

**Approaches to Address the
Current Species Separation Requirements in the
Atlantic Surfclam and Ocean Quahog Fisheries**

**Prepared by the Surfclam and Ocean Quahog
Species Separation Requirements
Fishery Management Action Team (FMAT)**

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Table of Contents

| | |
|--|-----------|
| 1.0 BACKGROUND | 2 |
| 2.0 KEY ISSUES | 7 |
| 3.0 POTENTIAL SOLUTIONS | 7 |
| 4.0 RECOMMENDATIONS TO THE COUNCIL (NEXT STEPS) | 13 |
| 5.0 REFERENCES | 14 |
| APPENDIX A | 15 |
| APPENDIX B | 21 |

1.0 Background

Industry has asked the Council to address issues related to the mixing of surfclam and ocean quahog in landings in the fishery. The current regulations do not allow for both surfclam and ocean quahog to be landed on the same trip or placed in the same cages - these are a result of the Individual Transferable Quota (ITQ) system which requires landings by species to be tracked separately. Industry noted that they currently avoid areas where species co-occur to the extent possible because mixed catches are undesirable, as processors can only process one species at a time. Furthermore, there is not an easy way to fully separate these species onboard and industry has indicated that onboard sorting by hand is not a desirable solution to this issue. Despite both regulatory and economic incentives to avoid mixed catches, industry has indicated that this issue needs to be addressed because cooccurrence (i.e., "commingling") of these clams is occurring more frequently, and it may become a larger problem in the future due to climate change. Appendix A provides an analysis of information available from the Northeast Fisheries Science Center clam survey, which also reinforces this notion.

These mixed landings of both surfclam and ocean quahog within ITQ tagged cages do create a monitoring issue. The commercial landings data are an important input to the stock assessment. They are assumed to be 100 percent accurate, and the stock assessment relies heavily upon the assumption that the landings reported in each of the tagged cages are not mixed. This presents challenges in terms of mixing allowance and how to address this issue without degrading any of the data streams or cross-checks in the data collection systems, to ensure that both commercial landings of each species are accurately tracked and that catch limits and accountability measures can be effectively applied. Regardless of stock status, it is important to accurately track the catch.

A Fishery Management Action Team (FMAT)¹ has been tasked with synthesizing information on this issue in the surfclam and ocean quahog fisheries, and the extent to which this has created concerns for the industry related to the current species separation requirements and existing regulations. Through this document, the FMAT will describe the extent of the mixing issue, how this relates to the current regulations and their enforcement, data collection related issues, and how it relates to industry operations and practices described by Council advisors and experts in the industry. The FMAT will also explore approaches to address the mixed landings issue - which will likely require an approach to separating and monitoring the catch somehow (e.g., manual separation, and/or through a manual sampling program or electronic monitoring (EM) system). This document will also summarize information available on different approaches, as well as some of the pros and cons, and general costs (with potential detailed costs to be later analyzed). It is possible that the recommendations made in this document could be addressed via regulatory action by NMFS or recommendations for new measures and regulations by the Council through an Amendment.

Cage Tagging Requirements

The surfclam and ocean quahog fisheries have been managed under an ITQ system since 1990. Each fishing year, the Greater Atlantic Regional Fisheries Office (GARFO) calculates the initial allocation of surfclam and ocean quahog for the next fishing year by multiplying the allocation percentage owned by each allocation owner by the total allowable catch for the fishing season. The total number of bushels of allocation for both surfclam and ocean quahog are divided by 32 (32-bushel cages; 60ft³ cages (1,700 L of cage volume)) to determine the appropriate number of cage tags to be issued to ITQ allocation owners. GARFO issues uniquely numbered cage tags corresponding to the owner's share of the allowed harvest at the beginning of the year.

After fishing has occurred and before offloading from the vessel, all cages that contain surfclam or ocean quahog must be tagged on or as near as possible to the upper crossbar of the cage. A tag is required for every 60 ft³, or portion thereof. A tag or tags must not be removed until the cage is emptied by the processor, at which time the processor must promptly remove and retain the tag(s) for 60 days beyond the end of the calendar year.

¹ FMAT members are Jessica Coakley (Council Staff- FMAT Chair), Brett Alger (NMFS OST), Daniel Hennen (NMFS NEFSC), José Montañez (Council Staff), Douglas Potts (NMFS GARFO - SFD), John Walden (NMFS NEFSC - SSB), John Sullivan (NMFS GARFO- APSD), and Sharon Benjamin (NMFS GARFO – NEPA).

