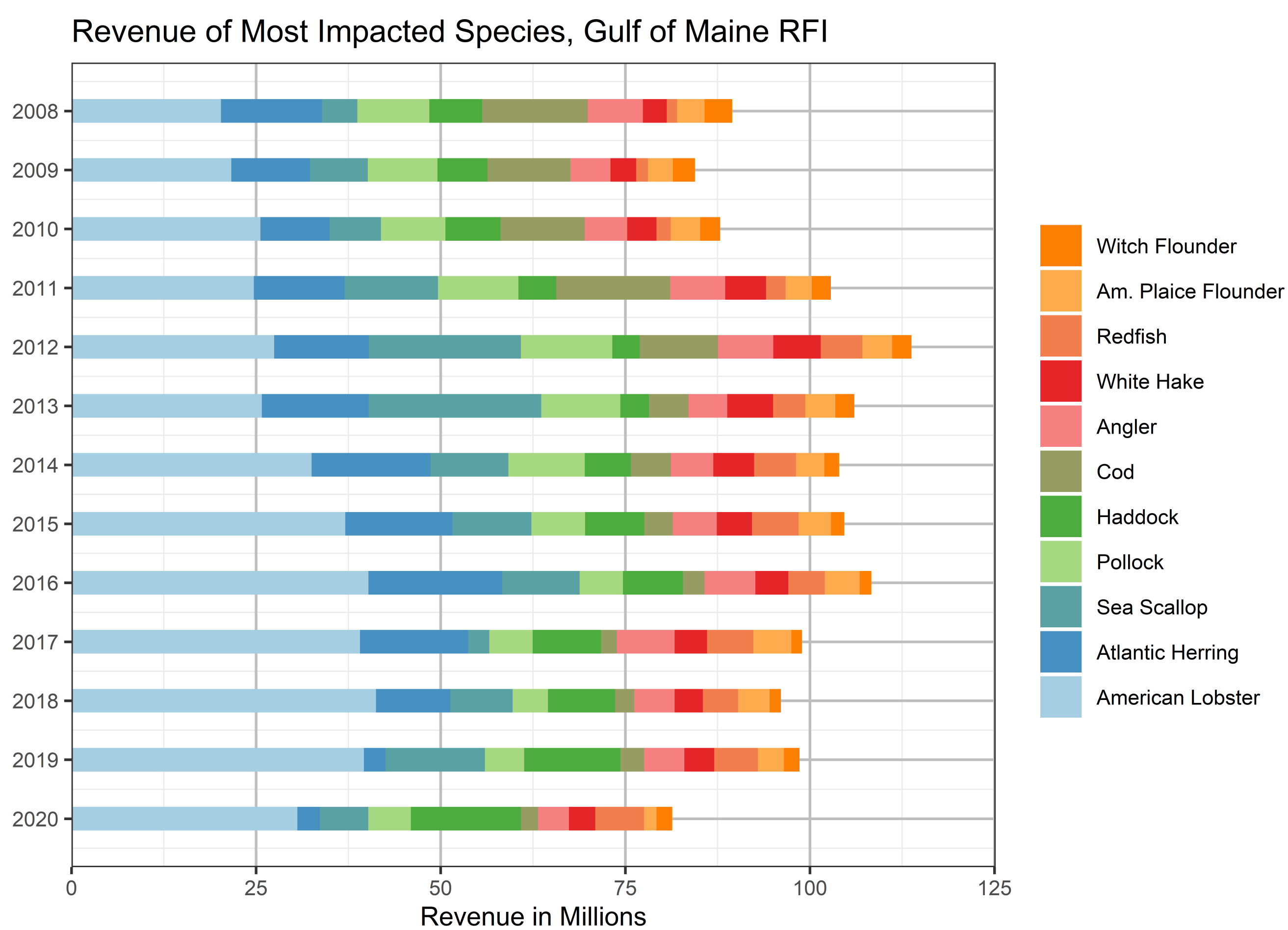


Table 3.2 Thirteen Year Total Revenue, Most Impacted Species, Gulf of Maine RFI

Species	Thirteen Year Revenue
American Lobster	$405,761,000
Atlantic Herring	$152,742,000
Sea Scallop	$139,231,000
Pollock	$107,102,000
Haddock	$102,821,000
Cod	$90,790,000
Angler	$80,326,000
White Hake	$59,394,000
Redfish	$58,081,000
Am. Plaice Flounder	$50,316,000
Witch Flounder	$29,903,000
Total	**$1,276,468,000**

Select Gear Types

We analyzed select gear types to better understand the type of fishing occurring in Gulf of Maine RFI . The select gear types are: Dredge-Other, Dredge-Clam, Dredge-Scallop, Gillnet-Sink, Gillnet-Other, Weir-Trap, Seine-Purse, Seine-Other, Handline, Hand-Other, Trawl-Bottom, Trawl-Midwater, Longline-Bottom, Longline-Pelagic, Pot-Other, and Pot-Lobster. The category “All Others” refers to species with less than three permits or dealers impacted to protect data confidentiality. Revenue values have been deflated to 2020 dollars. All numbers have been rounded to the nearest thousand.

Figure 4.1 Landings of Select Gear Types, Gulf of Maine RFI

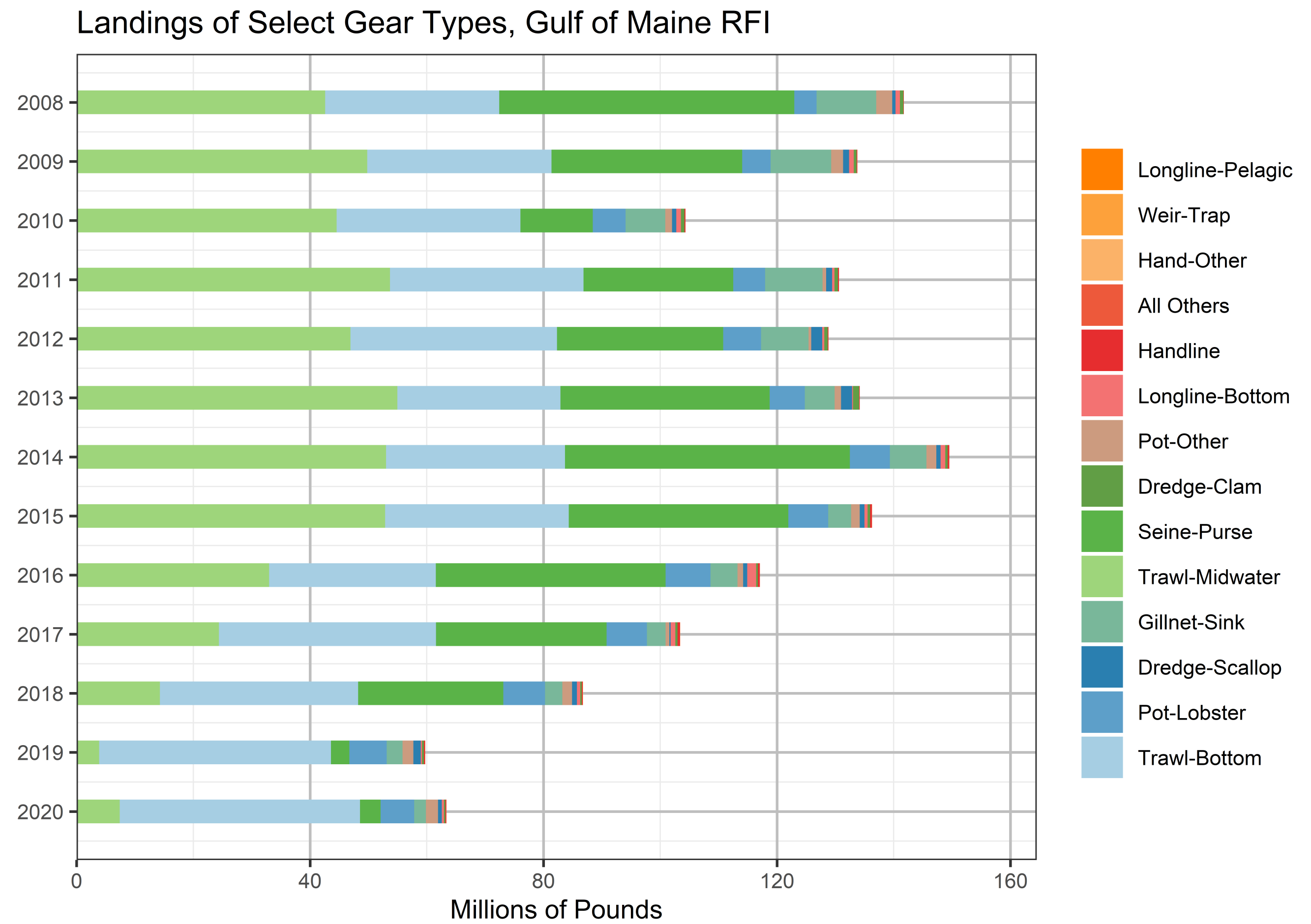


Table 4.1 Thirteen Year Total Landings (Pounds), Select Gear Types, Gulf of Maine RFI

Gear Type	Thirteen Year Landings
Trawl-Midwater	481,389,000
Trawl-Bottom	432,024,000
Seine-Purse	372,191,000
Pot-Lobster	79,874,000
Gillnet-Sink	76,185,000
Pot-Other	18,522,000
Dredge-Scallop	12,263,000
Longline-Bottom	8,121,000
Dredge-Clam	6,247,000
Handline	2,578,000
All Others	256,000
Weir-Trap	47,000
Hand-Other	45,000

Gear Type	Thirteen Year Landings
Longline-Pelagic	6,000
Total	**1,489,749,000**

Figure 4.2 Revenue from Select Gear Types, Gulf of Maine RFI

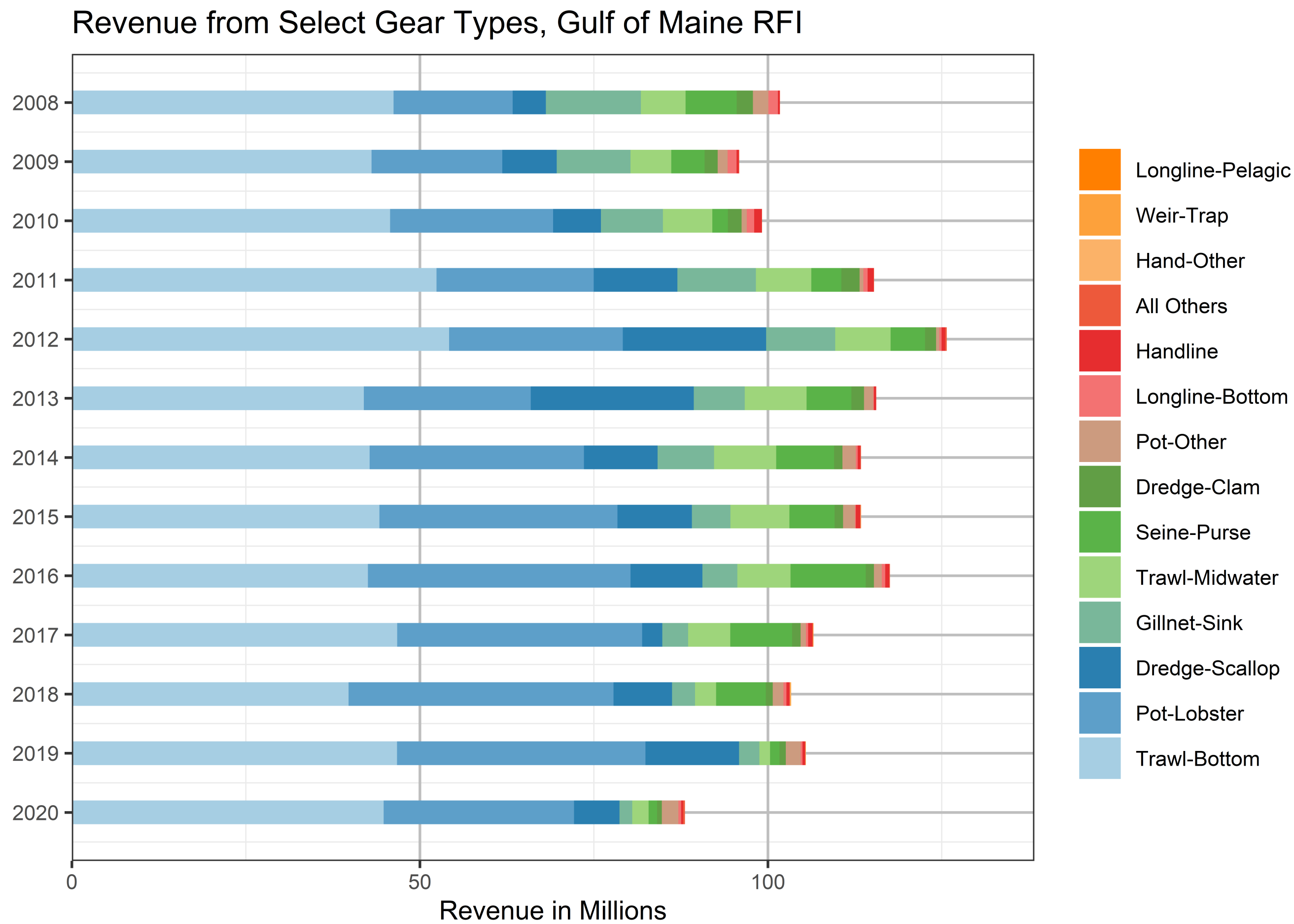


Table 4.2 Thirteen Year Total Revenue, Select Gear Types, Gulf of Maine RFI

Gear Type	Thirteen Year Revenue
Trawl-Bottom	$591,222,000
Pot-Lobster	$369,861,000
Dredge-Scallop	$138,362,000
Gillnet-Sink	$92,102,000
Trawl-Midwater	$82,269,000
Seine-Purse	$74,284,000
Dredge-Clam	$19,636,000
Pot-Other	$18,264,000
Longline-Bottom	$7,030,000

Gear Type	Thirteen Year Revenue
Handline	$6,808,000
All Others	$893,000
Hand-Other	$303,000
Weir-Trap	$212,000
Longline-Pelagic	$3,000
Total	**$1,401,248,000**

Totals

The following tables display the given year total revenue and total landed pounds of all species by all gear types within the area. Gulf Of Maine Rfi totals the most pounds landed, 1.49 billion, and the most revenue derived from within an area, $1.401 billion. All numbers have been rounded to the nearest thousand.

Table 5.1 Thirteen Year Total Revenue and Landings (Pounds), Gulf of Maine RFI

Year	Revenue	Landings
2008	$101,758,000	141,731,000
2009	$95,906,000	133,776,000
2010	$99,171,000	104,348,000
2011	$115,260,000	130,641,000
2012	$125,709,000	128,845,000
2013	$115,590,000	134,183,000
2014	$113,383,000	149,533,000
2015	$113,418,000	136,297,000
2016	$117,552,000	117,077,000
2017	$106,565,000	103,421,000
2018	$103,359,000	86,768,000
2019	$105,485,000	59,741,000
2020	$88,093,000	63,389,000
Total	**$1,401,248,000**	**1,489,749,000**

Revenue by Port

The ten most impacted (by revenue) ports are listed below. These ports are estimated to receive the most landings from fishing done within the Gulf of Maine RFI area. The table below displays each port's landings revenue breakdown. The table present the cumulative revenues from 2008-2020. New Bedford receives the highest value of landings of any port, with $301.373 million from 2008-2020. All numbers have been rounded to the nearest thousand.

Table 6.1 Most Impacted Ports, by Landings Revenues

City	State	Thirteen Year Revenue
New Bedford	MA	$301,373,000
Gloucester	MA	$287,984,000
Boston	MA	$146,466,000
Newington	NH	$126,045,000
Portland	ME	$123,657,000
Rockland	ME	$40,813,000
Portsmouth	NH	$38,286,000
Jonesport	ME	$36,283,000
Chatham	MA	$19,507,000
Vinalhaven	ME	$17,797,000

Landings and Revenue by State

The following table displays total revenue and total landed pounds by state within the area. All numbers have been rounded to the nearest thousand.

Table 7.1 Most Impacted States, by Revenue and Landings

State	Thirteen Year Revenue	Thirteen Year Landings
MA	$801,912,000	725,128,000
ME	$378,814,000	671,983,000
NH	$196,705,000	81,473,000
RI	$16,364,000	6,921,000
CT	$1,386,000	334,000
NJ	$1,169,000	1,661,000
VA	$951,000	106,000
NY	$616,000	963,000
NC	$14,000	5,000

State	Thirteen Year Revenue	Thirteen Year Landings
All Others	$1,000	<500

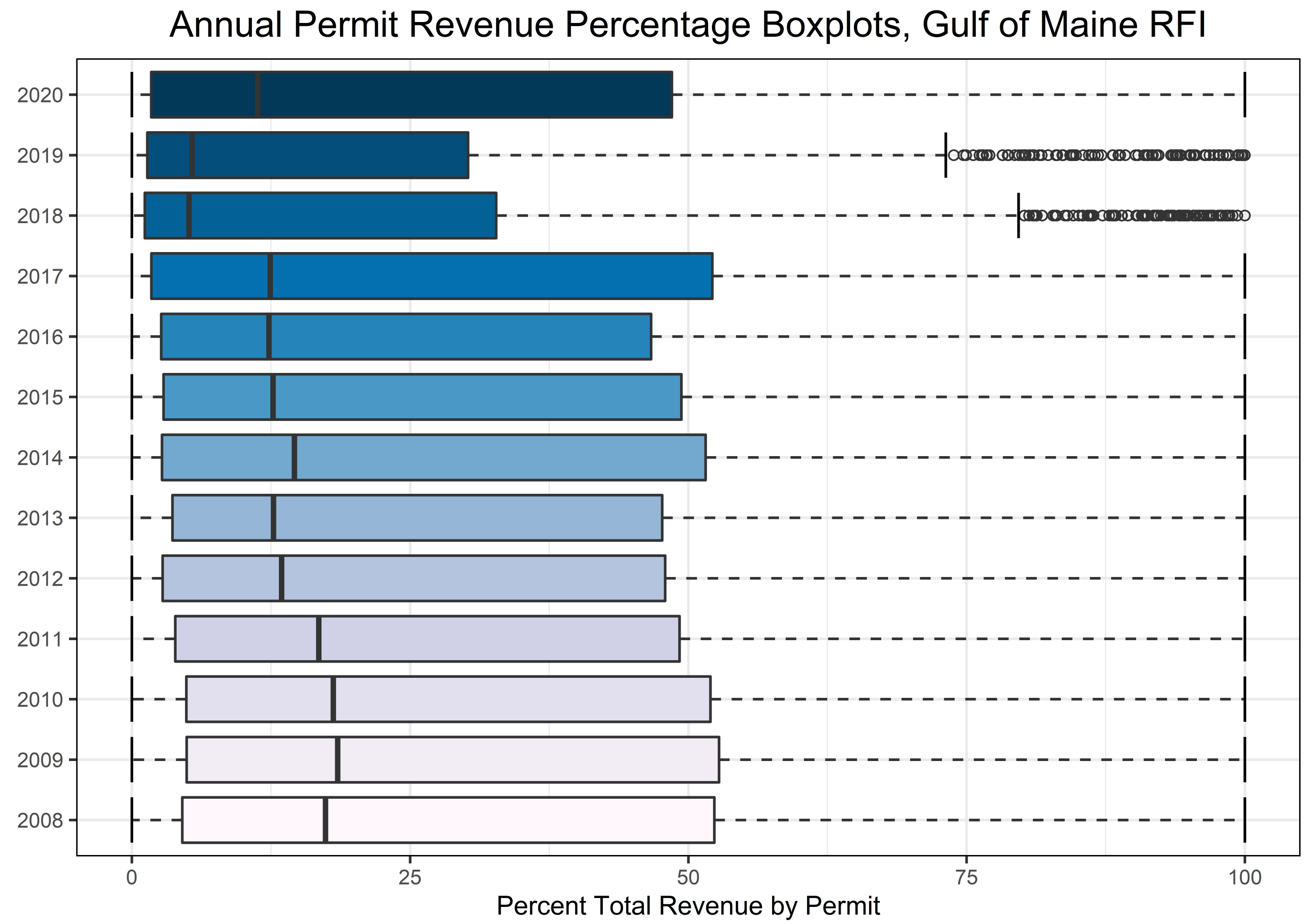
Percentage of Revenue by Permit

We also analyzed the percentage of each permit's total commercial fishing revenue coming from within the Gulf of Maine RFI area (see boxplots figures and tables below). Boxplots are important statistical summaries because they provide information about the distribution of the percentages. The boxplots below begin at the 1st quartile, or the value beneath which 25 percent of all observations fall. A thick line within the box identifies the median, the observation at which 50 percent of observations are above or beneath. The box ends at the 3rd quartile, or the observation beneath which 75 percent of observations fall. Nonparametric estimates of the minimum and maximum values are also indicated by the "whiskers" (dashed line terminating in a vertical line) that jut out from each side of the box. Any points outside of these whiskers are observations that are considered outliers. In our tables, however, the maximum values are inclusive of outliers. The first table below presents the minimum, 1st quartile, median, 3rd quartile, and maximum values for the area. These are the thirteen year revenue percentages. The following table represents the total number of outliers by year. The boxplots in the figures below further separate the area out by year.

Table 8.1 Analysis of Thirteen Year Permit Revenue Percentage Boxplots, Gulf of Maine RFI

Min	1st Quartile	Median	3rd Quartile	Max
0	3	12	44	100

Figure 8.1 Annual Permit Revenue Percentage Boxplots, Gulf of Maine RFI



IRFA Analysis

Small and large businesses could have differing ability to respond to impacts from wind energy development. As such, this section presents the total number of entities, by business category, and the total revenue generated by that business category in Table 1, for those businesses with historical fishing within the Gulf of Maine RFI area. Table 2 presents the revenue generated inside the Gulf of Maine RFI area against the total revenue, by business category. Revenue values have been deflated to 2020 dollars. All numbers have been rounded to the nearest thousand.