VMS, Logbook, and Dealer Reporting Requirements

Mandatory reporting of landings (for vessel owners/operators) and purchase of clams (for dealers) is required. Vessel owners/operators report vessel catch using a clam logbook report (nearly all electronically) and dealers report clam purchases electronically. Cage tag numbers must be reported on both vessel logbook reports and dealer-processor reports and are used to cross-check logbooks between the vessels reports and the dealer reports. These landings data are then utilized in the stock assessment and are assumed to be accurate. Estimates of discards are based on area and effort expansion of observed trips (see Wigley et al., 2020) and are subject to the limitations imposed by observer coverage. It is worth noting that most of the commingling of surfclam and ocean quahog occurs at the deepest margin of surfclam distribution and may not overlap well with the limited number of observed trips in any given year.

Permitted surfclam and ocean quahog fishing vessels in the EEZ (i.e., those that hold a surfclam (SF 1) or an ocean quahog (OQ 6) open access permit) are also required to use a vessel monitoring system (VMS) at all times, except when a "VMS Power Down Exemption Request" has been granted. Prior to leaving port at the start of a fishing trip, the vessel's owner or operator must declare its intent to fish through the vessel's VMS and declare the target species for the trip (i.e., surfclam or ocean quahog).

There is no allowance for small amounts of the non-target species to be kept on board federally permitted surfclam and/or ocean quahog vessels that are part of the federal ITQ program.² In addition, unlike some other fisheries in the region, there is no "take home" or "consumption allowance" of surfclam or ocean quahog on these ITQ fishing trips.

Dealers are required to provide the unit of measure and amount by species being purchased. In the case of surfclam and ocean quahog, cage tag numbers must also be reported. A review of the dealer data indicated that no mixing is being reported. This means if a 32-bushel cage of surfclam is purchased, but only 30 bushels were surfclam, this creates an issue with data quality and reporting.

Industry members indicate that processing facilities are set up to handle either surfclam or ocean quahog only; or for processors that process both species, they are run one at a time through their processing lines. This is because processing facilities do not process mixed clam catches - each species is being processed for different market products. Non-target species are typically discarded at the facility because it is not feasible to store and transport them to another facility.

² Vessels fishing in state-only waters may have slightly different requirements; see individual state regulations for more details.

Onboard Vessel Sorting (History of)

The minimum size (shell length) regulation for the surfclam fishery was first established by Amendment 2 to the FMP (1979). That amendment implemented a 4.5” minimum size limit for surfclam. Surfclam beds were also to be closed to fishing when over 60 percent of the clams were under 4.5” in length and less than 15 percent were over 5.5” in length. Amendment 3 (1981) to the FMP implemented a 5.5” minimum size limit. Amendment 3 was not intended to secure sustainability of the resource as much as it was intended to assure a supply of large surfclam for breaded fried clam products (Marvin 1992). Some facilities producing clam strips have indicated a preference for larger size clams, for ease of hand shucking.

The 5.5” minimum size limit had been in place from 1982-1990 and was suspended because it led to high levels of discarded surfclam in the early years of implementation (1982-1986; ranged from 11.4 - 37.1 percent of landings discarded annually), although discard rates declined over time (1987-1991; ranged from 2.7 - 8.7 percent). The vast majority of those surfclam died because vessels used “sorting” machines which often damaged undersized clams as it routed them back overboard.

Since the suspension of the minimum size limit, the primary tool to minimize bycatch and bycatch mortality has been the design of a highly selective dredge. The fishery employs a steel hydraulic dredge that uses jets of water to fluidize the bottom sediment, thereby loosening the clams from their habitat. The bars of the dredge are spaced to retain larger surfclam and quahog and let the smaller ones, along with the bulk of unwanted fish and invertebrates, and other unwanted debris, pass through. After tows ranging from several minutes up to an hour the dredge is retrieved, the material is run through a shaker to remove rocks and shells (but not the clams), then dumped onto a belt, and the harvested clams are then discharged into steel cages on the vessel. This process is repeated until the vessel has completed its operations. The gear itself is not able to sort the two clam species of the selected size; therefore, both are retained in the dredge and appear on the belt.

At present, sorting machines to separate surfclam from quahog are not used, but there is some hand sorting that is done on the conveyor belt on the vessels after the dredge is retrieved and clams are moved to the cages. When a mixed dredge is retrieved, the crew try to separate the material as fast as possible. Because of the speed of the belt, it is not possible for all the species and material to be separated and it is not possible to separate all the surfclam or ocean quahog bycatch. As noted above, this mixed composition is not captured in the logbook data or the dealer data.