Table 9.1 Total number of entities engaged in federally managed fishing within the Northeast region, and their total revenue, by business category

Year	Business Type	Number of Entities	Revenue
2018	Large Business	9	$202,087,000
2018	Small Business	1,215	$773,913,000
2019	Large Business	9	$210,372,000
2019	Small Business	1,246	$796,740,000
2020	Large Business	9	$161,827,000

Year	Business Type	Number of Entities	Revenue
2020	Small Business	1,288	$683,249,000

Table 9.2 Revenue inside the Gulf of Maine RFI area against total revenue by business category

Year	Business Type	Area Revenue	Total Revenue
2018	Large Business	$19,304,000	$199,072,000
2018	Small Business	$84,055,000	$618,910,000
2019	Large Business	$17,323,000	$210,372,000
2019	Small Business	$88,162,000	$579,096,000
2020	Large Business	$9,188,000	$141,773,000
2020	Small Business	$78,852,000	$394,207,000

Species Dependence

The tables below indicate the top ten species deriving the most revenue from the area by year. Additional information includes landings, and effort (Days-at-Sea, or DAS), occurring within the area of interest, as a percentage of totals generated by that species across the entire region by year and the total number of trips and vessels from the area by year, FMP, species, and port. Trips with less than three permits or dealers have been removed to protect data confidentiality. The total number of trips, and number vessels taking those trips, represent an upper bound on the counts as it does not take into account the probability of these trips actually overlapping the area of interest, and identifies all the individuals who could be displaced by wind energy development. Therefore, also included is a count of trips and vessels weighted by the probability of overlap with the area of interest, to generate a more precise expected count of trips and vessels fishing within the area. The category “All Others” refers to gear type categories with less than three permits or dealers impacted to protect data confidentiality.

Table 10.1 Total and Expected Number of Trips and Vessels by Year, Gulf Of Maine Rfi

Year	Number of Trips	Number of Vessels	Expected Trips	Expected Vessels
2008	46,860	1,049	17,276	864
2009	46,965	988	17,500	845
2010	47,250	988	17,347	826
2011	44,113	931	17,140	753
2012	45,159	994	17,340	754
2013	38,266	962	15,247	726
2014	36,886	802	14,394	630
2015	35,506	825	13,930	633

Year	Number of Trips	Number of Vessels	Expected Trips	Expected Vessels
2016	37,833	829	14,400	631
2017	37,110	818	14,397	612
2018	36,380	989	13,143	631
2019	35,423	934	12,655	605
2020	32,920	811	12,583	593

Table 10.2 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2020

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	92.88	93.00	80.17
Pollock	89.20	89.89	81.64
White Hake	88.71	89.79	81.15
American Plaice	76.86	73.15	76.69
Atlantic Halibut	72.83	73.02	75.72
Witch Flounder	70.50	70.81	76.73
Haddock	66.86	64.25	75.42
Atlantic Cod	65.17	64.25	72.00
Monkfish	48.72	43.05	40.53
Atlantic Herring	45.09	43.61	34.10

Table 10.3 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2020

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	24,449	484	414	9,153
Atlantic Herring	228	25	21	126
Bluefish	108	40	4	5
Highly Migratory Species	222	56	31	114
Mackerel, Squid, and Butterfish	1,004	122	59	408
Monkfish	5,562	196	149	3,275
No Federal FMP	3,281	193	150	2,038
Northeast Multispecies	6,177	206	171	3,869

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Sea Scallop	2,604	227	124	708
Skates	1,934	111	83	546
Small-Mesh Multispecies	2,365	137	105	1,252
Spiny Dogfish	1,171	46	35	296
Summer Flounder, Scup, Black Sea Bass	383	84	26	48
Surfclam, Ocean Quahog	389	15	8	332

Table 10.4 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2020

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	4,343	121	112	2,716
American Lobster	23,716	441	398	9,081
Angler	5,562	196	149	3,275
Atlantic Halibut	1,186	123	107	894
Atlantic Herring	228	25	21	126
Atlantic Mackerel	562	75	42	226
Black Sea Bass	220	52	6	8
Blue Crab	64	7	5	15
Bluefin Tuna	210	51	30	112
Bluefish	108	40	4	5
Bonito	4	4	1	1
Butterfish	195	33	9	65
Channeled Whelk	137	10	2	2
Cod	4,577	164	143	2,912
Conchs	15	3	2	4
Cunner	9	4	4	5
Cusk	1,306	103	88	1,113
Dogfish Smooth	11	5	1	1
Dogfish Spiny	1,171	46	35	296
Fourspot Flounder	70	5	5	24

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Haddock	5,318	170	146	3,396
Illex Squid	220	14	10	121
John Dory	5	4	2	2
Jonah Crab	2,874	127	97	1,354
King Whiting	540	30	28	304
Knobbed Whelk	42	5	2	5
Longfin Squid	445	59	22	190
Menhaden	526	31	21	49
Nk Crab	523	21	18	237
Ocean Quahog	348	5	5	328
Offshore Hake	21	9	6	6
Pollock	3,599	140	127	2,855
Red Hake	404	25	16	171
Redfish	3,594	126	113	2,499
Rock Crab	536	30	26	366
Scup	183	45	8	14
Sea Raven	72	5	4	22
Sea Scallop	2,604	227	124	708
Silver Hake	2,301	131	100	1,219
Skates	1,929	110	83	546
Spider Crab	77	9	7	67
Striped Bass	198	38	10	23
Summer Flounder	213	68	17	29
Surf Clam	40	9	3	4
Tautog	36	4	2	2
Waved Whelk	14	5	2	3
White Hake	3,544	124	116	2,633
Winter Flounder	2,432	108	92	940
Witch Flounder	4,167	121	111	2,661
Yellowtail Flounder	2,141	89	80	805

Table 10.5 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2020

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	132	3	3	30
Bar Harbor, ME	34	4	3	4
Bass Harbor, ME	72	5	3	60
Bass River, MA	15	3	2	3
Beals Island, ME	347	6	5	194
Beaufort, NC	26	19	1	1
Beverly, MA	962	11	10	63
Boothbay Harbor, ME	417	10	10	255
Boston, MA	1,004	27	21	700
Bucks Harbor, ME	123	4	4	15
Cape Porpoise, ME	181	3	3	151
Chatham, MA	2,575	63	49	412
Cundys Harbor, ME	378	8	8	258
Cutler, ME	138	7	6	55
Dennis, MA	120	6	6	17
Friendship, ME	397	5	5	203
Gloucester, MA	7,134	165	138	2,202
Green Harbor, MA	435	6	5	18
Hampton, NH	123	5	5	43
Hampton, VA	10	7	1	1
Harpswell, ME	704	10	8	324
Harwichport, MA	423	21	15	83
Hull, MA	287	3	3	15
Hyannis, MA	188	10	8	43
Jonesport, ME	768	14	14	581
Kennebunkport, ME	200	4	4	179
Kittery, ME	136	5	5	68
Lubec, ME	109	3	3	29
Marshfield, MA	864	18	14	67

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Nahant, MA	116	3	3	13
Nantucket, MA	7	6	1	1
New Bedford, MA	1,346	169	70	701
Newburyport, MA	307	10	8	200
Newport, RI	16	3	3	6
Plymouth, MA	290	8	4	4
Point Judith, RI	73	21	2	4
Port Clyde, ME	303	5	5	224
Portland, ME	816	54	50	502
Portsmouth, NH	1,559	20	20	936
Provincetown, MA	814	31	23	118
Rockland, ME	49	6	5	25
Rockport, MA	1,245	15	15	427
Rye, NH	359	12	12	214
Sandwich, MA	91	6	3	6
Scituate, MA	625	14	11	71
South Bristol, ME	234	3	3	69
South Harpswell, ME	93	3	3	9
Southwest Harbor, ME	88	6	5	19
Sprucehead, ME	211	4	4	88
Stonington, CT	15	7	3	4
Stonington, ME	601	10	10	294
Stueben, ME	244	4	4	168
Tenants Harbor, ME	326	6	6	61
Vinalhaven, ME	323	6	6	219
Wellfleet, MA	37	4	4	35
Winter Harbor, ME	358	4	4	221

Table 10.6 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2019

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	94.18	94.41	79.93
Pollock	90.18	90.37	80.30
White Hake	88.07	89.38	81.12
American Plaice	83.79	82.44	76.97
Atlantic Halibut	71.50	72.10	78.20
Witch Flounder	69.97	73.06	76.84
Haddock	69.33	67.99	73.01
Atlantic Cod	64.14	65.09	69.00
Monkfish	39.86	33.80	35.39
American Lobster	32.60	31.57	42.59

Table 10.7 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2019

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	26,304	504	412	9,260
Atlantic Herring	289	29	26	153
Bluefish	295	77	12	13
Highly Migratory Species	237	64	31	92
Mackerel, Squid, and Butterfish	1,196	146	56	423
Monkfish	5,549	230	137	3,279
No Federal FMP	3,051	199	126	1,879
Northeast Multispecies	5,958	195	156	3,833
Sea Scallop	2,800	351	132	469
SERO FMP	4	4	2	2
Skates	2,160	130	80	661
Small-Mesh Multispecies	2,521	151	100	1,485
Spiny Dogfish	1,362	48	39	374
Summer Flounder, Scup, Black Sea Bass	558	104	23	45
Surfclam, Ocean Quahog	471	11	8	362

Table 10.8 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2019

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	4,179	108	102	2,754
American Eel	5	3	1	1
American Lobster	25,553	432	392	9,187
Angler	5,549	230	137	3,279
Atlantic Halibut	1,191	115	97	910
Atlantic Herring	289	29	26	153
Atlantic Mackerel	594	95	44	202
Black Sea Bass	253	76	6	9
Blue Crab	70	5	4	29
Bluefin Tuna	195	50	30	90
Bluefish	295	77	12	13
Butterfish	383	59	12	127
Channeled Whelk	163	14	3	4
Cod	4,382	156	131	2,807
Conger Eel	16	13	1	1
Cunner	12	5	3	10
Cusk	1,032	82	70	890
Dogfish Smooth	40	12	1	1
Dogfish Spiny	1,362	48	39	374
Haddock	4,981	163	133	3,321
Horseshoe Crab	63	8	1	1
Illex Squid	199	13	8	98
Jonah Crab	2,876	114	89	1,276
King Whiting	391	28	22	255
Knobbed Whelk	108	12	2	2
Longfin Squid	575	81	16	185
Menhaden	514	35	20	38
Nk Crab	498	22	12	240
Ocean Quahog	437	6	6	360

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Offshore Hake	8	6	2	3
Pollock	3,688	134	111	3,009
Red Hake	384	44	22	218
Redfish	3,237	110	99	2,417
Rock Crab	773	36	27	456
Sculpins	5	3	2	2
Scup	329	80	6	9
Sea Raven	12	4	2	3
Sea Robins	14	5	1	1
Sea Scallop	2,800	351	132	469
Silver Hake	2,475	145	96	1,453
Skates	2,160	130	80	661
Spider Crab	79	7	7	70
Striped Bass	263	65	19	31
Summer Flounder	422	86	17	34
Surf Clam	34	5	2	2
Tautog	32	18	2	2
Triggerfish	3	3	1	1
Waved Whelk	17	6	2	2
White Hake	3,373	115	105	2,686
Winter Flounder	2,094	98	80	779
Witch Flounder	3,832	109	100	2,537
Yellowtail Flounder	1,763	76	67	644

Table 10.9 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2019

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	159	3	3	39
Bass Harbor, ME	26	3	1	1
Bass River, MA	26	3	3	9
Beals Island, ME	442	6	6	231

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Beaufort, NC	7	7	1	1
Beverly, MA	1,157	12	12	68
Boothbay Harbor, ME	472	10	10	284
Boston, MA	880	21	17	721
Cape May, NJ	6	6	1	1
Cape Porpoise, ME	224	4	4	185
Chatham, MA	2,879	65	52	369
Cohasset, MA	397	3	3	23
Cundys Harbor, ME	388	5	5	260
Dennis, MA	72	3	2	6
Friendship, ME	450	5	5	229
Gloucester, MA	6,953	150	118	2,177
Green Harbor, MA	447	8	5	16
Hampton, NH	74	4	4	31
Harpswell, ME	767	9	9	281
Harwichport, MA	573	26	19	59
Hull, MA	244	3	3	12
Hyannis, MA	309	18	10	19
Jonesport, ME	924	14	14	678
Kittery, ME	219	4	4	129
Manchester, MA	173	3	3	5
Marblehead, MA	209	6	5	16
Marshfield, MA	801	18	15	78
Montauk, NY	40	6	1	1
New Bedford, MA	1,372	269	84	497
Newburyport, MA	161	8	7	85
Newport, RI	29	3	3	9
Northeast Harbor, ME	107	4	4	56
Plymouth, MA	240	7	1	1
Point Judith, RI	222	55	6	7

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Port Clyde, ME	301	6	5	215
Portland, ME	777	46	40	454
Portsmouth, NH	1,571	21	21	909
Provincetown, MA	676	25	17	114
Rockland, ME	42	9	8	17
Rockport, MA	1,357	12	12	485
Rye, NH	299	9	9	197
Sandwich, MA	108	4	2	2
Scituate, MA	939	18	15	90
Sorrento, ME	140	3	3	37
South Bristol, ME	179	3	3	41
Southwest Harbor, ME	152	6	4	39
Sprucehead, ME	314	4	4	117
Stonington, CT	31	10	2	4
Stonington, ME	331	5	5	87
Stueben, ME	187	3	3	166
Tenants Harbor, ME	355	5	5	59
Vinalhaven, ME	313	7	7	168
Wanchese, NC	5	5	1	1
Wellfleet, MA	48	3	3	39
Winter Harbor, ME	222	3	3	91
York Harbor, ME	260	3	3	90

Table 10.10 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2018

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	91.75	92.05	80.99
White Hake	89.12	90.61	82.85
Pollock	88.12	90.11	80.54
American Plaice	79.64	78.68	76.63
Atlantic Halibut	70.57	68.96	75.46

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Haddock	66.75	67.73	71.02
Witch Flounder	62.11	64.72	75.90
Atlantic Cod	54.52	55.37	66.04
Atlantic Herring	42.35	39.78	32.18
Monkfish	38.51	31.85	33.22

Table 10.11 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2018

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	27,114	508	434	9,528
Atlantic Herring	566	33	30	304
Bluefish	197	64	8	9
Highly Migratory Species	251	67	40	109
Mackerel, Squid, and Butterfish	1,239	161	72	471
Monkfish	5,894	274	163	3,211
No Federal FMP	3,626	238	157	2,099
Northeast Multispecies	6,230	227	180	3,749
Sea Scallop	2,156	381	115	307
SERO FMP	5	4	1	1
Skates	3,128	133	98	927
Small-Mesh Multispecies	2,813	164	115	1,596
Spiny Dogfish	1,528	56	44	399
Summer Flounder, Scup, Black Sea Bass	432	97	22	35
Surfclam, Ocean Quahog	552	14	8	440
Tilefish	3	3	1	1

Table 10.12 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2018

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	4,227	123	121	2,600
American Lobster	26,669	456	416	9,469

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Angler	5,894	274	163	3,211
Atlantic Halibut	959	118	102	700
Atlantic Herring	566	33	30	304
Atlantic Mackerel	575	108	51	203
Black Sea Bass	182	67	6	7
Bluefin Tuna	230	57	38	106
Bluefish	197	64	8	9
Bonito	6	5	1	1
Butterfish	408	70	16	129
Cancer Crab	73	3	3	59
Channeled Whelk	245	20	4	6
Cod	4,611	193	158	2,695
Conger Eel	7	6	1	1
Cunner	10	4	2	3
Cusk	1,203	98	84	1,027
Dogfish Smooth	19	10	2	2
Dogfish Spiny	1,528	56	44	399
Haddock	5,190	187	159	3,202
Horseshoe Crab	99	11	1	1
Illex Squid	263	20	11	137
John Dory	10	9	2	3
Jonah Crab	2,834	128	101	1,234
King Whiting	596	35	27	410
Knobbed Whelk	177	17	1	1
Longfin Squid	696	103	34	254
Menhaden	203	13	8	20
Nk Crab	441	24	16	198
Ocean Quahog	532	8	8	439
Pollock	3,646	151	124	2,901
Red Hake	477	57	26	234

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Redfish	3,213	127	114	2,305
Rock Crab	904	42	36	508
Scup	227	73	8	15
Sea Raven	82	4	4	9
Sea Robins	7	7	1	1
Sea Scallop	2,156	381	115	307
Silver Hake	2,780	161	111	1,577
Skates	3,128	133	98	927
Squeteague Weakfish	21	13	1	1
Striped Bass	196	48	19	21
Summer Flounder	297	71	13	18
Surf Clam	19	6	1	1
Tautog	42	16	2	2
White Hake	3,195	119	108	2,559
Winter Flounder	2,314	102	84	697
Witch Flounder	3,912	119	116	2,405
Yellowtail Flounder	1,960	83	75	583

Table 10.13 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2018

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	227	3	3	83
Bass Harbor, ME	10	3	1	1
Beals Island, ME	392	5	5	269
Beverly, MA	1,100	11	11	68
Boothbay Harbor, ME	505	11	11	296
Boston, MA	1,085	24	20	778
Bucks Harbor, ME	223	4	4	58
Cape May, NJ	12	10	2	3
Cape Porpoise, ME	246	4	4	199
Chatham, MA	3,238	74	62	424

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Cohasset, MA	222	3	3	16
Cundys Harbor, ME	457	5	5	287
Dennis, MA	79	6	5	18
Fairhaven, MA	7	3	1	1
Friendship, ME	445	7	7	262
Gloucester, MA	7,329	150	123	2,054
Green Harbor, MA	467	6	5	14
Hampton, NH	150	3	3	55
Hampton, VA	12	7	2	2
Harpswell, ME	836	9	9	299
Harwichport, MA	300	20	11	54
Hull, MA	243	3	3	19
Hyannis, MA	221	18	8	16
Jonesport, ME	1,050	19	19	781
Kennebunkport, ME	235	3	3	217
Kittery, ME	307	5	5	150
Marblehead, MA	197	6	4	21
Marshfield, MA	1,012	24	15	79
Montauk, NY	16	7	1	1
Nahant, MA	239	5	3	6
New Bedford, MA	1,324	284	74	437
Newburyport, MA	248	5	5	142
Newport, RI	31	3	3	19
Plymouth, MA	292	10	4	5
Point Judith, RI	214	65	10	16
Port Clyde, ME	273	6	5	230
Portland, ME	971	52	49	571
Portsmouth, NH	1,941	24	24	1,104
Prospect Harbor, ME	108	4	4	103
Provincetown, MA	745	27	23	99

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Rockland, ME	151	9	8	80
Rockport, MA	1,538	15	15	625
Rye, NH	264	9	9	170
Salisbury, MA	56	3	3	19
Sandwich, MA	97	4	3	8
Scituate, MA	924	18	15	85
Seabrook, NH	629	16	15	482
South Bristol, ME	160	3	3	38
South Harpswell, ME	110	3	3	8
Sprucehead, ME	342	6	6	211
Stonington, CT	35	9	2	9
Stonington, ME	376	8	8	156
Stueben, ME	175	4	4	120
Swans Island, ME	175	3	3	19
Tenants Harbor, ME	393	7	6	94
Vinalhaven, ME	336	6	6	160
Winter Harbor, ME	334	3	3	198
Yarmouth, MA	23	3	2	14

Table 10.14 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2017

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	94.64	94.94	85.72
White Hake	92.14	92.48	85.18
Pollock	91.05	91.39	84.66
American Plaice	82.50	81.42	81.23
Haddock	74.42	75.19	77.52
Witch Flounder	60.74	62.96	80.38
Atlantic Halibut	57.67	59.68	82.15
Atlantic Herring	52.07	48.77	38.99
Atlantic Cod	51.36	53.14	68.88

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Alewife	50.29	51.80	16.94

Table 10.15 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2017

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	27,847	536	449	10,266
Atlantic Herring	800	38	34	507
Bluefish	399	106	19	21
Highly Migratory Species	219	72	34	66
Mackerel, Squid, and Butterfish	1,768	184	87	542
Monkfish	5,548	222	163	3,463
No Federal FMP	3,118	254	172	1,915
Northeast Multispecies	6,151	242	200	4,131
Sea Scallop	1,230	171	74	255
SERO FMP	10	8	2	2
Skates	2,756	152	104	867
Small-Mesh Multispecies	2,815	184	117	1,739
Spiny Dogfish	1,893	73	58	565
Summer Flounder, Scup, Black Sea Bass	494	106	19	27
Surfclam, Ocean Quahog	657	13	9	557

Table 10.16 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2017

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Alewife	7	3	2	5
Am. Plaice Flounder	3,823	137	125	2,696
American Lobster	27,520	468	430	10,218
Angler	5,548	222	163	3,463
Atlantic Halibut	1,050	133	117	850
Atlantic Herring	800	38	34	507
Atlantic Mackerel	1,128	137	74	329

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Black Sea Bass	178	68	3	3
Blue Back Herring	14	5	4	11
Blue Crab	90	5	3	52
Bluefin Tuna	155	53	34	65
Bluefish	399	106	19	21
Bonito	8	6	1	1
Butterfish	668	83	19	221
Channeled Whelk	145	16	4	6
Cod	4,194	202	163	2,632
Conger Eel	7	5	1	1
Cusk	1,382	111	102	1,210
Dogfish Smooth	61	17	1	1
Dogfish Spiny	1,893	73	58	565
Haddock	4,846	201	167	3,430
Horseshoe Crab	57	11	1	1
Illex Squid	153	18	11	89
John Dory	11	6	3	4
Jonah Crab	3,229	134	105	1,216
King Whiting	395	40	22	261
Knobbed Whelk	112	13	1	1
Longfin Squid	750	98	26	221
Menhaden	48	9	4	8
Nk Crab	432	33	18	182
Ocean Quahog	625	7	7	555
Pandalid Shrimp	50	8	7	19
Pollock	3,904	178	147	3,213
Red Hake	573	69	31	298
Redfish	2,866	132	118	2,379
Rock Crab	580	40	31	283
Scup	303	77	5	8

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Sea Robins	19	9	1	1
Sea Scallop	1,230	171	74	255
Silver Hake	2,789	181	114	1,727
Skates	2,756	152	104	867
Spider Crab	21	6	5	18
Striped Bass	191	56	14	16
Summer Flounder	322	81	16	20
Surf Clam	31	5	2	3
Tautog	35	15	2	2
Triggerfish	6	6	1	1
White Hake	3,534	134	121	2,894
Winter Flounder	1,753	98	82	583
Witch Flounder	3,422	130	120	2,389
Yellowtail Flounder	1,393	85	67	412

Table 10.17 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2017

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	280	3	3	86
Beals Island, ME	532	7	7	368
Beverly, MA	987	8	8	58
Boothbay Harbor, ME	495	8	8	292
Boston, MA	1,015	29	23	760
Bucks Harbor, ME	229	4	4	79
Cape May, NJ	14	6	2	2
Cape Porpoise, ME	358	6	6	300
Chatham, MA	3,451	62	54	496
Cundys Harbor, ME	449	5	5	325
Cushing, ME	210	6	6	190
Cutler, ME	106	6	5	17
Dennis, MA	102	8	5	31

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Fairhaven, MA	6	3	1	1
Friendship, ME	405	6	6	235
Gloucester, MA	7,126	139	118	2,186
Green Harbor, MA	467	13	6	19
Harpswell, ME	865	13	11	275
Harwichport, MA	154	20	14	54
Hull, MA	331	3	3	18
Hyannis, MA	154	18	6	11
Jonesport, ME	1,225	16	16	894
Kennebunkport, ME	145	5	5	134
Kittery, ME	330	8	8	172
Machiasport, ME	79	3	3	50
Manchester, MA	155	3	3	5
Marblehead, MA	191	4	3	10
Marshfield, MA	1,012	25	16	75
Montauk, NY	37	7	1	1
Nahant, MA	221	4	4	13
Nantucket, MA	39	5	3	16
New Bedford, MA	1,533	142	73	823
Newburyport, MA	132	5	5	104
Newington, NH	626	12	12	413
Newport, RI	30	4	3	23
Northeast Harbor, ME	319	5	5	180
Orleans, MA	72	4	3	16
Plymouth, MA	302	12	5	8
Point Judith, RI	282	57	5	8
Port Clyde, ME	247	6	6	157
Portland, ME	982	54	52	661
Portsmouth, NH	1,967	25	25	1,135
Provincetown, MA	575	32	24	100

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Rockland, ME	167	12	9	120
Rockport, MA	1,375	13	13	518
Rye, NH	317	8	8	191
Sandwich, MA	93	4	3	3
Scituate, MA	960	21	15	107
Seabrook, NH	666	15	15	512
South Bristol, ME	140	4	4	40
Sprucehead, ME	321	4	4	178
Stonington, ME	312	8	8	85
Stueben, ME	219	3	3	157
Tenants Harbor, ME	476	9	8	163
Vinalhaven, ME	449	7	7	218
Wellfleet, MA	49	5	3	13
Winter Harbor, ME	397	3	3	224
Yarmouth, MA	12	3	1	1

Table 10.18 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2016

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	91.70	92.03	84.65
White Hake	89.40	89.30	81.84
Pollock	87.52	86.95	79.67
American Plaice	80.45	79.16	78.48
Atlantic Halibut	74.76	75.27	76.98
Witch Flounder	63.31	66.87	76.65
Atlantic Herring	58.44	51.89	47.63
Haddock	57.58	54.72	70.74
Atlantic Cod	49.54	50.67	63.62
American Lobster	35.13	35.26	42.83

Table 10.19 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2016

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	27,619	521	433	10,008
Atlantic Herring	598	38	34	402
Bluefish	451	111	30	67
Highly Migratory Species	242	63	34	128
Mackerel, Squid, and Butterfish	1,347	179	81	411
Monkfish	5,569	237	173	3,376
No Federal FMP	2,724	213	157	1,808
Northeast Multispecies	5,995	233	198	3,864
Sea Scallop	1,548	187	107	238
Skates	2,249	132	94	778
Small-Mesh Multispecies	2,674	161	121	1,712
Spiny Dogfish	3,046	93	74	1,110
Summer Flounder, Scup, Black Sea Bass	475	100	29	50
Surfclam, Ocean Quahog	782	15	9	499

Table 10.20 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2016

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	3,577	132	127	2,501
American Lobster	27,304	452	406	9,956
Angler	5,569	237	173	3,376
Atlantic Halibut	908	127	108	706
Atlantic Herring	598	38	34	402
Atlantic Mackerel	858	129	62	195
Bay Scallop	3	3	2	2
Black Sea Bass	79	28	2	2
Blue Crab	53	6	2	27
Bluefin Tuna	226	54	31	123
Bluefish	451	111	30	67
Butterfish	495	79	27	201

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Channeled Whelk	190	17	3	3
Cod	4,366	199	167	2,683
Conger Eel	4	4	1	1
Cusk	1,403	112	104	1,172
Dogfish Smooth	7	5	1	1
Dogfish Spiny	3,046	93	74	1,110
Haddock	4,669	188	168	3,153
Horseshoe Crab	65	12	1	1
Illex Squid	26	5	5	13
Jonah Crab	1,985	105	81	815
King Whiting	67	14	10	34
Knobbed Whelk	122	10	1	1
Longfin Squid	470	92	25	113
Menhaden	36	4	3	3
Nk Crab	271	13	7	187
Ocean Quahog	726	7	7	497
Pandalid Shrimp	19	4	4	10
Pollock	3,771	165	142	2,938
Red Hake	577	64	34	349
Redfish	2,769	139	119	2,227
Rock Crab	545	40	33	343
Scup	247	73	8	17
Sea Robins	4	3	1	1
Sea Scallop	1,548	187	107	238
Silver Hake	2,637	156	119	1,698
Skates	2,249	132	94	778
Squeteague Weakfish	13	8	2	2
Striped Bass	242	70	25	33
Summer Flounder	362	85	22	34
Surf Clam	54	6	1	1

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Tautog	10	8	1	1
Waved Whelk	7	3	2	2
White Hake	3,373	143	124	2,691
Winter Flounder	1,926	113	95	660
Witch Flounder	3,182	140	128	2,222
Yellowtail Flounder	1,365	100	81	421

Table 10.21 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2016

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Beals Island, ME	330	5	5	199
Beverly, MA	1,125	7	7	77
Boothbay Harbor, ME	409	6	6	237
Boston, MA	894	23	21	746
Cape Porpoise, ME	325	4	4	258
Chatham, MA	4,195	70	61	1,011
Cundys Harbor, ME	531	6	6	353
Cushing, ME	46	4	4	42
Cutler, ME	28	3	3	5
Dennis, MA	44	6	3	4
Fairhaven, MA	17	6	2	2
Friendship, ME	413	6	6	272
Gloucester, MA	7,236	146	122	2,073
Green Harbor, MA	566	14	8	24
Hampton, NH	141	5	5	71
Harpswell, ME	754	10	9	267
Harwichport, MA	236	26	16	43
Hull, MA	337	3	3	35
Hyannis, MA	142	16	4	7
Jonesport, ME	1,559	21	21	987
Kennebunkport, ME	147	3	3	142

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Kittery, ME	307	4	4	157
Manchester, MA	234	3	3	6
Marblehead, MA	207	5	3	12
Marshfield, MA	1,124	21	16	64
Montauk, NY	11	6	1	1
Nahant, MA	363	3	3	7
Nantucket, MA	28	3	3	17
New Bedford, MA	1,634	165	94	773
Newburyport, MA	135	6	6	43
Orleans, MA	102	3	3	25
Plymouth, MA	226	6	2	2
Point Judith, RI	188	47	5	7
Port Clyde, ME	152	5	5	119
Portland, ME	976	51	51	651
Portsmouth, NH	1,852	27	27	1,025
Provincetown, MA	606	29	22	105
Rockland, ME	128	10	8	85
Rockport, MA	1,066	13	12	458
Rye, NH	387	10	10	224
Salisbury, MA	84	3	3	21
Sandwich, MA	157	9	4	4
Scituate, MA	989	16	13	116
Seabrook, NH	708	17	17	517
Sprucehead, ME	414	6	6	248
Stonington, ME	233	8	7	58
Stueben, ME	216	4	4	164
Tenants Harbor, ME	474	9	8	180
Truro, MA	18	3	2	2
Vinalhaven, ME	504	7	7	265
Wellfleet, MA	42	4	3	3

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Winter Harbor, ME	407	3	3	218
Yarmouth, MA	14	3	2	4
York Harbor, ME	280	5	5	126

Table 10.22 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2015

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	92.49	92.36	84.38
Pollock	89.21	88.35	80.07
White Hake	88.46	88.46	81.28
American Plaice	79.88	78.20	77.09
Atlantic Hagfish	78.82	79.59	71.82
Atlantic Halibut	74.31	74.17	75.58
Witch Flounder	64.38	64.94	74.37
Haddock	58.04	55.77	70.16
Atlantic Cod	57.10	57.30	65.76
Atlantic Herring	53.43	51.09	50.88

Table 10.23 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2015

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	25,610	492	415	9,262
Atlantic Herring	745	38	35	511
Bluefish	479	100	20	40
Highly Migratory Species	260	70	40	98
Mackerel, Squid, and Butterfish	1,534	178	89	517
Monkfish	5,583	253	175	3,434
No Federal FMP	2,932	227	165	1,963
Northeast Multispecies	6,111	235	195	4,019
Sea Scallop	2,016	205	113	615
Skates	1,901	146	99	633

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Small-Mesh Multispecies	3,085	185	135	1,935
Spiny Dogfish	2,084	96	72	673
Summer Flounder, Scup, Black Sea Bass	539	93	27	37
Surfclam, Ocean Quahog	866	14	11	637

Table 10.24 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2015

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	3,804	152	139	2,698
American Lobster	25,458	449	403	9,239
Angler	5,581	253	175	3,434
Atlantic Halibut	968	139	121	761
Atlantic Herring	745	38	35	511
Atlantic Mackerel	842	128	68	245
Black Sea Bass	96	42	2	2
Blue Crab	106	8	4	53
Bluefin Tuna	221	56	39	97
Bluefish	479	100	20	40
Butterfish	629	86	24	227
Channeled Whelk	229	12	4	5
Clearnose Skate	18	3	3	12
Cod	4,574	185	156	2,929
Cusk	1,573	112	101	1,344
Dogfish Smooth	34	10	1	1
Dogfish Spiny	2,084	96	72	673
Fourspot Flounder	16	3	2	5
Haddock	4,568	181	159	3,125
Hagfish	45	4	4	41
Horseshoe Crab	37	8	1	1
Illex Squid	62	13	9	31

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
John Dory	7	4	1	1
Jonah Crab	1,617	96	70	661
King Whiting	156	21	17	129
Knobbed Whelk	126	9	2	2
Longfin Squid	546	92	23	96
Nk Crab	180	19	12	89
Ocean Quahog	820	8	8	634
Offshore Hake	21	3	3	11
Other Fish	6	3	2	3
Pollock	4,027	166	140	3,097
Red Hake	533	65	33	295
Redfish	2,981	140	126	2,430
Rock Crab	558	44	38	317
Scup	282	61	4	4
Sea Robins	9	7	1	1
Sea Scallop	2,016	205	113	615
Silver Hake	3,050	179	132	1,920
Skates	1,896	145	98	629
Spider Crab	5	4	3	4
Striped Bass	109	46	10	10
Summer Flounder	474	86	24	33
Surf Clam	44	5	3	4
Tautog	23	12	1	1
White Hake	3,557	146	128	2,819
Winter Flounder	2,055	122	103	784
Witch Flounder	3,440	152	141	2,433
Yellowtail Flounder	1,525	117	99	570

Table 10.25 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2015

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	180	3	3	37
Beals Island, ME	285	7	7	177
Beverly, MA	930	8	7	105
Boothbay Harbor, ME	289	7	7	133
Boston, MA	902	31	25	712
Bucks Harbor, ME	184	3	3	70
Cape May, NJ	10	5	3	5
Cape Porpoise, ME	377	5	5	322
Chatham, MA	2,796	63	55	432
Cundys Harbor, ME	500	7	7	329
Cushing, ME	119	4	4	114
Dennis, MA	69	6	3	4
Fairhaven, MA	16	7	4	6
Friendship, ME	273	4	4	163
Gloucester, MA	6,290	140	121	1,766
Green Harbor, MA	547	12	9	26
Hampton, NH	148	8	8	66
Harpswell, ME	679	10	9	238
Harwichport, MA	304	18	12	19
Hull, MA	331	3	3	24
Hyannis, MA	102	13	4	8
Jonesport, ME	1,657	20	20	1,147
Kennebunkport, ME	172	3	3	167
Kittery, ME	299	5	5	162
Manchester, MA	240	4	3	6
Marblehead, MA	191	5	4	16
Marshfield, MA	933	20	13	71
Montauk, NY	33	9	2	2
Nahant, MA	330	3	3	7
Nantucket, MA	32	3	2	18

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
New Bedford, MA	1,750	161	96	849
Newburyport, MA	277	6	5	140
Newport, RI	34	3	3	21
Orleans, MA	107	5	3	28
Plymouth, MA	236	7	3	3
Point Judith, RI	288	50	7	15
Port Clyde, ME	262	6	6	238
Portland, ME	1,043	52	49	780
Portsmouth, NH	1,589	24	24	874
Prospect Harbor, ME	96	3	3	88
Provincetown, MA	820	30	25	120
Rockland, ME	124	6	6	92
Rockport, MA	994	11	11	343
Rye, NH	698	9	9	535
Salisbury, MA	85	3	3	47
Sandwich, MA	155	7	3	6
Scituate, MA	769	15	11	102
Seabrook, NH	634	17	17	449
South Bristol, ME	168	3	3	54
Sprucehead, ME	137	4	4	64
Stonington, CT	8	5	1	1
Stonington, ME	213	6	6	38
Stueben, ME	161	3	3	135
Tenants Harbor, ME	552	9	9	176
Vinalhaven, ME	689	8	8	383
Winter Harbor, ME	420	4	4	231
York Harbor, ME	420	4	4	159

Table 10.26 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2014

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	93.35	93.65	83.08
Atlantic Hagfish	87.51	87.14	88.71
Pollock	87.43	87.47	79.18
White Hake	86.64	87.28	78.27
American Plaice	74.79	73.11	75.03
Witch Flounder	63.37	66.00	72.36
Atlantic Cod	53.68	52.48	63.67
Atlantic Herring	51.01	48.11	51.41
Haddock	50.01	47.66	66.19
Atlantic Halibut	38.05	34.63	75.68

Table 10.27 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2014

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	25,541	486	407	9,207
Atlantic Herring	801	47	41	554
Bluefish	513	116	27	78
Highly Migratory Species	214	62	33	103
Mackerel, Squid, and Butterfish	1,497	177	91	615
Monkfish	6,381	250	184	3,896
No Federal FMP	3,700	248	182	2,355
Northeast Multispecies	7,686	248	211	4,630
Sea Scallop	2,371	197	113	719
Skates	2,111	152	104	690
Small-Mesh Multispecies	3,887	186	133	2,393
Spiny Dogfish	3,354	126	100	1,324
Summer Flounder, Scup, Black Sea Bass	581	94	29	53
Surfclam, Ocean Quahog	771	20	12	567
Tilefish	5	3	2	4

Table 10.28 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2014

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	5,133	171	157	3,307
American Lobster	25,317	441	392	9,167
American Shad	6	3	2	3
Angler	6,381	250	184	3,896
Atlantic Halibut	879	135	117	661
Atlantic Herring	801	47	41	554
Atlantic Mackerel	849	117	64	353
Black Sea Bass	121	46	2	6
Blue Back Herring	11	3	2	2
Blue Crab	60	5	4	24
Bluefin Tuna	138	43	28	69
Bluefish	513	116	27	78
Butterfish	437	78	21	129
Channeled Whelk	325	16	4	4
Cod	6,627	214	186	3,968
Conchs	9	4	1	1
Conger Eel	23	17	1	1
Cusk	2,014	138	123	1,641
Dogfish Smooth	30	11	1	1
Dogfish Spiny	3,354	126	100	1,324
Golden Tilefish	5	3	2	4
Haddock	5,258	197	179	3,331
Hagfish	62	4	4	57
Horseshoe Crab	84	7	1	1
Illex Squid	165	20	14	115
John Dory	9	9	2	2
Jonah Crab	1,689	92	73	784
King Whiting	462	34	26	276
Knobbed Whelk	149	15	2	2

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Lightning Whelk	7	3	1	1
Longfin Squid	620	91	29	195
Nk Crab	128	18	15	69
Ocean Quahog	728	10	10	564
Offshore Hake	52	9	7	33
Pollock	4,831	176	150	3,639
Porbeagle Shark	39	4	4	32
Red Hake	516	66	33	239
Redfish	3,653	162	140	2,762
Rock Crab	608	43	34	378
Scup	312	66	8	15
Sea Raven	8	3	3	4
Sea Robins	16	7	2	2
Sea Scallop	2,371	197	113	719
Silver Hake	3,846	182	132	2,374
Skates	2,110	152	104	689
Squeteague Weakfish	10	6	1	1
Striped Bass	214	55	19	33
Summer Flounder	504	81	23	37
Surf Clam	42	10	3	3
Tautog	14	8	2	3
White Hake	4,220	166	142	3,263
Winter Flounder	3,497	157	138	1,378
Witch Flounder	4,549	169	156	2,931
Yellowtail Flounder	2,935	144	122	1,132

Table 10.29 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2014

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	308	4	4	80
Beals Island, ME	414	11	11	156

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Beverly, MA	850	6	6	75
Boothbay Harbor, ME	255	7	7	73
Boston, MA	986	27	25	711
Bremen, ME	24	3	3	11
Bucks Harbor, ME	274	3	3	85
Cape Porpoise, ME	317	6	6	270
Chatham, MA	2,897	69	57	559
Cundys Harbor, ME	416	6	6	201
Cushing, ME	76	4	4	71
Dennis, MA	42	8	4	18
Eastport, ME	50	4	3	34
Fairhaven, MA	10	6	3	6
Friendship, ME	265	3	3	171
Gloucester, MA	6,878	148	130	1,702
Green Harbor, MA	342	8	6	14
Hampton, NH	83	4	4	43
Harpswell, ME	800	11	10	213
Harwichport, MA	420	19	11	23
Hull, MA	294	3	3	14
Hyannis, MA	119	14	5	7
Jonesport, ME	1,883	29	28	1,288
Kennebunkport, ME	260	3	3	238
Marshfield, MA	1,037	20	17	92
Montauk, NY	18	4	1	1
Nahant, MA	325	5	3	7
Nantucket, MA	31	10	6	19
New Bedford, MA	1,923	163	92	850
Newburyport, MA	254	6	5	144
Orleans, MA	121	4	4	31
Plymouth, MA	247	7	3	5

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Point Judith, RI	206	46	4	4
Port Clyde, ME	150	8	8	135
Portland, ME	1,290	54	50	970
Portsmouth, NH	1,757	21	21	1,028
Prospect Harbor, ME	95	5	5	82
Provincetown, MA	883	27	26	122
Rockland, ME	182	6	6	147
Rockport, MA	995	13	13	346
Rye, NH	666	10	10	517
Saco, ME	164	4	4	65
Salisbury, MA	35	3	3	33
Sandwich, MA	166	7	5	10
Scituate, MA	776	18	13	117
Seabrook, NH	874	18	18	669
South Bristol, ME	161	4	4	74
Southwest Harbor, ME	143	4	4	85
Stonington, ME	269	5	5	152
Stueben, ME	138	3	3	107
Swans Island, ME	169	3	3	30
Tenants Harbor, ME	451	8	8	111
Vinalhaven, ME	739	9	9	395
Wellfleet, MA	33	3	2	2
Winter Harbor, ME	427	4	4	232
Yarmouth, MA	9	3	2	4
York Harbor, ME	441	3	3	169

Table 10.30 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2013

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	91.35	92.09	80.90
White Hake	85.69	86.27	77.66

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Pollock	84.46	85.47	76.83
American Plaice	78.35	77.18	74.44
Atlantic Hagfish	69.61	70.33	73.64
Atlantic Halibut	66.26	66.16	69.38
Witch Flounder	64.14	66.06	69.99
Haddock	57.91	56.37	67.24
Bluefin Tuna	48.15	49.89	23.78
Atlantic Cod	46.68	46.44	61.85

Table 10.31 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2013

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	26,917	572	492	10,095
Atlantic Herring	867	47	43	585
Bluefish	386	127	42	60
Highly Migratory Species	102	35	22	51
Mackerel, Squid, and Butterfish	1,290	162	93	655
Monkfish	6,700	281	210	4,114
No Federal FMP	3,402	242	183	2,079
Northeast Multispecies	8,336	310	259	4,893
Sea Scallop	2,761	304	152	686
SERO FMP	6	4	2	3
Skates	2,664	169	135	989
Small-Mesh Multispecies	3,672	185	135	2,285
Spiny Dogfish	1,956	112	88	629
Summer Flounder, Scup, Black Sea Bass	392	94	39	68
Surfclam, Ocean Quahog	1,009	22	17	698
Tilefish	5	5	1	1

Table 10.32 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2013

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	5,623	186	177	3,485
American Lobster	26,037	485	437	9,743
Angler	6,700	281	210	4,114
Atlantic Halibut	759	142	121	530
Atlantic Herring	867	47	43	585
Atlantic Mackerel	754	113	68	388
Black Sea Bass	75	36	5	5
Blue Crab	20	3	2	6
Bluefin Tuna	89	26	19	47
Bluefish	386	127	42	60
Butterfish	414	62	24	197
Channeled Whelk	344	28	13	18
Chub Mackerel	5	4	2	2
Cod	7,209	247	223	4,183
Conchs	95	8	5	8
Conger Eel	18	12	1	1
Cunner	7	6	2	2
Cusk	2,118	135	123	1,683
Dogfish Smooth	8	5	2	2
Dogfish Spiny	1,956	112	88	629
Golden Tilefish	4	4	1	1
Haddock	4,806	214	196	3,046
Hagfish	45	3	3	39
Horseshoe Crab	64	8	1	1
Illex Squid	159	18	13	93
John Dory	7	7	3	3
Jonah Crab	1,849	93	74	820
King Whiting	89	7	7	50
Knobbed Whelk	99	14	2	2
Longfin Squid	447	77	31	147

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Nk Crab	116	13	11	68
Nk Dogfish	4	4	3	3
Ocean Quahog	892	12	12	681
Offshore Hake	71	6	5	44
Pandalid Shrimp	555	77	72	318
Pollock	5,631	214	188	4,075
Red Hake	496	59	34	284
Redfish	4,105	187	170	3,000
Rock Crab	624	38	33	229
Sand-Dab Flounder	3	3	2	2
Scup	165	50	7	13
Sea Raven	11	3	3	8
Sea Scallop	2,761	304	152	686
Silver Hake	3,609	179	131	2,253
Skates	2,664	169	135	989
Squeteague Weakfish	12	10	1	1
Striped Bass	338	66	29	51
Summer Flounder	326	75	31	53
Surf Clam	112	9	6	17
Tautog	7	6	1	1
White Hake	4,702	180	158	3,589
Winter Flounder	3,715	185	161	1,359
Witch Flounder	5,099	188	176	3,236
Yellowtail Flounder	2,992	173	147	1,069