Biological Sampling

Biological sampling by port agents (or contractors applicable) is conducted to collect data for the surfclam minimum size analysis required in the regulations. Only surfclam is sampled - not ocean

quahog. This sampling is done sometimes by walking on top of the cages or a narrow ledge above the cages while they are still on board the vessels, or when the cages are offloaded. Cages are not dumped to obtain surfclam samples as tags cannot be removed to take samples. Samples are obtained by grabbing a few random surfclam off the top of the cage. Port agents have indicated they can see both surfclam and ocean quahog in these top layers of the cages on visual inspection. Obtaining required biological samples can be further hindered by weather and inability of samplers and boat captains to coordinate sampling activity. Some limited biological sampling is performed inside the processing facilities (e.g., samples are taken from coolers). However, this is not a widespread practice. In addition, there is limited observer coverage in this fishery (less than 3%) which indicates that surfclam are a top discard on quahog trips and vice versa, although the majority of each trip is comprised of the target species.

Port of Landing to Processor

As described above, surfclam and ocean quahog may not be landed without appropriate tags attached to all cages containing surfclam or quahog. When cages are landed, they must be transported to a dealer/processing facility without removing the cage tags (unless landed at a processing facility). Cages are loaded onto a truck immediately to avoid clam damage, and this can create difficulty in conducting necessary sampling, in part due to the very large sizes of the cages and inability to access contents.

Law Enforcement

Enforcement in the SCOQ ITQ program relies heavily on shoreside surveillance. As previously indicated, to establish a chain of evidence adequate for enforcement of the SCOQ ITQ program from the vessel to the processor, all surfclam and ocean quahog cages must be tagged before the winch cable is disconnected from the cage on the dock, and tags must not be removed until cages are emptied at the processing plant. Cross-checking logbooks between vessels and processors also provides a system to double check the information reported. ITQ allocation permits may be suspended, revoked, or modified by NMFS for violations of the FMP.

Law enforcement officers may inspect cages once they are offloaded from fishing boats to verify that tags are attached to the cages. However, cages are not inspected to determine if surfclam and ocean quahog are mixed in the cages as this would require that the entire contents of the cages be dumped out. Dumping animals out of the cage would be a messy process, create difficulties with refilling the cages, and potentially kill many of the clams (catch loss). Fishing vessels are not required to report to law enforcement when they are coming back to port unless they have fished in a paralytic shellfish poisoning (PSP) area of concern; therefore, vessels are only inspected when they are spotted on the VMS system or when they are visually seen reaching port.

2.0 Key Issues

- There are challenges with accounting for mixing in cages. If mixing were to be allowed, the clams must be sorted at some point: either manually, visually, or electronically. At this point, each cage is assumed to be 100% one clam species or the other when tagged.
- Processors do not want mixed cages for processing, as product lines for each species are different and some processors only process one species. Live clams have a limited shelf life, therefore, storing and saving non-target species and/or transporting them to other processing lines is not feasible.
- Captains/vessels don't want mixed cages because it is undesirable for the processors for whom they land clams. In addition, landing mixed species may impact vessel profitability.
- Tagged cages of clams cannot easily be dumped for sorting once filled. They are extremely large and heavy. Dumping out clams for sorting would be time consuming, as they are difficult to refill, and it creates the potential for mixing between cages/tags.
- The stock assessment relies heavily on the bushels of clams for each species reported by cage. At present, those cages erroneously are assumed to be 100 percent clean and unmixed for each species.
- Catch limits and accountability measures rely heavily on accurate reporting of the logbook catch. In addition, the dealer data is utilized as a crosscheck on the logbook reporting.
- Surfclam distribution has been shifting northward and further offshore, and increased mixing has been occurring (Appendix A); this may continue as the ocean continues to warm. This makes static assumptions about the extent of mixing challenging (i.e., ongoing monitoring will be required).
- Contents of cages are currently not inspected by enforcement, nor is any biological sampling of the entire cage occurring (i.e., only a few surfclam taken from perimeter/top for sampling). Therefore, even though it is required that the contents be 100% of the tagged species, no one from enforcement or other sampling program is presently checking cage contents.
- There are large differences between the size of vessels harvesting, the processing operations at different facilities, and what each of the handful of processors may consider to be feasible. Some fishing industry representatives have indicated that onboard sorting beyond what is currently done would be an undesirable outcome because it is labor intensive and challenging on deck. Others have indicated sorting on board may be feasible.

3.0 Potential Solutions

Table 1 provides a high-level description of potential solutions to the species separation issue, including some advantages, disadvantages, and other issues. The FMAT incorporated early input from the Atlantic Surfclam and Ocean Quahog Advisors and Committee members when developing these solutions.