Table 10.33 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2013

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	413	4	4	122
Bass River, MA	16	5	2	4
Beals Island, ME	407	8	8	205

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Beverly, MA	1,032	7	7	141
Boothbay Harbor, ME	345	10	10	101
Boston, MA	966	29	28	670
Bucks Harbor, ME	277	4	4	99
Cape Porpoise, ME	329	6	6	268
Chatham, MA	2,703	70	56	479
Cundys Harbor, ME	337	7	7	239
Dennis, MA	44	10	7	11
Eastport, ME	84	3	3	46
Fairhaven, MA	20	10	4	5
Friendship, ME	293	7	7	180
Gloucester, MA	7,174	156	141	1,867
Hampton, NH	94	5	5	62
Harpswell, ME	863	16	14	261
Harwichport, MA	378	18	11	26
Hull, MA	381	3	3	25
Hyannis, MA	79	16	4	4
Jonesport, ME	2,112	31	30	1,450
Kennebunkport, ME	306	5	5	296
Kittery, ME	207	7	7	118
Marshfield, MA	1,259	25	16	80
Nahant, MA	344	4	3	11
Nantucket, MA	31	5	5	13
New Bedford, MA	2,160	246	125	857
New London, CT	4	3	1	1
Newburyport, MA	245	8	7	135
Newport News, VA	5	5	1	1
Newport, RI	44	12	5	16
Plymouth, MA	223	6	4	8
Point Judith, RI	114	36	6	11

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Port Clyde, ME	126	9	9	83
Portland, ME	1,457	59	56	1,093
Portsmouth, NH	1,840	26	26	1,110
Prospect Harbor, ME	106	4	4	63
Provincetown, MA	742	21	21	128
Rockland, ME	146	6	6	107
Rockport, MA	907	10	10	324
Rye, NH	709	11	11	572
Salisbury, MA	47	5	4	22
Sandwich, MA	186	12	6	8
Scituate, MA	997	18	16	141
South Bristol, ME	283	8	8	109
Southwest Harbor, ME	230	4	4	113
Stonington, CT	10	5	2	3
Stonington, ME	248	4	4	125
Stueben, ME	125	3	3	103
Tenants Harbor, ME	439	7	7	102
Vinalhaven, ME	762	9	9	457
Winter Harbor, ME	389	4	4	211
Yarmouth, MA	28	7	3	3
York Harbor, ME	400	4	4	185

Table 10.34 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2012

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	89.07	89.80	75.94
Pollock	82.93	83.18	70.94
White Hake	81.41	81.66	73.53
American Plaice	70.77	70.66	66.39
Atlantic Hagfish	69.65	66.23	68.13
Atlantic Halibut	65.85	65.65	69.39

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Witch Flounder	56.33	59.10	65.66
Atlantic Cod	42.85	41.35	55.55
Atlantic Herring	42.52	39.37	44.46
Northern Shrimp	42.05	44.70	42.88

Table 10.35 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2012

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	30,104	640	544	11,377
Atlantic Herring	999	51	47	654
Bluefish	924	173	73	277
Highly Migratory Species	201	64	37	119
Mackerel, Squid, and Butterfish	1,502	178	105	539
Monkfish	8,958	334	246	4,968
No Federal FMP	3,938	281	209	2,122
Northeast Multispecies	12,021	357	301	5,951
Sea Scallop	2,378	269	125	346
SERO FMP	25	12	7	8
Skates	4,165	209	163	1,512
Small-Mesh Multispecies	4,824	206	146	2,571
Spiny Dogfish	5,656	177	141	2,161
Summer Flounder, Scup, Black Sea Bass	485	103	40	76
Surfclam, Ocean Quahog	1,016	17	15	765
Tilefish	10	7	2	3

Table 10.36 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2012

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	7,543	231	215	4,094
American Lobster	28,350	532	465	10,616
American Shad	6	5	4	5

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Angler	8,958	334	246	4,968
Atlantic Halibut	696	158	131	486
Atlantic Herring	999	51	47	654
Atlantic Mackerel	762	109	59	213
Bay Scallop	15	3	2	9
Black Sea Bass	116	51	4	4
Blue Crab	37	5	4	23
Bluefish	924	173	73	277
Butterfish	500	87	32	204
Channeled Whelk	412	25	10	16
Cod	10,833	288	260	5,260
Conchs	67	11	4	8
Conger Eel	12	9	1	1
Cunner	26	8	5	6
Cusk	2,393	165	142	1,659
Dogfish Smooth	15	7	1	1
Dogfish Spiny	5,656	177	141	2,161
Fourspot Flounder	7	4	2	2
Golden Tilefish	10	7	2	3
Greenland Halibut	42	8	8	39
Haddock	6,131	254	230	3,244
Hagfish	43	3	3	27
Horseshoe Crab	42	3	1	1
Illex Squid	187	22	19	111
John Dory	19	10	5	6
Jonah Crab	1,752	75	63	842
King Whiting	73	11	7	21
Knobbed Whelk	77	8	2	2
Longfin Squid	646	98	42	171
Nk Crab	155	12	8	108

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Nk Shrimp	66	14	13	30
Ocean Quahog	998	13	13	763
Offshore Hake	74	8	4	54
Pandalid Shrimp	1,425	112	106	715
Penaeid Shrimp	22	9	7	8
Pollock	7,348	255	230	4,642
Porbeagle Shark	18	5	5	14
Red Crab	6	4	2	2
Red Hake	652	75	43	395
Redfish	4,680	221	194	3,281
Rock Crab	674	35	29	201
Scup	227	63	6	6
Sea Raven	15	6	4	11
Sea Robins	6	4	1	1
Sea Scallop	2,378	269	125	346
Silver Hake	4,773	199	142	2,541
Skates	4,164	209	163	1,511
Striped Bass	350	79	33	60
Summer Flounder	428	92	36	69
Surf Clam	16	4	2	2
Tautog	6	4	2	2
White Hake	6,153	226	200	4,298
Winter Flounder	6,195	213	186	2,119
Witch Flounder	6,989	228	211	3,914
Yellowtail Flounder	5,552	220	188	1,772

Table 10.37 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2012

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	373	4	4	109
Barnstable, MA	34	10	2	9

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Beals Island, ME	411	8	8	159
Beverly, MA	1,007	7	7	101
Boothbay Harbor, ME	574	11	11	341
Boston, MA	941	25	23	579
Bremen, ME	44	4	4	22
Bristol, ME	10	3	3	8
Bucks Harbor, ME	157	3	3	27
Cape May, NJ	8	8	1	1
Cape Porpoise, ME	526	9	9	339
Chatham, MA	3,691	74	56	822
Cundys Harbor, ME	408	8	8	259
Dennis, MA	54	7	5	25
Eastport, ME	41	4	3	28
Fairhaven, MA	15	7	1	1
Friendship, ME	510	7	7	307
Gloucester, MA	9,740	170	151	2,430
Hampton, NH	162	5	5	94
Harpswell, ME	1,038	19	16	327
Harwichport, MA	369	21	16	26
Hull, MA	429	7	6	25
Hyannis, MA	19	6	1	1
Jonesport, ME	2,237	30	30	1,582
Kennebunkport, ME	279	5	5	242
Kittery, ME	320	10	10	201
Machiasport, ME	118	3	3	78
Marblehead, MA	269	6	4	30
Marshfield, MA	1,299	30	21	98
Montauk, NY	26	7	1	1
Nahant, MA	386	4	4	22
Nantucket, MA	86	5	4	26

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
New Bedford, MA	1,938	210	108	829
New Harbor, ME	99	7	7	47
New London, CT	12	4	1	1
Newburyport, MA	225	10	10	141
Newington, NH	436	12	12	301
Newport, RI	32	7	3	17
Orleans, MA	90	7	4	26
Plymouth, MA	241	9	5	12
Point Judith, RI	165	39	7	10
Port Clyde, ME	414	12	12	283
Portland, ME	1,340	70	67	848
Portsmouth, NH	1,997	29	29	1,308
Provincetown, MA	834	24	17	108
Rockland, ME	144	6	6	94
Rockport, MA	1,129	13	13	414
Rye, NH	907	13	13	803
Sandwich, MA	284	10	7	11
Scituate, MA	1,621	26	20	247
Seabrook, NH	1,093	24	24	797
South Bristol, ME	467	14	14	152
Southwest Harbor, ME	150	4	4	44
Sprucehead, ME	91	4	3	5
Stonington, CT	16	6	1	1
Stonington, ME	285	6	6	151
Stueben, ME	150	3	3	105
Tenants Harbor, ME	499	7	7	150
Vinalhaven, ME	798	8	8	436
Winter Harbor, ME	309	4	4	182
Yarmouth, MA	23	4	3	3
York Harbor, ME	456	3	3	221

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
York, ME	124	4	4	68

Table 10.38 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2011

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	84.00	85.20	75.12
White Hake	81.27	81.36	68.50
Pollock	77.33	77.05	65.48
Atlantic Halibut	73.60	72.70	67.62
Atlantic Hagfish	73.50	69.85	72.30
American Plaice	72.71	71.71	63.27
Witch Flounder	58.95	61.36	63.47
Atlantic Herring	45.21	44.37	40.27
Atlantic Cod	42.48	41.66	51.96
Bluefin Tuna	38.75	38.42	26.13

Table 10.39 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2011

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	30,466	650	569	10,992
Atlantic Herring	939	51	44	580
Bluefish	572	130	53	95
Highly Migratory Species	295	59	47	168
Mackerel, Squid, and Butterfish	1,223	157	91	487
Monkfish	8,498	291	247	4,950
No Federal FMP	3,661	268	206	2,088
Northeast Multispecies	11,396	354	301	5,889
Sea Scallop	1,816	201	95	271
SERO FMP	4	3	3	3
Skates	4,229	217	174	1,852
Small-Mesh Multispecies	3,678	184	145	2,033

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Spiny Dogfish	3,541	160	136	1,676
Summer Flounder, Scup, Black Sea Bass	458	101	50	103
Surfclam, Ocean Quahog	1,197	16	15	991

Table 10.40 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2011

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	6,619	239	214	3,824
American Lobster	27,543	539	482	9,731
American Shad	5	5	5	5
Angler	8,498	291	247	4,950
Atlantic Halibut	516	130	118	375
Atlantic Herring	939	51	44	580
Atlantic Mackerel	591	99	58	196
Black Sea Bass	81	32	4	4
Blue Crab	42	4	4	18
Bluefin Tuna	261	51	42	150
Bluefish	572	130	53	95
Butterfish	440	61	22	165
Channeled Whelk	316	17	8	29
Chub Mackerel	26	10	5	6
Cod	10,495	316	277	5,334
Conchs	70	8	4	18
Cusk	2,332	180	150	1,596
Dogfish Smooth	7	3	1	1
Dogfish Spiny	3,541	160	136	1,676
Greenland Halibut	54	4	4	51
Haddock	6,476	276	241	3,323
Hagfish	54	3	3	39
Horseshoe Crab	16	3	1	1

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Illex Squid	182	22	14	86
John Dory	16	6	3	9
Jonah Crab	1,723	82	62	1,052
King Whiting	188	17	10	78
Knobbed Whelk	25	6	1	1
Longfin Squid	435	78	31	142
Nk Crab	35	10	6	23
Ocean Quahog	1,190	13	13	989
Offshore Hake	24	11	6	10
Other Fish	45	13	12	30
Pandalid Shrimp	2,597	122	116	1,230
Pollock	8,123	283	248	4,896
Porbeagle Shark	22	4	4	14
Queen Snow Crab	5	3	3	5
Red Hake	489	58	33	243
Redfish	4,359	216	188	3,113
Rock Crab	547	39	32	218
Sand-Dab Flounder	7	4	2	2
Scup	84	36	4	7
Sea Robins	4	3	1	1
Sea Scallop	1,816	201	95	271
Silver Hake	3,648	174	138	2,017
Skates	4,229	217	174	1,852
Striped Bass	358	69	36	54
Summer Flounder	398	87	45	97
Tautog	5	5	1	1
White Hake	6,370	243	219	4,385
Winter Flounder	4,986	232	201	1,740
Witch Flounder	6,282	234	218	3,689
Wolffishes	5	3	2	2

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Yellowtail Flounder	4,697	226	197	1,525

Table 10.41 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2011

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Addison, ME	62	3	3	50
Bailey Island, ME	323	5	5	85
Barnstable, MA	30	8	3	5
Beals Island, ME	412	11	11	197
Beverly, MA	978	7	7	89
Boothbay Harbor, ME	737	12	11	387
Boston, MA	768	22	19	526
Bremen, ME	67	5	5	23
Bucks Harbor, ME	177	3	3	27
Cape May, NJ	5	5	1	1
Cape Porpoise, ME	453	8	8	319
Chatham, MA	3,740	69	58	998
Cundys Harbor, ME	507	13	13	230
Dennis, MA	72	11	8	19
Fairhaven, MA	13	7	3	3
Friendship, ME	466	7	7	202
Gloucester, MA	8,814	180	152	2,358
Hampton, NH	252	11	11	113
Harpswell, ME	1,134	18	17	252
Harwichport, MA	480	19	14	32
Hull, MA	658	8	6	33
Jonesport, ME	2,200	29	29	1,666
Kennebunkport, ME	326	4	4	251
Kittery, ME	379	6	6	168
Machiasport, ME	249	3	3	182
Marblehead, MA	341	6	6	43

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Marshfield, MA	1,192	28	19	84
Matinicus, ME	83	3	3	22
Milbridge, ME	115	3	3	102
Montauk, NY	9	6	1	1
Nahant, MA	349	4	4	12
Nantucket, MA	49	9	7	25
New Bedford, MA	1,602	159	92	724
New Harbor, ME	158	9	9	49
Newburyport, MA	397	11	11	260
Newington, NH	410	9	9	287
Newport News, VA	8	8	1	1
Newport, RI	45	8	3	29
Orleans, MA	76	7	5	27
Plymouth, MA	261	13	9	14
Point Judith, RI	101	26	10	20
Port Clyde, ME	211	12	10	119
Portland, ME	1,741	64	61	891
Portsmouth, NH	1,715	30	29	1,191
Prospect Harbor, ME	116	6	5	97
Provincetown, MA	795	25	20	97
Rockland, ME	167	11	10	111
Rockport, MA	1,038	13	11	382
Rye, NH	785	10	10	704
Sandwich, MA	177	9	6	9
Scituate, MA	1,155	25	23	154
Seabrook, NH	1,196	27	27	935
South Bristol, ME	731	16	16	301
Stonington, CT	7	4	1	1
Stonington, ME	397	10	10	152
Swans Island, ME	127	3	3	34

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Tenants Harbor, ME	373	6	6	94
Vinalhaven, ME	821	10	10	439
West Point, ME	182	5	5	58
Winter Harbor, ME	293	4	4	162
York Harbor, ME	425	3	3	149
York, ME	136	5	4	84

Table 10.42 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2010

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	84.49	85.75	72.74
White Hake	79.38	79.22	62.66
Pollock	77.23	76.48	62.59
American Plaice	75.82	75.43	59.59
Atlantic Halibut	71.22	72.08	69.93
Atlantic Hagfish	71.09	71.62	72.33
Witch Flounder	62.64	65.76	59.58
Bluefin Tuna	46.86	45.30	37.15
Atlantic Wolffish	42.96	44.86	67.17
Atlantic Herring	42.72	39.48	36.21

Table 10.43 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2010

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	33,463	719	614	11,673
Atlantic Herring	942	67	59	598
Bluefish	900	161	78	176
Highly Migratory Species	422	85	61	270
Mackerel, Squid, and Butterfish	842	148	66	235
Monkfish	6,712	341	275	3,704
No Federal FMP	3,963	340	250	2,270

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Northeast Multispecies	11,619	434	374	4,872
Sea Scallop	1,025	146	76	181
Skates	3,244	233	192	1,298
Small-Mesh Multispecies	2,441	188	146	1,349
Spiny Dogfish	2,718	175	131	1,101
Summer Flounder, Scup, Black Sea Bass	385	95	47	74
Surfclam, Ocean Quahog	1,289	19	17	1,128
Tilefish	7	5	3	5

Table 10.44 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2010

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	5,315	295	252	3,004
American Lobster	29,764	602	524	10,086
American Shad	44	8	8	43
Angler	6,712	341	275	3,704
Atlantic Halibut	543	145	131	420
Atlantic Herring	942	67	59	598
Atlantic Mackerel	452	99	47	125
Black Sea Bass	73	31	2	2
Blue Back Herring	28	3	2	4
Blue Crab	55	8	6	16
Bluefin Tuna	368	66	50	233
Bluefish	900	161	78	176
Butterfish	419	58	16	75
Channeled Whelk	300	20	10	22
Cod	10,801	386	339	4,431
Conchs	56	9	5	11
Conger Eel	8	6	1	1
Cusk	1,736	192	167	1,284

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Dogfish Smooth	8	5	1	1
Dogfish Spiny	2,718	175	131	1,101
Golden Tilefish	7	5	3	5
Greenland Halibut	18	4	4	18
Haddock	5,522	329	278	2,933
Hagfish	88	6	6	69
Horseshoe Crab	21	6	2	2
Illex Squid	49	10	4	16
John Dory	3	3	1	1
Jonah Crab	1,840	90	69	1,049
King Whiting	146	13	6	23
Knobbed Whelk	58	13	3	5
Longfin Squid	366	75	23	57
Nk Crab	577	19	16	354
Nk Dogfish	9	3	3	7
Nk Flounders	23	8	7	20
Ocean Quahog	1,256	16	16	1,127
Offshore Hake	47	9	5	7
Other Fish	36	12	10	22
Pandalid Shrimp	3,280	120	119	1,549
Pollock	6,107	319	262	3,576
Porbeagle Shark	24	10	6	18
Red Hake	491	65	39	183
Redfish	3,390	233	205	2,553
Rock Crab	671	39	29	356
Sand-Dab Flounder	68	14	6	32
Scup	133	40	4	4
Sea Robins	5	5	2	2
Sea Scallop	1,025	146	76	181
Silver Hake	2,370	181	141	1,318

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Skates	3,244	233	192	1,298
Striped Bass	459	88	38	70
Summer Flounder	342	89	46	72
Surf Clam	32	3	2	2
Tautog	9	5	1	1
White Hake	4,710	259	228	3,193
Winter Flounder	5,066	278	234	1,368
Witch Flounder	4,588	266	233	2,780
Wolffishes	330	123	78	161
Yellowtail Flounder	5,310	281	238	1,239

Table 10.45 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2010

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bailey Island, ME	525	6	6	115
Barnstable, MA	140	21	6	16
Beals Island, ME	363	5	5	194
Beverly, MA	956	7	7	70
Boothbay Harbor, ME	708	13	13	313
Boston, MA	604	26	21	401
Bremen, ME	48	5	4	21
Bucks Harbor, ME	164	3	3	30
Cape Porpoise, ME	475	6	6	343
Chatham, MA	2,871	67	59	750
Cundys Harbor, ME	847	17	17	307
Friendship, ME	503	5	5	217
Gloucester, MA	9,496	221	188	2,051
Hampton, NH	254	11	11	176
Harpswell, ME	1,128	18	17	423
Harwichport, MA	480	26	18	103
Hull, MA	689	9	9	36

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Jonesport, ME	2,398	33	30	1,865
Kennebunkport, ME	267	5	5	200
Kittery, ME	427	8	8	210
Marblehead, MA	269	5	5	51
Marshfield, MA	1,405	30	18	110
Matinicus, ME	164	3	3	36
Milbridge, ME	269	4	4	164
Montauk, NY	14	5	1	1
Nantucket, MA	80	22	21	49
New Bedford, MA	1,345	147	93	565
New Harbor, ME	335	7	7	85
Newburyport, MA	347	14	14	229
Newington, NH	351	9	9	239
Newport, RI	35	4	3	19
North Kingstown, RI	13	3	1	1
Orleans, MA	112	4	3	50
Plymouth, MA	235	13	7	16
Point Judith, RI	123	32	14	19
Port Clyde, ME	302	9	9	158
Portland, ME	1,518	61	59	758
Portsmouth, NH	1,692	31	29	1,076
Prospect Harbor, ME	88	6	6	79
Provincetown, MA	779	26	18	59
Quincy, MA	12	3	2	2
Rockland, ME	122	9	9	78
Rockport, MA	1,434	16	15	482
Rockport, ME	6	4	3	4
Rye, NH	765	11	11	668
Sandwich, MA	132	8	6	14
Scituate, MA	1,474	32	28	208

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Seabrook, NH	1,196	32	31	861
South Bristol, ME	1,139	20	20	380
Southwest Harbor, ME	300	6	6	110
Stonington, CT	4	4	1	1
Stonington, ME	688	11	11	306
Swans Island, ME	119	3	3	30
Tenants Harbor, ME	351	11	10	126
Tremont, ME	225	3	3	153
Truro, MA	16	3	3	4
Vinalhaven, ME	1,030	10	10	355
Winter Harbor, ME	408	8	8	231
York Harbor, ME	420	3	3	186
York, ME	150	5	5	77

Table 10.46 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2009

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	85.73	87.22	73.69
Pollock	77.59	77.09	64.11
White Hake	76.58	76.24	64.29
Atlantic Halibut	73.71	74.67	68.72
American Plaice	72.24	70.82	57.45
Atlantic Hagfish	65.37	67.02	66.05
Witch Flounder	61.37	62.71	56.02
Northern Shrimp	56.50	56.50	53.98
Haddock	40.34	40.88	54.61
Atlantic Herring	39.77	38.01	38.31

Table 10.47 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2009

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	29,446	684	581	10,406
Atlantic Herring	639	49	44	404
Bluefish	748	167	70	203
Highly Migratory Species	217	67	37	71
Mackerel, Squid, and Butterfish	832	165	80	242
Monkfish	9,496	410	339	5,093
No Federal FMP	5,900	428	337	3,222
Northeast Multispecies	16,850	493	436	6,902
Sea Scallop	1,001	170	99	276
SERO FMP	34	10	5	19
Skates	2,900	265	204	1,226
Small-Mesh Multispecies	3,544	239	174	1,894
Spiny Dogfish	4,520	217	158	1,916
Summer Flounder, Scup, Black Sea Bass	426	122	54	93
Surfclam, Ocean Quahog	1,250	21	21	1,087
Tilefish	8	7	6	6

Table 10.48 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2009

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	7,309	339	303	3,839
American Lobster	27,590	608	532	9,548
American Shad	111	13	12	75
Angler	9,496	410	339	5,093
Atlantic Halibut	824	191	162	637
Atlantic Herring	639	49	44	404
Atlantic Mackerel	460	106	59	125
Black Sea Bass	40	16	3	4
Blue Crab	25	4	3	10
Bluefin Tuna	157	42	27	54

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Bluefish	748	167	70	203
Butterfish	256	59	12	72
Channeled Whelk	404	17	10	14
Cod	16,039	444	399	6,517
Conchs	45	6	3	4
Conger Eel	4	4	1	1
Cusk	2,347	246	207	1,756
Dogfish Smooth	36	15	4	5
Dogfish Spiny	4,520	217	158	1,916
Dolphinfish	3	3	1	1
Fourspot Flounder	17	4	3	10
Golden Tilefish	7	6	5	6
Greenland Halibut	3	3	3	3
Haddock	7,701	384	337	3,767
Hagfish	113	6	6	95
Horseshoe Crab	31	3	1	1
Illex Squid	51	9	4	26
Jonah Crab	2,002	92	74	958
King Whiting	55	13	9	29
Knobbed Whelk	74	11	4	4
Longfin Squid	341	82	26	69
Menhaden	19	6	3	3
Nk Crab	590	31	27	216
Nk Flounders	24	12	10	14
Nk Shrimp	60	5	5	36
Ocean Pout	10	4	3	3
Ocean Quahog	1,249	20	20	1,086
Offshore Hake	47	9	6	14
Other Fish	25	12	12	20
Pandalid Shrimp	1,723	81	78	858

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Penaeid Shrimp	28	4	4	17
Pollock	8,279	353	307	4,941
Porbeagle Shark	16	7	5	12
Red Hake	552	78	45	356
Redfish	4,483	273	237	3,271
Rock Crab	949	49	40	492
Sand-Dab Flounder	403	97	63	146
Scup	166	47	5	12
Sea Raven	17	3	2	2
Sea Scallop	1,001	170	99	276
Silver Hake	3,369	232	166	1,774
Skates	2,900	265	204	1,226
Southern Flounder	6	4	2	2
Spider Crab	6	4	3	4
Squeteague Weakfish	4	4	1	1
Striped Bass	140	47	10	11
Summer Flounder	375	115	52	89
Tautog	11	7	1	1
White Hake	6,242	316	272	4,326
Winter Flounder	8,241	327	289	2,560
Witch Flounder	6,237	336	293	3,428
Wolffishes	1,768	268	212	843
Yellowtail Flounder	7,778	320	278	1,851

Table 10.49 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2009

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Addison, ME	147	3	3	135
Bailey Island, ME	471	5	5	138
Barnstable, MA	110	16	7	22
Beals Island, ME	378	9	9	168

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Beverly, MA	1,004	8	8	70
Boothbay Harbor, ME	497	11	10	273
Boston, MA	445	27	24	326
Bucks Harbor, ME	140	4	4	60
Cape Porpoise, ME	663	8	8	500
Chatham, MA	2,432	70	58	717
Cundys Harbor, ME	585	13	13	229
Fairhaven, MA	16	6	5	6
Fall River, MA	8	5	4	5
Friendship, ME	295	4	4	114
Gloucester, MA	11,084	218	192	2,178
Hampton, NH	384	11	11	256
Harpswell, ME	1,108	13	13	450
Harwichport, MA	285	20	8	27
Jonesport, ME	2,127	34	34	1,628
Kennebunkport, ME	197	4	4	148
Kittery, ME	455	8	8	222
Machiasport, ME	280	3	3	192
Marblehead, MA	399	9	7	58
Marshfield, MA	1,389	20	17	126
Matinicus, ME	173	3	3	34
Milbridge, ME	352	3	3	195
Montauk, NY	14	5	1	1
Nahant, MA	170	3	3	5
Nantucket, MA	34	21	14	20
New Bedford, MA	1,253	163	117	541
Newburyport, MA	284	10	10	207
Newington, NH	319	10	10	222
Newport, RI	33	6	4	23
Northeast Harbor, ME	200	3	3	87

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Orleans, MA	141	3	3	55
Plymouth, MA	243	9	8	15
Point Judith, RI	166	39	16	35
Port Clyde, ME	314	13	13	188
Portland, ME	1,903	65	62	1,123
Portsmouth, NH	1,751	33	32	1,115
Prospect Harbor, ME	50	4	4	45
Provincetown, MA	462	23	14	49
Rockland, ME	87	8	8	60
Rockport, MA	1,431	13	13	358
Rye, NH	960	14	14	854
Salisbury, MA	45	6	5	19
Sandwich, MA	134	8	5	18
Scituate, MA	1,569	37	33	245
Seabrook, NH	1,476	31	29	1,031
South Bristol, ME	650	11	11	196
Southwest Harbor, ME	247	7	7	100
Stonington, ME	655	8	8	273
Tenants Harbor, ME	440	7	7	164
Tremont, ME	283	3	3	197
Vinalhaven, ME	721	14	12	268
Winter Harbor, ME	411	5	5	228
York, ME	168	3	3	144

Table 10.50 Percentages of Total, Revenue, Landings, and Days-at-Sea for Species of Interest, Gulf Of Maine Rfi, 2008

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Redfish	82.56	83.68	70.45
American Plaice	74.16	69.83	53.97
Pollock	71.34	65.86	59.61
White Hake	70.21	72.08	60.94

Species	Revenue as % of Total	Landings as % of Total	DAS as % of Total
Northern Shrimp	68.32	68.42	45.90
Atlantic Halibut	68.08	68.60	63.02
Witch Flounder	60.63	61.89	51.61
Atlantic Herring	56.31	53.20	48.23
Atlantic Hagfish	48.75	49.23	49.12
Atlantic Cod	38.90	34.39	46.86

Table 10.51 Total and Expected Number of Trips and Vessels by FMP, Gulf Of Maine Rfi, 2008

FMP	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
ASMFC FMP	29,815	738	622	10,311
Atlantic Herring	658	47	42	496
Bluefish	616	138	47	172
Highly Migratory Species	178	55	28	68
Mackerel, Squid, and Butterfish	822	157	75	271
Monkfish	10,081	433	358	5,068
No Federal FMP	6,519	432	340	3,317
Northeast Multispecies	16,441	486	424	6,564
Sea Scallop	1,136	218	121	305
SERO FMP	11	6	5	8
Skates	3,446	288	230	1,276
Small-Mesh Multispecies	2,965	218	155	1,423
Spiny Dogfish	3,213	168	124	1,144
Summer Flounder, Scup, Black Sea Bass	461	134	60	90
Surfclam, Ocean Quahog	1,381	26	24	1,218
Tilefish	19	13	9	11

Table 10.52 Total and Expected Number of Trips and Vessels by Species, Gulf Of Maine Rfi, 2008

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Am. Plaice Flounder	7,257	350	320	3,528

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
American Lobster	26,907	640	554	9,051
American Shad	32	12	10	25
Angler	10,081	433	358	5,068
Atlantic Halibut	611	183	151	434
Atlantic Herring	658	47	42	496
Atlantic Mackerel	481	86	55	172
Black Sea Bass	118	49	5	5
Bluefish	616	138	47	172
Butterfish	184	49	8	50
Channeled Whelk	289	13	4	7
Cod	15,805	448	398	6,260
Conchs	16	7	1	1
Conger Eel	14	7	1	1
Cunner	128	17	14	45
Cusk	2,273	250	203	1,666
Dogfish Smooth	11	5	3	4
Dogfish Spiny	3,213	168	124	1,144
Fourspot Flounder	29	4	3	8
Golden Tilefish	19	13	9	11
Haddock	8,802	403	358	3,953
Hagfish	142	7	7	96
Horseshoe Crab	28	3	1	1
Illex Squid	40	8	5	22
John Dory	5	4	2	2
Jonah Crab	2,014	94	70	976
King Whiting	55	18	13	28
Knobbed Whelk	97	8	4	5
Longfin Squid	281	76	18	53
Menhaden	63	13	6	11
Nk Crab	160	15	8	21

Species	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Nk Flounders	15	11	5	7
Nk Shrimp	22	8	7	16
Ocean Pout	26	6	4	5
Ocean Quahog	1,375	22	22	1,216
Offshore Hake	20	7	4	7
Other Fish	10	6	5	7
Pandalid Shrimp	2,773	111	109	1,315
Penaeid Shrimp	9	4	3	7
Pollock	8,952	367	322	4,840
Porbeagle Shark	19	5	5	18
Quahog	5	3	2	2
Red Hake	558	74	37	345
Redfish	4,189	284	252	2,827
Rock Crab	1,340	53	40	665
Sand-Dab Flounder	497	114	72	164
Scup	69	20	5	8
Sea Raven	10	4	2	2
Sea Scallop	1,136	218	121	305
Silver Hake	2,678	205	143	1,222
Skates	3,446	288	230	1,276
Striped Bass	187	46	11	14
Summer Flounder	412	119	57	87
Tautog	16	9	1	1
White Hake	6,095	327	281	4,030
Winter Flounder	9,396	344	301	2,648
Witch Flounder	6,234	342	308	3,212
Wolffishes	2,621	304	243	1,224
Yellowtail Flounder	7,696	325	282	1,729

Table 10.53 Total and Expected Number of Trips and Vessels by Port, Gulf Of Maine Rfi, 2008

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Barnstable, MA	122	21	6	11
Beals Island, ME	464	14	14	274
Beverly, MA	970	8	8	64
Boothbay Harbor, ME	704	14	14	285
Boston, MA	366	23	23	265
Bucks Harbor, ME	236	9	7	100
Cape Porpoise, ME	598	7	7	462
Chatham, MA	2,406	69	57	632
Cundys Harbor, ME	742	13	13	271
Fall River, MA	13	3	2	2
Falmouth, MA	11	5	1	1
Gloucester, MA	10,752	226	198	2,185
Hampton, NH	374	12	10	233
Harpswell, ME	732	13	13	286
Harwichport, MA	336	22	12	47
Jonesport, ME	2,188	36	36	1,661
Kennebunkport, ME	221	6	6	158
Kittery, ME	642	11	11	297
Machiasport, ME	349	6	6	239
Marblehead, MA	599	10	8	92
Marshfield, MA	1,222	25	19	98
Milbridge, ME	434	5	5	267
Montauk, NY	15	7	1	1
Nantucket, MA	43	23	13	17
New Bedford, MA	1,289	172	111	499
New Castle, NH	252	3	3	92
Newburyport, MA	306	9	9	200
Newington, NH	375	9	9	263
Newport, RI	67	8	7	41
Northeast Harbor, ME	78	4	4	24

Port	Number of Trips	Number of Vessels	Expected Vessels	Expected Trips
Orleans, MA	156	7	5	52
Plymouth, MA	230	12	8	15
Point Judith, RI	172	36	12	30
Port Clyde, ME	398	14	14	239
Portland, ME	1,821	69	63	1,050
Portsmouth, NH	1,431	26	26	886
Prospect Harbor, ME	76	3	3	50
Provincetown, MA	571	33	24	78
Rockland, ME	111	7	7	96
Rockport, MA	1,432	18	18	404
Rye, NH	911	17	17	811
Saco, ME	203	4	4	110
Salisbury, MA	21	3	3	5
Sandwich, MA	148	10	5	35
Scituate, MA	1,406	34	31	235
Sebasco Estates, ME	250	6	6	83
South Bristol, ME	606	14	12	211
Southwest Harbor, ME	453	10	10	153
Stonington, CT	8	4	2	2
Stonington, ME	701	11	11	292
Vinalhaven, ME	447	6	6	123
York Harbor, ME	387	3	3	204
York, ME	228	5	5	174

APPENDIX C

Greater Atlantic Regional Fisheries Office

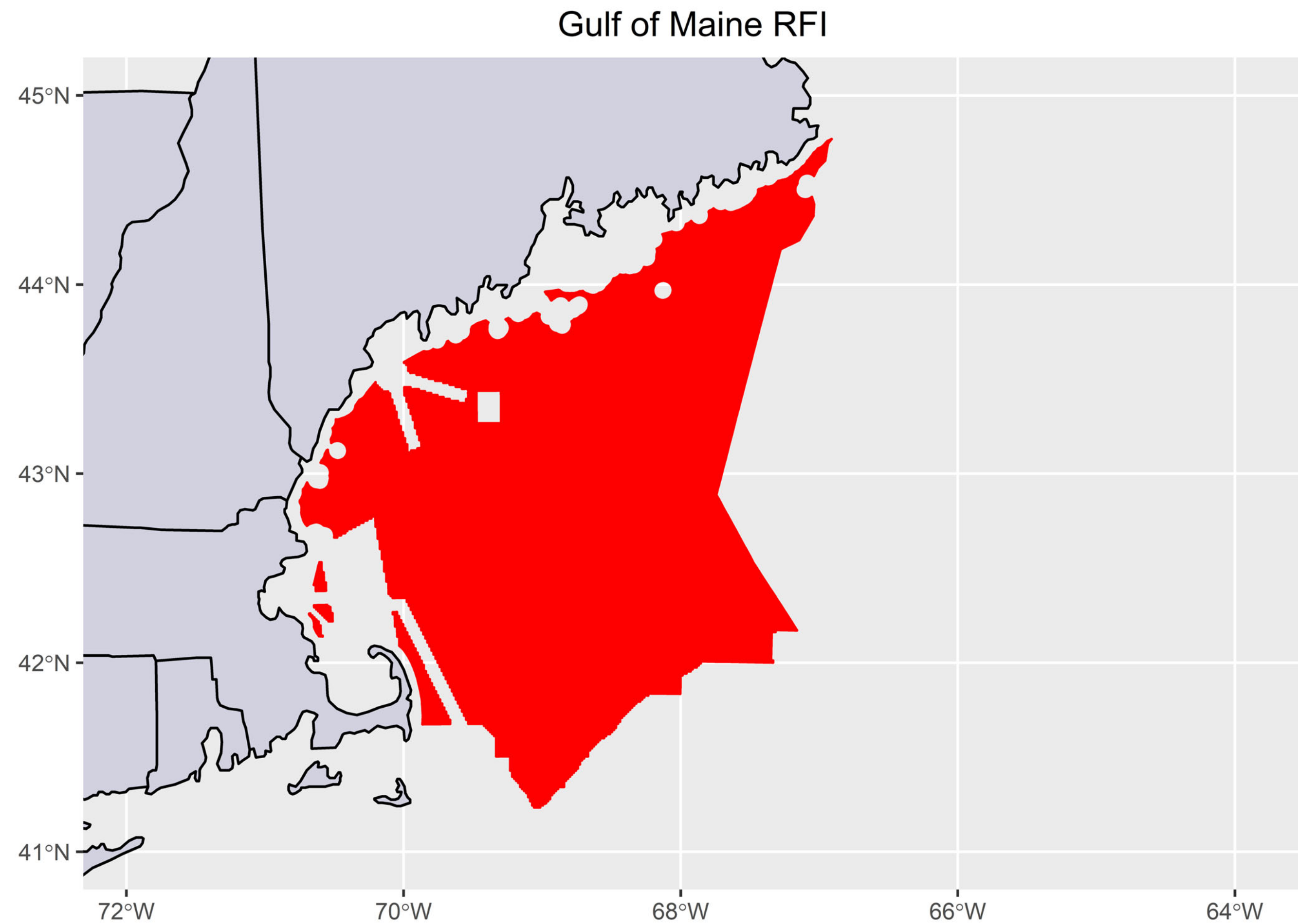
For-Hire Recreational Vessel Permit Historic Operations within the RFI Area

Back (https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development)

Descriptions of Selected Fishery Landings and Estimates of Recreational Party and Charter Vessel Revenue from Areas: A Planning-level Assessment

Prepared by:
National Marine Fisheries Service

September 13, 2022



Data sources:
Recreational fisheries landings data from vessel trip reports (VTR) for vessels issued a party/charter permit and marine angler expenditure surveys

In order to meet requirements of maintaining data confidentiality, these strata are presented individually. In addition, records that did not meet the rule of three (>= 3 unique permits), values were summarized as 'All Others'.

Some caveats/notes:

- Values are reported in nominal dollars. Values in 2019 dollars are reported as well (see below for details).
- Landings are reported in number of fish kept on party/charter trips.
- The term "angler trips" refers to the number of reported passengers on party/charter VTRs.
- The party/charter VTRs contain some trips where no fish were landed. Although these trips do not contribute to the species summaries, they are included in the activity summaries of trips, angler trips, and revenues.
- The term "vessel trips" refers to the number of party/charter VTRs submitted to NMFS where landings of any species were recorded.
- Data summarized here are based on federal VTRs submitted to NMFS.
- Numbers of individual fish species landed on party/charter trips are summarized by management categories as follows:
    - **Northeast Multispecies; Bluefish; Mackerel, Squid, Butterfish; Golden and Blueline Tilefish; Summer Flounder, Scup, Black Sea Bass:** Individual New England and Mid-Atlantic Fishery Management Council FMPs that require a party/charter permit
    - **Other Federal FMPs:** Individual New England and Mid-Atlantic Fishery Management Council FMPs that do not require a party/charter permit and have no recreational measures (Atlantic herring, Atlantic Sea Scallops, Monkfish, Spiny Dogfish, Skates, Red Crab, and Surfclams and Ocean Quahogs)
    - **Atlantic HMS FMP:** Atlantic billfish, Atlantic tunas, swordfish and sharks

- **ASMFC Interstate FMPs:** Species managed exclusively under an ASMFC ISFMP (American Lobster, Atlantic Croaker, Cobia, Red Drum, Black Drum Spanish Mackerel, Spot, striped Bass, Spotted Sea Trout, Tautog, Weakfish and Coastal Sharks)
- **No Federal Plan:** Species that are not managed under any Federal or ASMFC ISFMP

- VTR data with missing coordinates have been removed.
- The information reported for 2020 should be interpreted with caution due to the generalized impacts the COVID-19 pandemic had on passenger demand for party/charter trips across many fisheries in the Greater Atlantic Region resulting in an unusually low number of angler trips; hence reduced revenues from passenger fees for affected party/charter entities.

References

DePiper GS (2014) Statistically assessing the precision of self-reported VTR fishing locations. (https://repository.library.noaa.gov/view/noaa/4806)
Benjamin S, Lee MY, DePiper G. 2018. Visualizing fishing data as rasters. NEFSC Ref Doc 18-12; 24 p. (https://repository.library.noaa.gov/view/noaa/23030)

Most Impacted Species By Management Category

The table below indicates the total number of fish kept from the area by Management Categories. The category “All Others” refers to categories with less than three permits impacted to protect data confidentiality.

Figure 1.1 Fish Count of Top Categories, Gulf Of Maine RFI

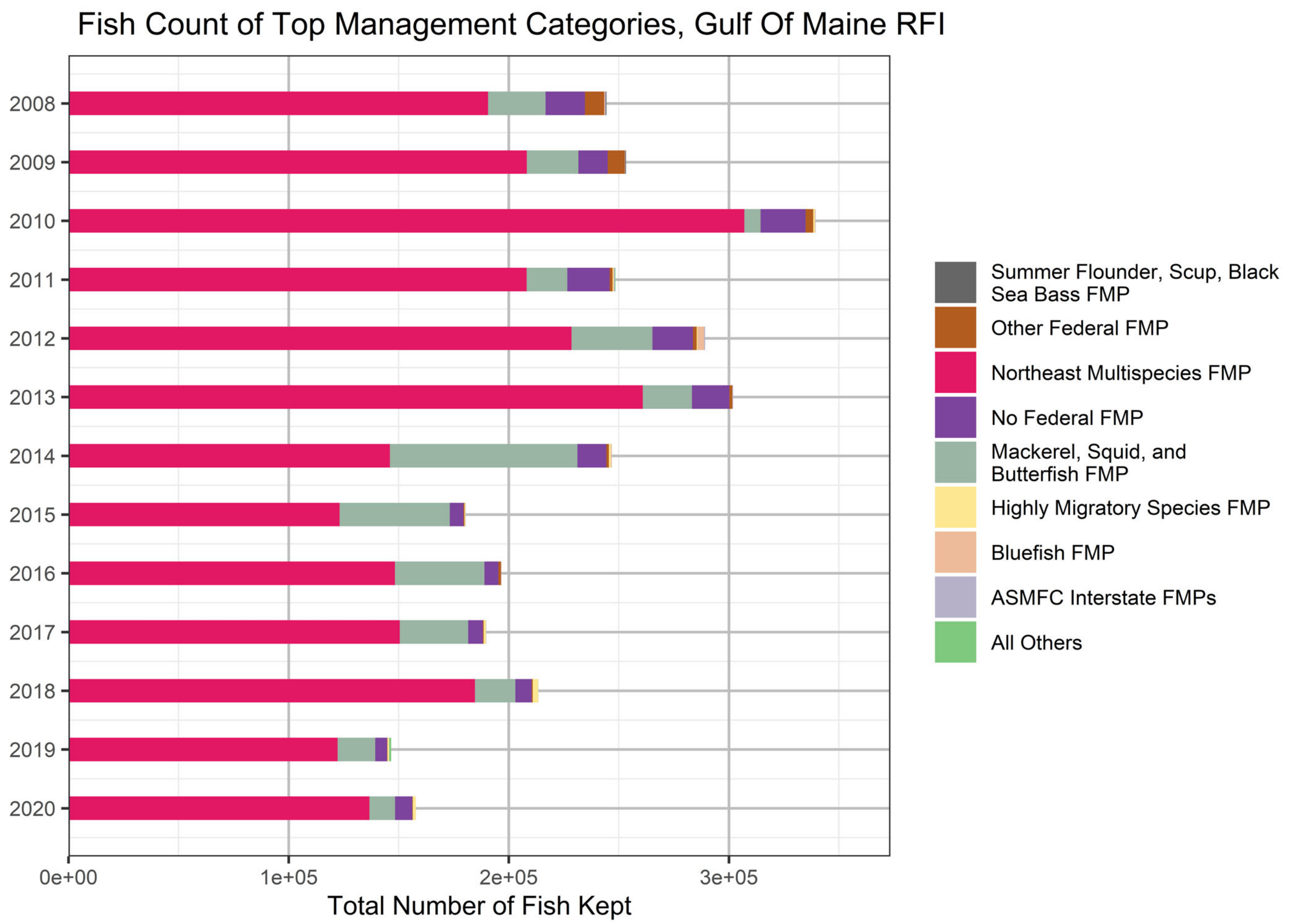


Table 1.1 Management Categories Fish Count, Gulf Of Maine RFI

Management Categories	Thirteen Year Fish Count
Northeast Multispecies FMP	2,415,158
Mackerel, Squid, and Butterfish FMP	388,740
No Federal FMP	159,151
Other Federal FMP	28,391
Highly Migratory Species FMP	8,408
Bluefish FMP	4,567
ASMFC Interstate FMPs	2,365
All Others	1,078
Summer Flounder, Scup, Black Sea Bass FMP	726
Total	**3,008,584**

Most Impacted Species

We analyzed the top ten species most frequently kept on recreational party/charter trips in the area and to isolate them from combined FMPs. The top ten species by the total number of fish kept are: Atlantic Mackerel, Chub Mackerel, Cod, Cusk, Dogfish Spiny, Haddock, Pollock, Red Hake, Redfish and Silver Hake . The category “All Others” refers to species with less than three permits impacted to protect data confidentiality. Additional species outside of the top ten include: Albacore Tuna, All Others, Angler, Atlantic Halibut, Atlantic Herring, Black Sea Bass, Blue Shark, Bluefin Tuna, Bluefish, Bonito, Cunner, Hake Mix Red & White, Longfin Squid, Mako Shortfin Shark, Menhaden, Ocean Pout, Offshore Hake, Other Fish, Porbeagle Shark, Sculpins, Scup, Sea Raven, Sea Robins, Skates, Striped Bass, Thresher Shark, Unknown, White Hake, Winter Flounder, Wolffishes and Yellowtail Flounder.