Table 1. Summary of potential solution to the species separation regulatory issue.

| ID # | Potential Solutions* | Overview | Additional Monitoring/Sampling** | Additional Enforcement** | Other Reg. Details | Advantages | Disadvantages | Other Issues | Amendment |
|------|---|--|--|--|--|---|---|--|-------------------|
| 1 | <p><u>No Council Involvement</u> (Industry Solves Issue with GARFO)</p> | <p>GARFO must ensure regulations are followed and enforced. Only one target species (SC or OQ) are landed on each trip, and cage contents are 100% that target clam species. Industry and GARFO figure it out.</p> | <p>Depends on solution agreed upon between GARFO and industry.</p> | <p>Depends on solution agreed upon between GARFO and industry.</p> | <p>TBD</p> | <p>Allows for precise ITQ catch accounting, and consistent with assumption that 100% of cage contents are as tagged for each species. Vessels only land one species per trip, which is appealing to processors.</p> | <p>Given species mixing and data quality issues, additional monitoring/sampling and/or enforcement levels may be required by GARFO to ensure regulation are followed. Discards of non-target clam species will need to be reported and monitored.</p> | <p>SCOQ Committee commented that the industry specifically asked the Council to address this issue.</p> | <p>No</p> |
| 2 | <p>Modify Regulations to <u>Require Onboard Sorting</u>; Maintain current regs of <u>No Mixed Trips</u></p> | <p>Require onboard sorting and removal of non-target clams from vessel before cages are filled (i.e., while on belt), to ensure only target species are landed on a trip, and all vessel cages are 100% target clam species.</p> | <p>No additional onboard sampling beyond current observer coverage</p> | <p>Likely require some kind of enhanced validation/enforcement to ensure cage contents are 100% target on trips.</p> | <p>Would not change current declaration process for either SC or OQ trips; no mixed trips allowed.</p> | <p>Allows for precise ITQ catch accounting, and consistent with assumption that 100% of the cage contents are as tagged for each species. Vessels only land one species per trip, which is appealing to processors.</p> | <p>Difficult to manually sort effectively on board; may need to slow down fishing operations to fully sort catch. High expected discard mortality for clams tossed overboard. Some beds may become economically un-fishable.</p> | <p>Some advisors indicated that onboard sorting is not feasible. Other advisors indicated that some onboard sorting is performed to remove undesirable species and trash and suggested sorting each species onboard is feasible.</p> | <p>Likely yes</p> |

* Some of these alternatives may result in increased costs to GARFO and/or the industry, depending on the solution identified.**Intercepting vessels on arrival to port, or at processing facilities, to verify and/or sample cage contents would be time consuming and logistically challenging (both for monitoring and/or enforcement).

| ID # | Potential Solutions* | Overview | Additional Monitoring/Sampling** | Additional Enforcement** | Other Reg. Details | Advantages | Disadvantages | Other Issues | Amendment |
|---|--|---|--|---|--|---|--|--|---|
| 3 | Modify Regulations to <u>Require Onboard Sorting and Allow Mixed Trips</u> | Allow for trips that land both species. Require onboard sorting and separation of clams by species when cages are filled. | No additional onboard sampling beyond current observer coverage. | Likely require some kind of enhanced validation/enforcement to ensure cage contents are either 100% surfclam or 100% ocean quahog, or a trip is being fished as declared. | Would change current declaration process to either SC, OQ or Mixed trips allowed. Cages must be tagged as a surfclam cage or an ocean quahog cage. | Allows for precise ITQ catch accounting, and consistent with assumption that 100% of the cage contents are as tagged for each species. | Difficult to manually sort effectively on board; may need to slow down operations to fully sort catch. Vessels may land two species per trip, which is unappealing to processors. Non-target clams may be discarded at processors. Impacts may vary by vessel size as smaller vessels/smaller processors may have an easier time adapting to sorting. | Cell I2 applies here. Industry indicated that non-target species (such as quahog mixed in surfclam cages) are trashed at surfclam only processing facilities - not all facilities process both species. Infeasible to put a cage or two of the undesired species to truck elsewhere. | Likely yes |
| 4 | Modify Regulations to <u>Allow for Mixing</u> (up to X% non-target) within Cages on Vessels <u>without Additional Monitoring</u> | Allow mixing of clam species within cages up to X% (e.g., 10%). | No onboard sorting, and no additional monitoring required. | Likely require some kind of enhanced validation/enforcement to ensure the percentage is not exceeded. | Would change current declaration process to either SC, OQ or Mixed trips allowed. Cages must be tagged as a surfclam cage or an ocean quahog cage. | This would address industry concerns about enforcement of mixed species in cages. Industry first proposed this as a potential solution so presumably supports it. | Having an unknown percentage of mixing within cages impacts the stock assessment and degrades ITQ catch accounting. Very difficult to enforce; contents of cages are currently not inspected by enforcement, nor is any biological sampling occurring of the entire cage (i.e., only a few surfclam taken from perimeter/top for sampling). Dumping cage contents to sort and assess mixed percentage by enforcement or samplers is challenging. | Industry provided comments on past enforcement history of minimum size in 1990s - enforcement would dump 1 cage and if too many small clams assumed all cages on trip not compliant. | Likely no (may not require an amendment; Council could potentially request NMFS implement). |
| <p>* Some of these alternatives may result in increased costs to GARFO and/or the industry, depending on the solution identified.**Intercepting vessels on arrival to port, or at processing facilities, to verify and/or sample cage contents would be time consuming and logistically challenging (both for monitoring and/or enforcement).</p> <p>Additional Questions for Alt 4: Would tagging be based on majority of cage contents? Are non-target clam species counted as discards? Do we assume maximum mixing allowance (i.e., 10% for stock assessment discard - implications? Is this in addition to incidental mortality of 5% for quahog and 12% for surfclam? If processor trashes non-targets, assume 100% mortality?</p> | | | | | | | | | |