Figure 2.1 Fish Count of Top Species, Gulf of Maine RFI

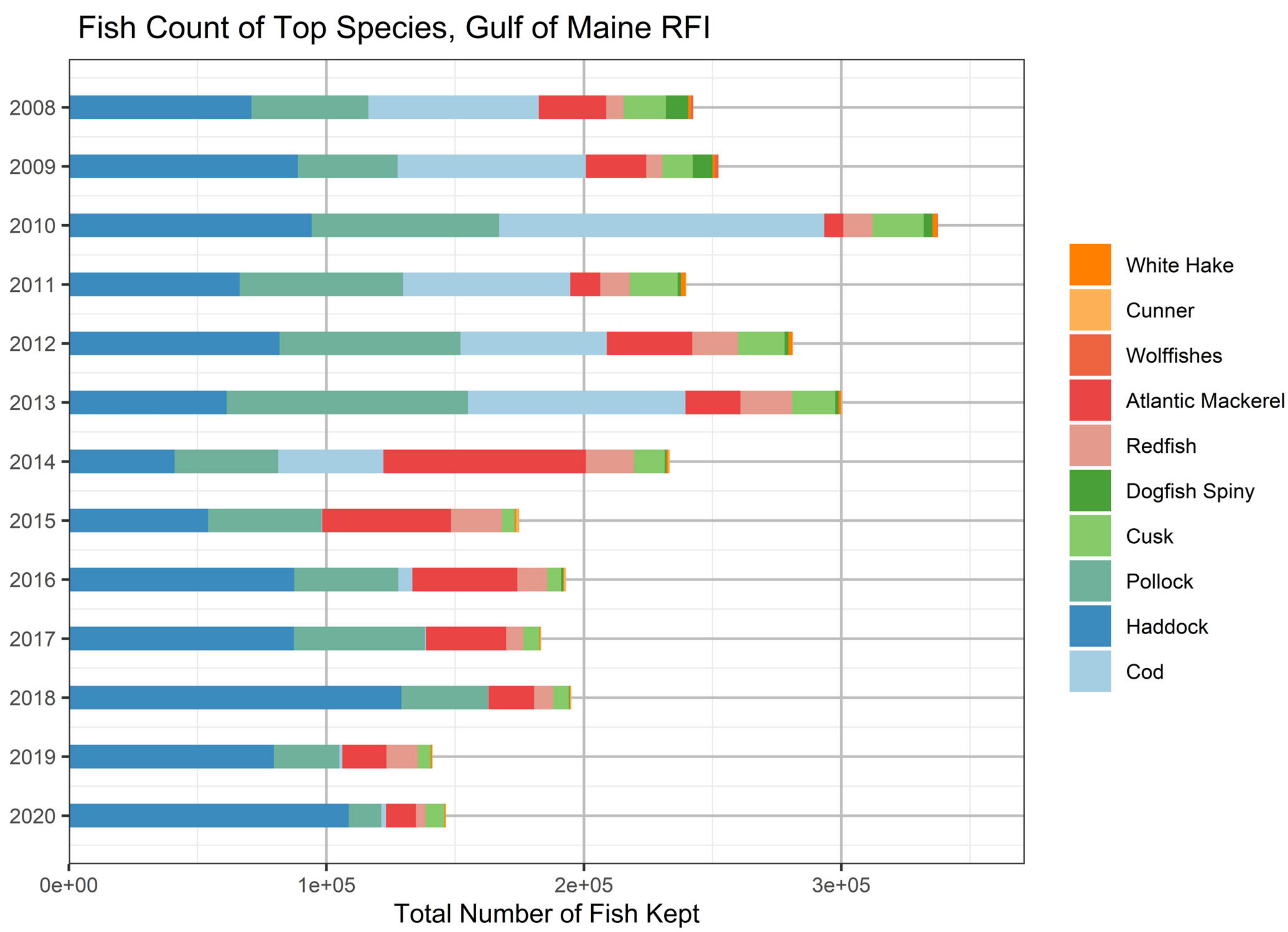


Table 2.1 Fish Count, Most Impacted Species, Gulf of Maine RFI

Species	Thirteen Year Fish Count
Haddock	1,051,481
Pollock	631,685
Cod	521,827
Atlantic Mackerel	369,957
Redfish	153,815

Species	Thirteen Year Fish Count
Cusk	148,668
Dogfish Spiny	25,458
White Hake	10,822
Cunner	4,854
Wolffishes	2,674
Total	**2,921,241**

Total Party/Charter Activity by Year

We analyzed the total revenue of party/charter trips by year by multiplying the annual mean combined charter and party for-hire fee of each state by the total number of anglers for each year. (See Methods section) Revenue values have been deflated to 2019 dollars. All numbers have been rounded to the nearest thousand.

Table 3.1 Total Party/Charter Revenue by Year, Gulf Of Maine RFI

Year	Annual Revenue
2008	$4,543,000
2009	$4,483,000
2010	$6,873,000
2011	$5,820,000
2012	$6,602,000
2013	$6,342,000
2014	$5,396,000
2015	$3,594,000
2016	$3,189,000
2017	$2,479,000
2018	$2,820,000
2019	$1,845,000
2020	$1,836,000
Total	**$55,821,000**

Number of Vessel Trips by Port

The table below indicate the total number of trips within the area by year and port. The category “Other Ports, XX” refers to ports with less than three permits to protect data confidentiality.

Table 4.1 Total Number of Vessel Trips by Port and Year, Gulf Of Maine RFI

Port	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gloucester, MA	145	89	196	62	111	131	88	55	67	45	68	34	134
Hampton, NH	406	479	565	331	369	384	432	389	311	233	188	190	188
Marshfield, MA	63	43	41	45	148	55	14	29	0	21	0	0	0
Newburyport, MA	186	162	183	169	225	245	209	92	92	103	159	15	115
Other Ports, MA	24	29	56	59	73	63	37	58	32	16	33	56	60
Other Ports, ME	494	362	465	330	316	328	316	299	401	401	258	191	277
Other Ports, NY	2	0	0	2	0	1	0	0	0	0	0	1	0
Plymouth, MA	17	7	12	0	0	0	0	0	0	3	11	0	0
Portland, ME	20	27	30	25	42	35	25	26	0	23	12	0	0
Portsmouth, NH	136	115	158	179	58	41	37	0	0	0	0	0	0
Rockport, MA	33	10	0	0	0	0	0	0	0	0	0	0	0
Rye, NH	298	229	230	221	278	293	273	102	76	48	59	41	34
Salisbury, MA	161	156	184	135	163	166	141	0	0	35	19	0	0
Seabrook, NH	428	411	540	551	738	751	761	607	490	437	406	173	186
Wells, ME	95	111	114	166	135	118	117	75	67	0	0	0	0
Boothbay Harbor, ME	0	44	0	0	0	0	0	0	0	0	0	91	0
Chatham, MA	0	0	5	0	0	0	0	0	0	0	0	12	17
Harwichport, MA	0	0	10	0	0	0	0	0	0	0	0	0	0
Other Ports, NH	0	0	8	2	0	3	5	24	33	34	171	45	51
Kennebunkport, ME	0	0	0	7	0	0	0	0	0	0	0	0	0
Other Ports, FL	0	0	0	22	0	0	0	0	0	0	0	0	0
Saco, ME	0	0	0	0	29	44	16	0	0	0	0	0	0
Scituate, MA	0	0	0	0	6	8	7	0	0	0	0	0	0
Other Ports, VA	0	0	0	0	0	1	3	2	2	1	0	0	0
Green Harbor, MA	0	0	0	0	0	0	0	9	6	0	0	0	0
South Portland, ME	0	0	0	0	0	0	0	34	63	0	0	0	0
No Port Data	0	0	0	0	0	0	0	0	0	0	4	33	11
Other Cumberland, ME	0	0	0	0	0	0	0	0	0	0	75	88	0
Other York, ME	0	0	0	0	0	0	0	0	0	0	80	0	45
Hampton/Seabrook, NH	0	0	0	0	0	0	0	0	0	0	0	151	103
Other Ports, NJ	0	0	0	0	0	0	0	0	0	0	0	1	0
Cumberland (County), ME	0	0	0	0	0	0	0	0	0	0	0	0	48
Massachusetts (State), MA	0	0	0	0	0	0	0	0	0	0	0	0	14
Other Massachusetts, MA	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	**2,508**	**2,274**	**2,797**	**2,306**	**2,691**	**2,667**	**2,481**	**1,801**	**1,640**	**1,400**	**1,543**	**1,122**	**1,286**

Number of Angler Trips by Port

The table below indicate the total number of angler trips from the area by year and port. The category “Other Ports, XX” refers to ports with less than three permits to protect data confidentiality.

Table 4.2 Total Number of Angler Trips by Port and Year, Gulf Of Maine RFI

Port	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gloucester, MA	2,576	1,030	4,551	1,214	2,272	2,679	1,311	1,065	1,440	1,146	1,761	900	2,495
Hampton, NH	13,087	13,188	16,219	8,663	10,671	11,124	11,294	9,997	9,728	5,352	3,651	4,288	2,568
Marshfield, MA	340	212	216	239	812	275	77	168	0	117	0	0	0
Newburyport, MA	3,990	3,459	4,120	3,133	5,189	5,647	4,357	1,956	2,449	3,067	4,231	278	2,319
Other Ports, MA	217	187	448	713	591	634	184	332	174	58	128	280	429
Other Ports, ME	7,641	6,080	7,173	5,616	5,362	5,334	4,974	4,183	5,659	4,931	2,797	1,284	3,455
Other Ports, NY	39	0	0	9	0	4	0	0	0	0	0	29	0
Plymouth, MA	542	229	651	0	0	0	0	0	0	82	162	0	0
Portland, ME	93	146	169	118	217	311	226	139	0	128	35	0	0
Portsmouth, NH	1,072	869	1,348	1,597	338	240	213	0	0	0	0	0	0
Rockport, MA	195	57	0	0	0	0	0	0	0	0	0	0	0
Rye, NH	2,322	1,712	1,890	2,648	2,687	2,765	2,692	891	555	271	237	306	193
Salisbury, MA	3,708	3,738	4,640	3,424	3,761	3,927	3,032	0	0	170	69	0	0
Seabrook, NH	12,739	10,759	13,966	15,750	19,247	17,693	18,191	14,400	7,811	7,008	6,387	3,766	1,625
Wells, ME	918	1,084	1,057	1,708	861	725	679	484	414	0	0	0	0
Boothbay Harbor, ME	0	405	0	0	0	0	0	0	0	0	0	392	0
Chatham, MA	0	0	12	0	0	0	0	0	0	0	0	44	53
Harwichport, MA	0	0	43	0	0	0	0	0	0	0	0	0	0
Other Ports, NH	0	0	29	8	0	14	18	136	194	190	6,795	260	292
Kennebunkport, ME	0	0	0	37	0	0	0	0	0	0	0	0	0
Other Ports, FL	0	0	0	605	0	0	0	0	0	0	0	0	0
Saco, ME	0	0	0	0	160	198	105	0	0	0	0	0	0
Scituate, MA	0	0	0	0	28	30	39	0	0	0	0	0	0
Other Ports, VA	0	0	0	0	0	18	68	44	81	18	0	0	0
Green Harbor, MA	0	0	0	0	0	0	0	35	20	0	0	0	0
South Portland, ME	0	0	0	0	0	0	0	133	273	0	0	0	0
No Port Data	0	0	0	0	0	0	0	0	0	0	23	175	48

Port	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Other Cumberland, ME	0	0	0	0	0	0	0	0	0	0	333	407	0
Other York, ME	0	0	0	0	0	0	0	0	0	0	1,162	0	258
Hampton/Seabrook, NH	0	0	0	0	0	0	0	0	0	0	0	7,240	4,761
Other Ports, NJ	0	0	0	0	0	0	0	0	0	0	0	3	0
Cumberland (County), ME	0	0	0	0	0	0	0	0	0	0	0	0	277
Massachusetts (State), MA	0	0	0	0	0	0	0	0	0	0	0	0	76
Other Massachusetts, MA	0	0	0	0	0	0	0	0	0	0	0	0	7
Total	**49,479**	**43,155**	**56,532**	**45,482**	**52,196**	**51,618**	**47,460**	**33,963**	**28,798**	**22,538**	**27,771**	**19,652**	**18,856**

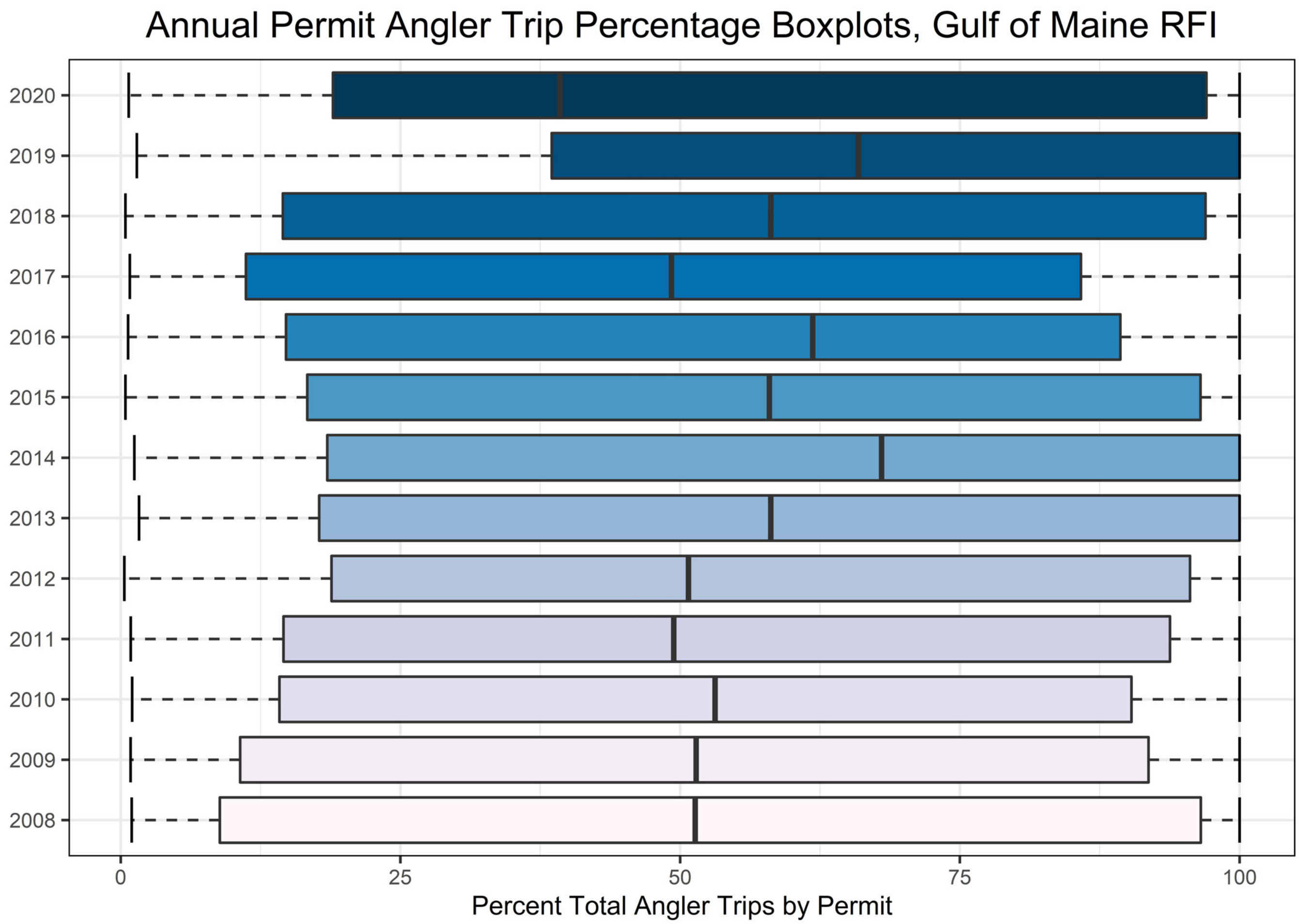
Percentage of Angler Trips by Permit

We also analyzed the percentage of each permit's total angler trips coming from within Gulf of Maine RFI area (see boxplot figure and table below). Boxplots are important statistical summaries because they provide information about the distribution of the percentages. The boxplots below begin at the 1st quartile, or the value beneath which 25 percent of all observations fall. A thick line within the box identifies the median, the observation at which 50 percent of observations are above or beneath. The box ends at the 3rd quartile, or the observation beneath which 75 percent of observations fall. Nonparametric estimates of the minimum and maximum values are also indicated by the "whiskers" (dashed line terminating in a vertical line) that jut out from each side of the box. Any points outside of these whiskers are observations that are considered outliers. In our table , however, the maximum values are inclusive of outliers. The table below presents the minimum, 1st quartile, median, 3rd quartile, and maximum values for the area. These are the thirteen year angler trip percentages. The boxplot in the figure below further separate the area out by year.

Table 5.1 Thirteen Year Summary of Permit Angler Trip Revenue Percent, Gulf Of Maine RFI

Area	Min	1st Quartile	Median	3rd Quartile	Max
Gulf Of Maine RFI	0.63%	11%	43%	89%	100%

Figure 5.1 Annual Permit Angler Trip Percentage Boxplots, Gulf of Maine RFI



IRFA Analysis

Small and large businesses could have differing ability to respond to impacts from wind energy development. As such, this section presents the total number of entities, by business category, and the total revenue generated by that business category in Table 1, for those businesses with historical fishing within the Gulf of Maine RFI area. Table 2 presents the revenue generated inside the Gulf of Maine RFI area against the total revenue, by business category.

Table 6.1 Total number of affected individuals, and their total revenue, by business category

Year	Business Type	Number of Entities	Revenue
2018	Small Business	308	$101,181,000
2019	Small Business	317	$97,050,000
2020	Small Business	383	$119,979,000

Table 6.2 Revenue inside the Gulf of Maine RFI area against total revenue by business category

Year	Business Type	Area Revenue	Total Revenue
2018	Small Business	$14,511,000	$20,091,000
2019	Small Business	$9,476,000	$11,281,000
2020	Small Business	$11,877,000	$15,770,000

Species Dependence

The tables below indicate party/charter vessel and angler trips, occurring within the area of interest, as a percentage of totals generated by party/charter vessel and angler trips across the entire region by year and the top ten species deriving the most fish kept from the area by year. The category “All Others” refers to species with less than three permits impacted to protect data confidentiality.

Table 7.1 Annual Party Vessel Trips, Angler Trips, and Number of Vessels in the Gulf Of Maine RFI, as a Percent of Total Northeast Region Party/Charter

Year	Vessel Trips as % of Total	Angler Trips as % of Total	Number of Vessels as % of Total
2008	9.19	51.14	17.93
2009	8.14	50.86	16.49
2010	8.56	55.51	15.66
2011	7.22	49.54	15.62
2012	8.69	56.28	17.62
2013	9.26	60.04	18.55
2014	8.97	62.83	18.04
2015	6.95	60.52	14.72
2016	6.56	54.24	14.58
2017	5.93	44.77	15.83
2018	7.33	56.74	15.66
2019	5.76	65.62	11.91
2020	6.24	53.69	14.18

Table 7.2 Thirteen Year Total Fish Count for Top ten Species as a Percent of Total, Gulf Of Maine RFI

Species	Fish Count as % of Total
Cusk	74.34
Wolffishes	74.13
Pollock	72.50
Silver Hake	70.78
Atlantic Halibut	69.40
Redfish	67.12
Blue Shark	63.00
Haddock	62.21
White Hake	46.79

Methods

NOAA Fisheries conducted their first marine angler expenditure survey in 1998 (Steinback and Gentner 2001; Gentner, Price, and Steinback 2001). Additional surveys were conducted in 2006 (Gentner, Price, and Steinback 2008), 2011 (Lovell Steinback, and Hilger 2013), and 2017 (Lovell et al 2020). For-hire passenger fee data collected from these surveys provided the baseline for calculating average annual fees by region/state from 1997 to 2019.

Linear extrapolation was used to estimate average for-hire fees for years with no survey data. For example, in Steinback and Gentner (2001), the average for-hire fee in Maine in 1998 was $46.20. The next angler expenditure survey, conducted in 2006, found the average for-hire fee in Maine was $63.65 (see Gentner, Price, and Steinback 2008). To calculate average fees for the years between 1998 and 2006 we simply extrapolated linearly between the two known data points. This same procedure was used to extrapolate values for all years between the four survey years.

Average for-hire fees in 1997, the year preceding the first survey, and in the two years following the last survey (2018 and 2019), were calculated using industry specific Bureau of Economic Analysis (BEA) output deflators. Specifically, we used BEA output deflators shown for Amusement, Gambling, and Recreation Industries (North American Industry Classification System code 713000), which include recreational fishing guide services. Nominal values were converted to 2019 dollars using the same BEA output deflators.

For further information email Scott Steinback, Economist, NOAA Fisheries, Northeast Fisheries Science Center (Scott.Steinback@noaa.gov (mailto:Scott.Steinback@noaa.gov)).

Steinback, S. and B. Gentner. 2001. “Marine Angler Expenditures in the Northeast Region, 1998”. U.S. Dept. of Commerce. NOAA Tech. Memo. NMFS-F/SPO-47. Gentner, B., M. Price, and S. Steinback. 2001. “Marine Angler Expenditures in the Southeast Region, 2001”. U.S. Dept. of Commerce. NOAA Tech. Memo. NMFS-F/SPO-48 Gentner, Brad, and Scott Steinback. 2008. The Economic Contribution of Marine Angler Expenditures in the United States, 2006.U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-94, 301 p. Lovell, Sabrina, Scott Steinback, and James Hilger. 2013. The Economic Contribution of Marine Angler Expenditures in the United States, 2011. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-134, 188 p. Lovell, Sabrina, James Hilger, Emily Rollins, Noelle A. Olsen, and Scott Steinback. 2020. The Economic Contribution of Marine Angler Expenditures on Fishing Trips in the United States, 2017. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-201, 80 p.

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

MEETING NOTICE
Ecosystem-Based Fishery Management Public Information Workshops

The public is invited to participate in workshops (schedule listed below) to hear and discuss the potential for the New England Fishery Management Council to regulate fisheries on Georges Bank using what is known as Ecosystem-Based Fishery Management or EBFM. The Council developed an example Fishery Ecosystem Plan (eFEP) that describes a general framework to account for trophic interactions and managed groups of stocks as a stock complex to reduce fishing costs and bycatch technical interactions. It also discusses management options that need to be considered to implement EBFM policies. EBFM Public Outreach Materials are available on the Council's website and include a short introductory video, infographics, stakeholder brochures, presentations, and interactive tools.

Date and Time	Location
Gloucester, MA Tuesday, October 25, 2022 3:00 p.m. – 6:00 p.m.	**Maritime Gloucester 23 Harbor Loop, Gloucester, MA 01930 Telephone: (978) 281-0470**
Portland, ME Wednesday, October 26, 2022 3:00 p.m. – 6:00 p.m.	**DoubleTree Hotel 363 Maine Mall Rd., Portland, ME 04106 Telephone: (207) 775-6161**
Chatham, MA Tuesday, November 1, 2022 3:00 p.m. – 6:00 p.m.	**Chatham Community Center 702 Main Street, Chatham, MA 02633 Telephone: (508) 945-5158**
New Bedford, MA Wednesday, November 2, 2022 3:00 p.m. – 6:00 p.m.	**New Bedford Whaling Museum 18 Johnny Cake Hill, New Bedford, MA 02740 Telephone: (508) 997-0046**
Point Judith, RI Tuesday, November 8, 2022 3:00 p.m. – 6:00 p.m.	**Superior Trawl Conference Room 55 State St, Narragansett, RI 02882 Telephone: (302) 503-4869**
Montauk, NY Wednesday, November 9, 2022 3:00 p.m. – 6:00 p.m.	**Montauk Playhouse and Community Center 240 Edgemere Street, Montauk, NY 11954 Telephone: (631) 668-1612**
Manahawkin, NJ Thursday, November 10, 2022 3:00 p.m. – 6:00 p.m.	**Holiday Inn 151 Route 72 West, Manahawkin, NJ 08050 Telephone: (609) 481-6100**

These sessions are intended to be interactive with sufficient time for questions to be answered and ample opportunity to hear your views about the potential for EBFM. The purpose of the workshops is to:

- Build a greater understanding of EBFM as a tool to assess and manage fisheries;
- Identify potential opportunities and concerns that different stakeholders see in EBFM. Examples of questions we would ask are:

- Provide an opportunity for stakeholders to help define the next steps and build a willingness to continue participation in the process.

Examples of questions we would ask are:

- What opportunities do you see to use EBFM to improve existing assessment and management systems?
- What do we stand to gain or lose in shifting towards an EBFM approach?

The workshops are scheduled for three hours. They will include three topical sessions with related group exercises for each session focusing on:

- An introduction to EBFM describing key concepts in the eFEP;
- The EBFM management framework in the eFEP, including an ecosystem cap, stock complex catch limits, and biomass floors for individual stocks; and
- Science that supports EBFM, including existing data and making decision-making data more timely.

Documents are available on the Council's website (https://www.nefmc.org/library/ebfm-public-information-workshops-and-outreach-materials) or may be obtained by contacting the Council office at (978) 465-0492.

These meetings will be recorded. Consistent with 16 USC 1852, a copy of the recording is available upon request.

These meetings are physically accessible to people with disabilities.
This schedule is subject to change. If you have questions, please call the Council office.

Scan this QR code with your phone camera to get to the New England Council's EBFM Public Information Workshops and Outreach Materials.

Notice date: October 3, 2022

East Coast Climate Change Scenario Planning

Revised Draft Scenario Narratives for Manager Brainstorming Sessions
September 2022

Introduction

This document outlines four draft scenarios that describe different possible futures for east coast fisheries in an era of climate change. The scenario framework is based on initial conversations held at a scenario creation workshop on June 21-23, 2022, attended by approximately 75 east coast fishery stakeholders and support staff. The draft scenarios were subsequently refined, based on comments received at two 'scenario deepening' webinars attended by over 100 fishery stakeholders.

Two core questions about the future - critical uncertainties - form the basis for the scenario framework:

1. What happens to stock production/species productivity by 2040 as climate change continues? Does it result in declining productivity (alongside worsening habitat, and low rates of species replacement), or is productivity mostly maintained (with adequate habitat and sufficient levels of species replacement)?

2. How unpredictable are ocean conditions, and how well is science able to assess and predict stock levels and locations by 2040? Do conditions become far more unpredictable, where existing science is clearly unable to provide much useful information, or are conditions sufficiently predictable to allow science to provide mostly accurate information about stocks and location?

Combining these uncertainties results in a 2x2 matrix that creates four distinct quadrants. None of these quadrants are predictions of what will happen in the next 20 years. Instead, they merely outline what might happen to ocean conditions, stocks and other changes to coastal communities. The scenarios also contain storylines and suggestions as to how fishing industry participants, managers, other ocean use sectors, and seafood consumers might adapt, react to and prepare for such conditions. We have often used specific examples as devices to add detail and color to the scenarios. These are meant as illustrations and not as specific suggestions for what will happen to a particular species, region or management action.

While the scenarios are designed to be divergent from each other, it is also important to acknowledge that there are some aspects that are broadly predictable over the next 20 years, so these elements will be reflected in all of the scenarios.

Across the scenarios, we can assume that ocean temperatures will increase in the next 20 years which will affect marine species biology and distribution. Regions are likely to exhibit differences in seasonal temperatures, and primary production will vary across different regions. We can expect that sea levels will rise. In terms of economic and social changes, it is likely that the coastal population will grow, and new and changing ocean uses will create more competition - for space and labor - for fisheries. These factors are features of each of the scenarios, but their impact might be different across quadrants.

How to Read and Use these Scenarios at Forthcoming Manager Meetings

Discussions are scheduled for Sep 19, Sep 20 and Oct 3, 2022. The sessions are designed as idea generation / brainstorming meetings. They are not designed to reach any decisions or discuss any form of prioritization. At each session, we will use the scenarios as a platform to imagine whether - and how - fishery management and governance might need to change in future.

To prepare for the session, please read each scenario, and imagine the conditions that you, as fishery managers, might face if conditions described in the scenarios play out.

At the session, you will be asked to consider the specific challenges (and opportunities) that each scenario poses for fishery managers, and then asked to generate ideas for possible changes and actions that are needed for fishery governance and management to be effective in future.

These discussions will focus on four topics described below. To assist your preparation, we have included the specific questions that we will ask during the discussion:

1) Management and Industry Adaptability / Flexibility / Nimbleness
   a) What does successful adaptability/nimbleness look like in this scenario for managers? For industry??
   b) What are the main barriers to effective adaptability in this scenario?
   c) If you knew this scenario was going to play out, what actions would you propose now, so that operators, communities and managers could adapt to cope with conditions in this scenario?

2) Data & Science
   a) What are the biggest data & science challenges facing fishery managers in this scenario?
   b) What new data & science opportunities emerge in this scenario?
   c) If you know this scenario was the future, what actions should fishery managers take now to ensure that data & science contributed to fisheries' success (data collection, coordination of existing streams, data usage, data sharing)

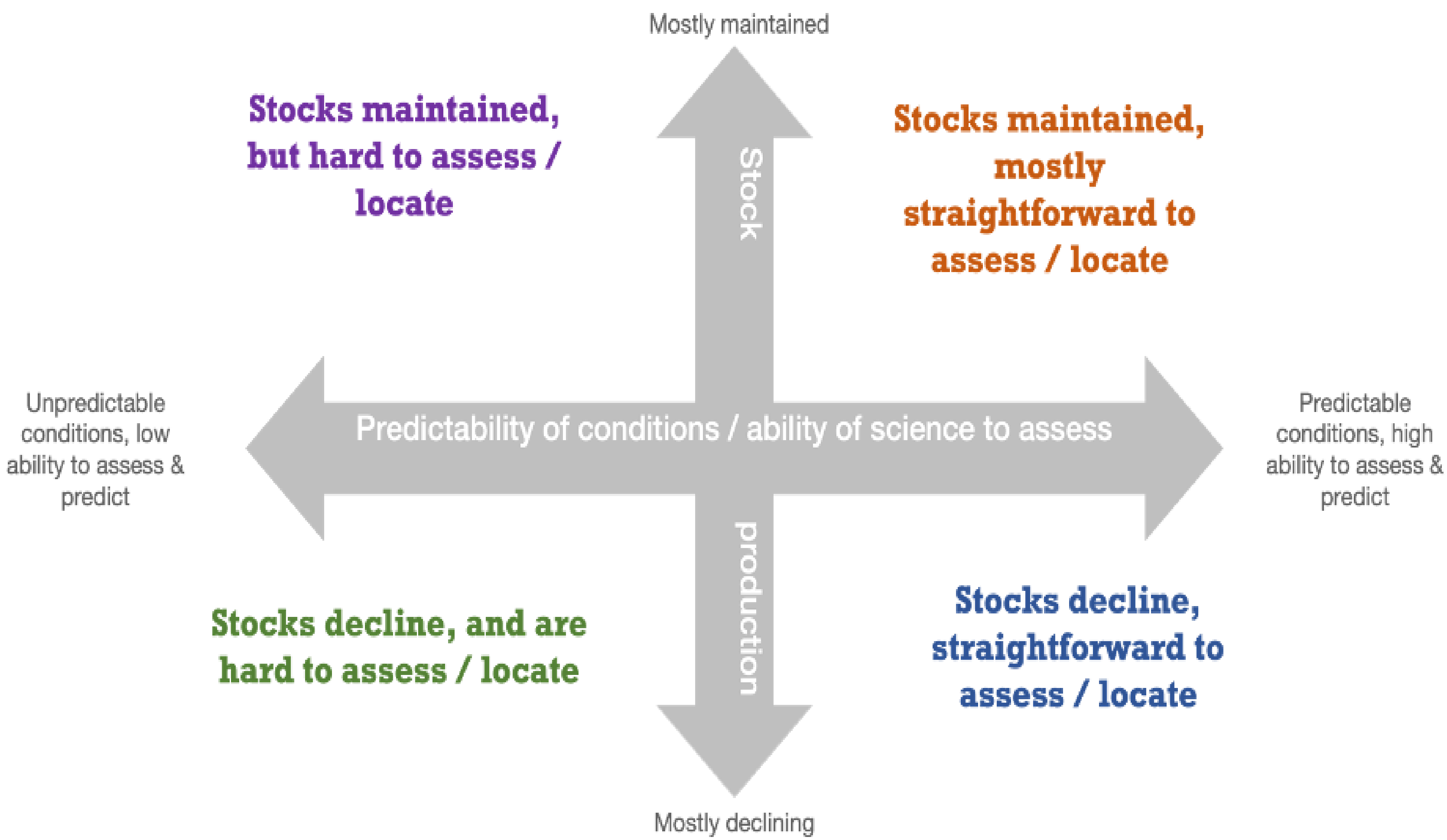
3) Alternative Ocean Uses
   a) What are the most significant challenges for fishery managers posed by new ocean uses (aquaculture, offshore wind, shipping, tourism) in this scenario?
   b) What opportunities are presented by new ocean uses in this scenario?
   c) If you knew this scenario was going to play out, what would you do now to ensure that alternative ocean uses resulted in a positive or minimal impact on fisheries?

4) Cross-Jurisdictional Management & Governance
   a) What major stresses would be placed on existing cross-jurisdictional (Council/Commission/State Boundaries) governance arrangements in this scenario?

b) Would current approaches for updating management authority over a fishery work well?
c) What new ways of changing management authority need to be considered?
d) What management challenges are present for species that move across jurisdictional boundaries?
e) What actions/changes are needed to better manage species that move across jurisdictional boundaries?

The suggestions for changes and actions from all three meetings will be gathered, synthesized and presented in Council and Commission meetings later in 2022. Each full Council/Commission will then be asked to review the suggestions and add their own ideas. The outcomes of these conversations will then be taken forward into discussions at a Summit Meeting in early 2023.

Draft Scenario Framework



Main Themes of Each Scenario

OCEAN PIONEERS "Weird weather and crazy conditions." That's what fishing operators and fishery managers are facing in 2040. Life on the ocean is remarkably different compared to 20 years ago. Climate change has prompted more investment in alternative energy and aquaculture. Seasons and locations of fisheries change unpredictably, and traditional science is unable to make accurate assessments. Despite this, fishermen report they are encountering plenty of seemingly healthy stocks. Ocean pioneers thrive in these turbulent conditions. Success doesn't come easy - it requires taking risks (such as investments in new data-gathering technology), deep pockets and an ability to ride out the storms of uncertainty.	**CHECKS AND BALANCE** Good science, smart collaboration and tolerable conditions allow East Coast fisheries to cope with the challenge of climate change in 2040. But nothing is easy: stocks shift and expand their ranges, while busier coasts and new offshore activity create accessibility challenges for commercial and recreational fishermen. Investments in habitat protection and restoration begin to reverse decades of damage and loss. Science capacity is boosted, delivering improved ocean monitoring, real-time catch reporting and population monitoring. A prosperous ocean economy leads to competition (e.g., between fisheries and aquaculture) but also collaboration (e.g., as fisheries science is boosted by wind energy installations). Gentrification creates concerns over accessibility for the recreational sector.
COMPOUND STRESS FRACTURES Several sources of stress have led East Coast fisheries to breaking point by 2040. Shifts in ocean currents and extreme weather events have tipped ecosystems out of balance. Major storms lead to more pollution and degraded habitats. Healthy stocks are scarce. Low abundance leads to reduced harvests and protected species regulations close several fishing grounds. Science is unable to help, as stock assessments data cannot cope with such a changeable and volatile ecosystem. Trust between stakeholders is in short supply, illustrated by fractious debates over the siting of offshore wind installations. Operators are forced to shift to lower trophic level species, and government support is needed to save a few selected fisheries.	**SWEET & SOUR SEAFOOD** "The science is good, but the news is bad." In 2040, climate change is affecting ocean and stock conditions in ways long predicted by scientists. Stocks have shifted their range, and productivity and abundance have declined for most relevant species. Better forecasting techniques help fishermen prepare for marine heatwaves and localized die-offs. Aquaculture provides a much-needed alternative as wild-caught seafood declines, and better science ensures that any pollution dangers are minimized. There are signs of a few smart management decisions (such as limits on newly arriving species) and adaptation from fishing operators, but most management approaches have not adapted to the tougher conditions of today, and those on the horizon.

Scenario Narratives

Ocean Pioneers

"Weird weather and crazy conditions." That's what fishing operators and fishery managers are facing in 2040. Life on the ocean is remarkably different compared to 20 years ago. Climate change has prompted more investment in alternative energy and aquaculture. Seasons and locations of fisheries change unpredictably, and traditional science is unable to make accurate assessments. Despite this, fishermen report they are encountering plenty of seemingly healthy stocks. Ocean pioneers thrive in these turbulent conditions. Success doesn't come easy - it requires taking risks (such as investments in new data-gathering technology), deep pockets and an ability to ride out the storms of uncertainty.

Ocean Conditions and Stock Productivity

In this scenario, ocean waters continue to warm, but rates of warming vary across regions. Environmental conditions and climate drivers are largely unpredictable, complex, and full of shocks and wild card events. Weather patterns and events become increasingly abnormal and harder to predict, including storms, heatwaves, localized warming, and severe weather events. Environmental change is not consistent, and there are spatial and temporal differences in the direction of climate drivers. Seasonal patterns and timing are changing, but with limited interannual predictability. Annual variability in currents and the cold pool contributes to the unpredictability of conditions.

Primary production is high due to increased upwelling and storms. Habitat generally remains of sufficient quality and quantity to support productive stocks. For some stocks, habitat is enhanced by the addition of more structure from wind farms on the continental shelf. Overall, fish stocks are doing well and the food web structure remains robust. Many species distributions have shifted, but species leaving an area are largely replaced by new species of similar economic value moving in. Most areas along the coast see changing and sometimes fluctuating species composition, but fishermen report that they are still encountering seemingly healthy stocks.

Science and Stock Assessments

The volatility in environmental conditions increases seasonal variability which makes it difficult to assess and forecast the health of specific marine resources in the current manner as stock availability and distributions are impacted. While overall productivity remains high, individual stock productivity is variable, with many species experiencing boom and bust years and frequent pendulum swings. Increased alternative energy and other ocean uses contribute to difficulties with stock assessments, as associated structures restrict traditional trawl survey areas. Seasonal management regulations become more difficult to set and less successful as it becomes harder to predict where fish will be at a given time of year.

Mismatches arise between how data is collected and where the fish are, both spatially and temporally. Assessments have a difficult time keeping up, and eventually it becomes difficult to assume that stock assessments are robust. It is also difficult to determine “sustainable” biomass and fishing levels given changing distributions and fluctuating productivity of species. Because there is little baseline information about how stocks may fare under new ranges and conditions, it is often unclear what targets are appropriate. Managers suspect that for some species, changes in productivity and stock size are not being captured adequately by traditional assessments; in other cases, assessments indicate large fluctuations in biomass that may not be occurring in reality. Overall productivity seems to be high yet the concerns about the accuracy of assessments leads some to consider if scientific uncertainty buffers should be reevaluated. A new paradigm for determining sustainable fishing parameters emerges, with many ‘historic’ stock assessments being replaced with more ‘pragmatic’ methods for setting catch limits. It is also difficult for scientists to predict species range changes, as it seems to vary by species and region, and there are few consistent trends across years.

In general, scientists and managers struggle to keep up with changing conditions and increasing management needs. In many situations the traditional scientific process is too slow to provide advice on management-relevant time scales. Technology helps address some issues arising under this scenario, but isn’t able to solve all problems. Increased use of transparent technology such as electronic monitoring and transmission of real time fishing data are able to give managers more information when traditional scientific methods and surveys struggle to keep up. While fishing industry and citizen science data are seen as increasingly critical, managers are still grappling with the best ways to use it, and tackling complicated questions around ownership of data. New data streams can also change conclusions about stock health, compounding uncertain and fluctuating estimates of biomass.

Fishing Practices and Pressures

Local ecological knowledge and innovative technological expertise is at a premium as fishermen adapt. Their data provides critical on-the-water observations and catch information. Management begins to rely more on the data and information collected and transmitted from fishermen on the water, as well as shoreside data collection at docks. Industry participants continue to push for this data to be used to its full potential.

Variations and unpredictability in environmental conditions and fish distributions lead to variable fishing success from year to year, creating “boom” and “bust” years for commercial and recreational fishing communities. In addition, sometimes harvesters must work around dangerous fishing conditions created by unexpected and extreme weather events. In the commercial sector, this creates market swings that cause frustration in the industry - it is hard to create stable seafood markets under these conditions. However, this is partially offset by increased public demand and willingness to pay a premium for sustainable seafood. Some smaller niche businesses succeed in adapting to fluctuating markets and new supply chain dynamics, but that requires courage, risk-taking, and a good amount of luck. The fishing industry faces a constant struggle to bring in new players given so much variability and uncertainty about future income potential. The next generation generally pulls back on investing in fishing industry businesses, aside from a few players who try to take advantage of new opportunities in a markedly different fisheries world.

Recreational for-hire businesses suffer in many areas as demand for trips drops: it is difficult to keep clients coming back with inconsistent catch and less familiar target species as local availability changes. However, a few recreational for-hire communities positioned in an area with an influx of popular for-hire target species are doing well. Private anglers are more adaptable as information about locally abundant fish populations travels through the angling community quickly enough to provide quality fishing opportunities for anglers with access to private boats or productive shore fishing sites.

Winners and Losers

Patterns of who is catching what have changed quickly. Inequity issues are prominent as differences in adaptability, largely driven by access to capital, have become clearer. For both commercial and recreational fisheries, those with access to more capital are able to ride out difficult times and take advantage of good stock conditions. Many others - often with fewer resources - struggle to cope with such uncertainty. There is a trend toward consolidation in the industry.

Winners are those who participate in highly mobile fleets as well as those who are able to invest in fleet and gear technology to adjust to fishing in deeper waters and/or to traveling further distances. Investing in more fuel efficient vessels contributes to success, given fluctuations in the cost of fuel. More complex business models adapt better to a different species composition, changing environmental conditions and weather patterns, and market conditions. Operators that are less able to diversify their target species and/or less able to travel to find fish are struggling. For some gear types, smaller, more nimble vessels are at an advantage.

Extreme weather also creates winners and losers at the shoreside community level. Depending on local resources and wealth, some communities struggle to reinvest after major storms, while others use these events as an opportunity to invest in improved infrastructure. Ports that have already invested early in the protection of the coastline, driven by sea level rise and previous storms, are benefitting. Regional factors also influence vulnerability to sea level rise and extreme weather events. For example, ports in Virginia are subsiding which accelerates sea level rise impacts while the rocky shoreline of Maine is rebounding and less vulnerable to erosion from storms. On the other hand, coastal areas off of the Chesapeake Bay, Delaware Bay, and Hudson Bay are more vulnerable to water quality changes due to freshwater and storm runoff.

Alternative Ocean Uses

While stocks are overall productive, many players have lost access to historically important fishing grounds due to space competition with new ocean uses, compounding industry struggles to maintain consistent access to shifting stocks. Extensive offshore wind and other ocean energy uses are changing access to traditional fishing grounds, so many fleets have shifted effort to less productive fishing grounds or expanded into previously un-fished areas. Shifts in the location of fishing effort combined with shifts in the range of marine species leads to changes in patterns of interactions with protected resources, which are now more difficult to predict. In some cases, increased interactions with whales and other protected species places further constraints on where fishing can occur. In addition, reduced available fishing area leads to increased user conflicts, between and among different gear types and between the fishing industry and adjacent uses. These changes have excluded participants who were unable or unwilling to modify their fishing practices.

Compound Stress Fractures

Several sources of stress have led East Coast fisheries to breaking point by 2040. Shifts in ocean currents and extreme weather events have tipped ecosystems out of balance. Major storms lead to more pollution and degraded habitats. Healthy stocks are scarce. Low abundance leads to reduced harvests and protected species regulations close several fishing grounds. Science is unable to help, as stock assessments cannot cope with such a changeable and volatile ecosystem. Trust between stakeholders is in short supply, illustrated by fractious debates over the siting of offshore wind installations. Operators are forced to shift to lower trophic level species, and government support is needed to save a few selected fisheries.

Ocean Conditions and Stock Productivity

This is a world in which ocean temperatures are increasing, sea levels are rising, currents are unpredictable, and marine heatwaves have increased in frequency and duration. There is a climate tipping point where the Atlantic Meridional Overturning Current, AMOC, becomes unstable. Severe storms have increased in frequency, which creates brown water and temporary dead zones nearshore, which in turn disrupts spawning events. Despite targeted restoration efforts, coverage of submerged aquatic vegetation, a climate-vulnerable coastal habitat upon which many species depend, is reduced. Temperature and pH changes vary, with some areas warming and/or acidifying more rapidly than others. Unpredictability is a hallmark.

Under these conditions, fisheries production and habitat quality has declined. Species distributions are shifting, and for some regions, there is little replacement of important commercial and recreational species that have moved into other areas or declined in abundance. Generally, species diversity has declined, while range expansion and contraction are extremely variable. Overall, the fish community looks quite different from today. Undesirable or low dollar value species that have traditionally been discarded (e.g., sculpins and searobins) are common. Abundance of lower trophic level species increases as top predators decline. Generalist species that occupy a range of habitats and do not rely on particular prey are more successful.

Estuaries, which are important fish nursery grounds, are experiencing declines in productivity due to habitat degradation. This is caused by several factors, including sea level rise and changes in salinity due to alterations of freshwater outflows. There is less larval dispersal and increased larval mortality. Saltmarsh areas are reduced due to droughts, and coastal population growth leads to increased demands for coastal armoring to protect infrastructure, which prevents natural landward migration of these habitats. Coral habitats, which support some southeastern species, decline in quality.

Changes in the distribution and abundance of plankton lead to shifts in where large whales occur. Efforts to conserve listed fish species, such as Atlantic sturgeon and Atlantic salmon, continue, but populations remain depleted.

Science and Stock Assessments

Science is not able to predict the changes occurring in this complex and unpredictable ocean - and partly as a result, funding does not keep pace with ever-increasing demands. Stock assessment and status determination suffer. For most stocks, data streams and assessments lag behind current conditions, and are not useful for predicting dynamics. Scientists' assessments often clash with the experience of fishermen, leading to a lack of trust in the data. New fisheries emerge, targeting species lower on the food web, but a lack of knowledge of these stocks often leads to overexploitation. In some cases there is limited ability to obtain permits to target locally available and abundant species. Many stocks experiencing range shifts are incorrectly classified as overfished, and these false flags undermine trust in the management process. Over time, there is less funding for science and fishery management in general.

In a few fisheries, scientists and managers eventually learn to use novel, real-time data streams from some stocks to conduct more frequent management track assessments. Through advances in electronic monitoring (EM) some fleets have adopted 100% monitoring coverage. These fleets are able to provide more real-time data to managers and scientists, allowing for more nimble management of stocks, both in-season and annually. While many fishery management plans and regulations remain inflexible and are slow to change, those with enhanced monitoring have started to develop new approaches to better suit the needs of the changing fisheries.

Social and Economic Conditions

The costs of harvesting fish continue to rise and profit margins shrink. Fuel prices are volatile, and costs for other items such as ice, fishing gear, and other provisions increase regularly. Vessels are more transient, chasing fish northward and offshore, which increases transit times from home ports. This places stress on crew members and leads to higher fuel consumption. Commercial harvesters and processors find it difficult to retain and recruit as crews are aging. Retiring workers are not replaced - fishing is not an attractive industry for most.

There are other stresses facing fishing operators. Precautionary management of protected species (including large whales) constrains fixed gear fisheries. Discards of diseased fish are problematic. Significant atrophy occurs within some fleets. Damage from more frequent and extreme weather events has a compounding negative impact on some coastal communities and fishing ports. As it becomes harder to succeed within existing fishery laws and regulations, trust and open communication between the fishing and management communities erodes.

More people move to the coast to gain relief from higher inland temperatures. This causes development-related stresses on nearshore habitats. Climate impacts on agriculture lead to rises in food prices, and ultimately, this leads to higher demand for seafood protein. While this provides opportunities for fisheries, consumers are primarily concerned with price and taste and are willing to buy imported or tissue cultured products so long as they are inexpensive and enjoyable to eat. There is limited broadscale emphasis on locally caught seafood. Further complicating matters, there are international tensions which also affect seafood trade. Faced with such multiple and mounting pressures, the industry experiences significant consolidation, with marginal players often forced to sell up and move out. This has a damaging effect on fishing communities, with traditional activity shrinking or disappearing.

Recreational fishing by boat becomes very expensive and is usually only available to the wealthy. Some of the more sought-after species move further offshore and occur at lower densities making them harder to target. As a result, new community groups form to lobby for government support to maintain access for lower-income recreational fishermen. The complexion of shoreside angling changes in many areas of the Southeast, where reductions in fish habitat and water quality render coastal waters unsuitable for species that previously were common there. This has ripple effects for bait and tackle shops and other recreational fishing infrastructure.

Alternative Ocean Uses

As fishing activity declines due to uncertainty and stock changes, fishing is no longer the dominant activity in the ocean. Offshore energy and shipping now take up more space and, despite good intentions, these industries don't need to rely on a healthy ocean ecosystem. Wind installations and shipping create damaging effects on nearshore and offshore fish and fisheries.

More funding is directed to these new ocean uses, with managers and scientists focusing their attention towards these new opportunities sometimes at the expense of researching changes in fisheries. Atrophy in the fishing industry allows ports to expand and change to accommodate offshore wind and shipping, but this does little to support fishing operations. Smaller fishing ports are lost without targeted interventions. Such interventions are successful where the right mix of resources come together, and a few ports experience a renaissance, where fishery support services are diverse and the number of fishing vessels increases for the first time in decades.

Responses to Difficult Conditions

As a short-term response to these extreme harvesting and marketing stresses, the Federal government acknowledges fisheries disasters and increases support for selected domestic fisheries. It supports the development of domestic markets for fish and reduces imports through tariffs. This includes market development, advertising, science, technology, and workforce training. Given limited resources, specific fisheries are targeted for these interventions because they likely have staying power under new environmental conditions. In fisheries that receive these interventions, there are successes around reduced operational costs, new markets, and innovative science programs. Some fisheries and fleets do not survive the cataclysm.

Despite these fractures, there are some bright spots on the horizon for the industry. Battery technology improves to allow some vessels to switch to more efficient electric vessels and improvements in radar systems allow for safer navigation. Offshore aquaculture expands to both supplement and enhance wild capture fisheries. Because both wild capture fisheries and aquaculture require processing infrastructure, aquaculture-related enhancements benefit wild capture fisheries as well. Shellfish aquaculture mitigates coastal water quality concerns in some specific areas, improving habitat for many species.

Sweet and Sour Seafood

"The science is good, but the news is bad." In 2040, climate change is affecting ocean and stock conditions in ways long predicted by scientists. Stocks have shifted their range, and productivity and abundance have declined for most relevant species. But data and management advances help make lemonade out of lemons. Better forecasting techniques help fishermen prepare for marine heatwaves and localized die-offs. Aquaculture provides a much-needed alternative as wild-caught seafood declines, and better science ensures that any pollution dangers are minimized. There are signs of a few smart management decisions (such as limits on newly arriving species) and adaptation from fishing operators, but most management approaches have not adapted to the tougher conditions of today, and those on the horizon.

Ocean Conditions and Stock Productivity

The earth and oceans continue to warm, particularly in the Gulf of Maine, where the average temperature has risen by ~1.5 degrees since 2022. The Gulf Stream has continued to become more prominent, bringing warmer water along the east coast, and edging out the cooler waters from the north. The cold pool historically present off of the mid-Atlantic is now a rare occurrence. New primary production varies with latitude, but generally, across all areas, we are seeing larger plankton being replaced by smaller species, resulting in lower fish productivity.

There is an increase in stronger and more frequent storms that impact coastal communities most acutely. While predictive capabilities of these storms are good, impacts to fish habitat and infrastructure are high due to the lack of time between storms to repair and restore. Along with storms, increased pollution plus continued warming have impacted habitat type and function, resulting in decreased abundance and a comprehensive shift in available fish stocks in each region. Some towns are faring well, despite these changes, because of the efforts made to develop living shorelines, while providing incentives to private marina owners for ensuring a proportion of the marina is available for commercial and for-hire vessel access.

Despite similar climatic influences, the biological impacts vary between regions due in a large part to local adaptation efforts. Stock distributions have continued to shift, sizes of individual fish are smaller, and productivity of most stocks have decreased. Continued degradation of estuaries and other habitats has contributed to impacts to spawning areas and decreased recruitment.

Science and Stock Assessments

In this scenario, scientific understanding of the oceanographic and biological conditions is very strong, even if the news is not good. Researchers are able to closely track changes in water temperature and stock distribution using a variety of methodologies. These include enhancements to the Federal trawl survey, cooperative research with the fishing, offshore energy, and aquaculture industries, and new techniques to better model and predict future changes. Marine heat waves continue to be important, but scientists are able to predict them in enough time for fishermen to prepare. Scientists track changes in the environment and share them with management using robust indicators within ecosystem status reports. Their findings indicate declining stocks and worsening habitat, but at least the accuracy of the information provides opportunities for managers to address such problems. Effective management is able to keep pace with new information and identify how to use it to inform timely decisions. Other managers are constrained by slow decision making processes and incongruent approaches along the East Coast.

Management Responses

In some cases, previously defined management units have allowed unregulated access to species in a new jurisdiction before the management program can respond. This leads to distrust across fishing communities, as groups who have the permits are unable to benefit from expanded stock availability due to complex regulations.

However, proactive efforts by one of the region's fishing industry collaboratives resulted in healthy and productive fisheries despite these changes. For example, their actions to limit fishing on the few newly arriving species allowed the establishment of reproducing populations that have generally replaced the cod, Atlantic mackerel, and lobster that have moved north into Canada. No trans-boundary agreements were forged to allow NE fishermen to follow the stocks into Canada, this in addition to a continued market focus on these historical species led to increased imports of these species rather than focusing on new species in the area. For example, tourists still insist on lobster rolls along the coast of Maine, rather than adjusting to eating the black sea bass that local fishermen are harvesting now.

Adapting to New Conditions

Aquaculture has seen significant growth in the area, driven by demand for protein as the abundance of wild caught seafood declines. Advances in science and technology have led to less pollution from net pens and less reliance on wild caught fish for aquaculture feed. Streamlining of the regulatory process has allowed for aquaculture businesses, including finfish farms in the wild, to expand but their small ocean footprint does not impact wild fishing to the extent of other alternative ocean uses.

Fish stock distributions have changed what is available for day-boat fishermen, but their ability to catch those species has stalled the shifts, with a few exceptions. Some fishermen have been able to adjust to fishing for different species, despite the expense associated with acquiring the gear necessary to make those changes. For example, one group has been able to capitalize on turning previously low value, bycatch species into animal feed and fertilizer. Importantly, a shift toward "boutique fisheries" allowed some small scale fishermen to adapt to the reduced catch limits and new stocks yet still remain economically viable. This occurred because an Alternative Ocean Use area reopened to commercial and for-hire hook and line fishing, primarily targeting highly migratory species such as Atlantic cobia. The closure of this area allowed for this previously southern stock to establish a strong sub-population without exploitation. The council added this species to an existing FMP, with provisions limiting access to previously permitted small vessels only.

Unfortunately, similar efforts were not implemented throughout the region, leading to varying levels of protection for newly arriving stocks, and limited establishment of new populations. This has been especially problematic as the loss of forage fish biomass has impacted all levels of the food web in these areas. Continuation of historical fishing methods and sales, along with poor articulation of priorities or values, has led to the loss of many small-scale fishermen in some areas because they are being replaced by large corporations able to focus on quantity over quality. In such areas, changes in the management process have been far behind the timetable necessary to allow smarter and more cost efficient permitting changes. This has resulted in an industrialization of the fleet, edging out owner/operators with less capital. The variable management response between regions has also led to increased conflict between regions and sectors. Fishermen have also struggled to establish solid marketing of locally sourced fish because consumers are still able to access the popular stocks from imports.

Access to fishing areas and stocks by commercial and recreational fishermen is not just impacted by the availability of permits and gear. Privatization of marinas, docks, and other ocean access sites has made it difficult for low and average income recreational participants to take advantage of new opportunities. These access restrictions have also led to substantial and disproportionate impacts on non-commercial/subsistence fishing, greatly limiting the ability of poorer communities to supplement food sources.

As the ocean gets busier, commercial and recreational fishing participation is limited by the physical space available to fish in. New offshore energy and aquaculture structures have narrowed the fishable areas that are not aligned with shifting habitat preferences of target species. Some participants in recreational fisheries have enjoyed an increased access to previously unavailable stocks closer to home, but most struggle to afford the ability to fish in deeper, colder waters.

Checks & Balance

Good science, smart collaboration and tolerable conditions allow East Coast fisheries to cope with the challenge of climate change in 2040. But nothing is easy: stocks shift and expand their ranges, while busier coasts and new offshore activity create accessibility challenges for commercial and recreational fishermen. Investments in habitat protection and restoration begin to reverse decades of damage and loss. Science capacity is boosted, delivering improved ocean monitoring, real-time catch reporting and population monitoring. A prosperous ocean economy leads to competition (e.g., between fisheries and aquaculture) but also collaboration (e.g., as fisheries science is boosted by wind energy installations). Changing management approaches help usher in more extensive opportunities and economic benefits for fisheries.

Ocean Conditions and Stock Productivity

This is a world where societal and policy choices are firmly focused on emissions reduction. This has not yet had noticeable impacts on ocean conditions (temperatures continue to warm and sea levels rise), but more investment and attention is now placed on addressing climate change and environmental concerns. This has resulted in increased funding for science and innovations in data that have improved the ability to predict and assess the impacts of climate change.

Ocean temperatures have increased, leading to extensive shifting stocks and range expansions. Science has been able to accurately predict the changing location of abundant stocks.

Public and private investments in estuarine conservation, restoration, and enhancement have created a more robust, foundational support for the ecosystem, food web, and forage and estuarine-dependent managed species. Habitats have improved, enhancing the production of many stocks. Storms are more frequent and intense, but science is able to better forecast and understand the impact of such events.

Fishing Practices and Pressures

Despite advancements in science, commercial fisheries still struggle to thrive, faced with high operational costs and a decrease in product prices. Fishermen travel long distances for their catch and some have diversified their employment across the seasons. Some fishery participants have adapted well to changing conditions by reconfiguring their vessels, moving to the new location of the fish, utilizing new technologies to find fish more effectively and using less fuel and resources. But this is a significant amount of work at a time when oceans are busier than ever.

Despite a broad abundance of stocks, some commercial fishery participants have decided that the fishing activity is not worth the effort. Many have sold their interest in fishing to corporations and are no longer involved in the industry. The result has been a general loss of small-scale commercial operators and an increase in corporate interest and aquaculture. Corporations have had better flexibility to sustain larger operations over a wider geographic area.

The recreational sector is strong thanks to abundant production and relatively predictable ocean conditions. Wealth has increased along the coastlines, encouraging expansion of recreational fishing. However, the accessibility to recreational fishing has diminished as the effects of sea level rise, coastal development and gentrification have reduced public access to the ocean via piers, docks, and beaches. Many recreational fishers must have the income to either fish on for-hire vessels or travel offshore on personal vessels. The for-hire sector adapts to new species and continues to expand creating an increase in overall recreational fishing. Fishermen in the Southeast have transitioned to different species such as harvesting yellowtail snapper off the reefs of Georgia or conch in North Florida. In the Northeast, recreational trips target black sea bass and spotted sea trout.

As society becomes more concerned with climate change impacts, science is well funded, and its efficiency has improved. Effective ocean monitoring, real time fisheries reporting, and food web and population monitoring are all regular sources of information for fishery participants. Smarter surveys are able to identify changes in species compositions, the habitats they are utilizing, and oceanographic characteristics, all of which lead to a better understanding of the changes in the food web. With proactive and increasingly effective science, species productivity is better assessed, distribution shifts and range expansions are forecast and tracked, and interactions with protected species and bycatch fall to historically low levels.

As science improved, stock production increased and management evolved, fishing operators and communities have started to successfully adapt to a range of changing conditions. New markets have been developed, helping to sustain more commercial fisheries and increased recreational opportunities. White and brown shrimp now compete with Maryland crab cakes in popularity and the grouper sandwich has now become a tourist draw in New Jersey. But the successful evolution of commercial and recreational fisheries was only possible because of changes in management approaches. When effective, such changes provided for a full and flexible balanced use of available stocks leading to a more diverse array of marketable species along the coast. Management approaches evolve to provide for a full and flexible balanced use of available fish stocks that provides a more diverse array of marketable species along the coast. Without changes to management, extensive opportunities and economic benefits for the commercial and recreational fisheries may not be realized.

Alternative Ocean Uses

East Coast waters are now being used for multiple purposes including extensive wind energy and aquaculture. These competing uses have created significant tensions related to fishing rights, opportunities, working waterfronts, and equity. Zoning issues on land combined with impacts of sea level rise create user conflicts. For example, the expansion of wind power has led to a decrease of commercial spaces in working waterfronts, causing commercial fishermen to have issues finding dock space and local dealers.

More alternative energy activity has resulted in less political leverage for fishermen as energy users become more powerful. However, many fishery and coastal stakeholders have benefited from this new influx of attention and investment. Ocean research and monitoring activity is improved by using offshore wind platforms. Aquaculture and offshore wind drive more infrastructure spending in coastal towns. More generally, fisheries benefit from improved coordination with alternative energy operations, assisted by effective regulatory and management approaches. In addition, aquaculture has expanded and is included in the suite of marketable seafood products.

Scenarios As Platforms for Thinking About Adaptability

The scenarios above represent four different futures influenced by varying levels of stock productivity/abundance and the level or predictability of ocean conditions. Within each of these four stories, the success of players in the system varied according to whether they (and the system in general) were adaptable to the new and different sets of conditions.

Different degrees of adaptability were in evidence in the scenarios. Sometimes, the stories explained how some regions were more adaptable than others. Sometimes players in the system learned over time, so adaptability was higher in later years compared to earlier. In other storylines, adaptability was determined by the level of capital investment, or sometimes by the willingness to use technology.

It seems clear that the secret to success (for most players) in an era of climate change is an ability to adapt to changing conditions. But what does adaptability mean? Across the scenarios, ideas about adaptability were discussed across several dimensions.

- Many of the scenario stories recognize that fishing operators are inherently adaptable, as they have reacted to changing conditions over many years. Stock availability has varied, fish have changed their ranges, economic challenges have emerged from unexpected sources (like the pandemic). But a future of climate change will put even more pressure on the ability of operators to adapt. The optimistic see no reason why operators won't continue to adapt. The pessimists see that climate change alters conditions so much that it could get more difficult to do so.
- Elements of the scenarios also reflect the fact that operators have only so much influence over their ability to adapt. They might be constrained by external factors, such as "too much change," a lack of resources, or technology. They might also be constrained by more internal factors such as existing skills and conventional attitudes.
- The scenarios also raise questions about: who adapts? In some situations, new players come into the market for ocean resources. Energy and aquaculture companies might innovate and become more powerful players, creating a highly adaptable environment that poses real challenges for fishing operators. This links back to the question of the resources and attitudes available for adaptation.
- During scenario creation conversations, fishing operators saw their ability to adapt being constrained by existing fishery management and governance approaches. In a future of climate change, where stocks might move, ranges might expand, and new challenges could emerge from year to year, it is imperative that governance and management recognize the need for their own approaches to adapt. There is a major concern that current arrangements will

limit success, given the need for operators to travel further, catch different stocks, etc. etc.

- Adaptability was also referenced in terms of the legal and regulatory apparatus (mostly the MSA, but also including other federal and state regulatory constraints). At this stage, the scenarios have been written in a way that assumes that the legal and regulatory apparatus remains broadly intact. However, this should not constrain the next stages of the process from generating ideas based on possible changes in the legal and regulatory environment.

To sum up, these scenarios describe ways in which various players and places might adapt (or fail to adapt) to a range of new and different conditions in an era of climate change. The descriptions outline some of the broad contours of possible changes - to fishing practice, use of technology, governance and management etc. - but they stop short of suggesting specific actions. That is the purpose of the next stage in the overall process. These scenarios should be used merely as platforms, containing hints and provocations to help stakeholders discuss the actions to come.

Using the Draft Scenarios at Forthcoming Management Meetings: A Reminder

To prepare for the forthcoming management sessions, please read each scenario, and imagine the conditions that you, as fishery managers, might face if conditions described in the scenarios play out.

At the session, you will be asked to consider the specific challenges (and opportunities) that each scenario poses for fishery managers, and then asked to generate ideas for possible changes and actions that are needed for fishery governance and management to be effective in future.

Discussion will be based around 4 topics:

- Management & Industry Adaptability / Flexibility / Nimbleness
- Data & Science
- Alternative Ocean Uses
- Cross-Jurisdictional Governance & Management