| ID # | Potential Solutions* | Overview | Additional Monitoring/Sampling** | Additional Enforcement†** | Other Reg. Details | Advantages | Disadvantages | Other Issues | Amendment |
|--|---|---|---|--|--|--|---|---|------------|
| 5 | Modify Regulations to <u>Allow for Mixing</u> (up to X% non-target) within Cages on Vessels with <u>Manual Onboard Monitoring</u> | Allow mixing of clam species within cages, with onboard manual monitoring to assess catch composition. | Manually inspect and sample cages onboard vessels and record catch composition. Will require some type of enhanced at-sea sampling program to get representation catch data (e.g., observer?) | May require some kind of enhanced validation/enforcement to ensure the percentage is not exceeded. | Would change current declaration process to either SC, OQ or Mixed trips allowed. Cages must be tagged as a surfclam cage or an ocean quahog cage. | Allows for precise/accurate ITQ catch accounting of the mixed landings. | Manual onboard monitoring may be challenging depending on vessel/deck configuration and pace of operations. Would require a carefully designed, representative sampling system. An allowance for a fixed percent mixing will likely be totally unenforceable at sea and very difficult to enforce at the dock | Would any additional mortality need to be accounted for in the specs process? What about ITQ allocations and plants that process the non-target clams - how to account for that? Do we even need to set a percent if we have adequate monitoring for these next alternatives? What level of monitoring is needed to be precise/accurate - 100%? | Maybe |
| 6 | Modify Regulations to <u>Allow for Mixing</u> (up to X% non-target) within Cages on Vessels with <u>Electronic Onboard Monitoring</u> | Allow mixing of clam species within cages, with onboard electronic monitoring (EM) to assess catch composition. | Electronically inspect material on "belt" prior to filling cages, and record catch composition. | May require some kind of enhanced validation/enforcement to ensure the percentage is not exceeded. | Would change current declaration process to either SC, OQ or Mixed trips allowed. Cages must be tagged as a surfclam cage or an ocean quahog cage. Would need new regulations related to EM. | Allows for precise/accurate ITQ catch accounting of the mixed landings. Existing electronic recording technology may be easily adapted. Clam fleet is small and vessels have unobscured belt that can easily be surveyed electronically, without capturing confidential details or interfering with fishing operations.*** | Initial cost may be high and there may be associated data storage costs. Impacts could occur on rate of operations and costs of at sea monitoring. Non-real time EM monitoring would likely be lower cost, than real-time approaches. | There may be resistance to adopting new monitoring technologies or concerns with proprietary information being provided. There may be cost offsets related to early technology adoption/research to develop and implement this technology. | Likely yes |
| <p>* Some of these alternatives may result in increased costs to GARFO and/or the industry, depending on the solution identified.**Intercepting vessels on arrival to port, or at processing facilities, to verify and/or sample cage contents would be time consuming and logistically challenging (both for monitoring and/or enforcement). ***EM approaches could support large-scale, ongoing data collection on catch of both surfclam and ocean quahog. This could include the collection of length data to support the length-based stock assessment. The technology could be utilized in a way that allows for video review later for accounting purposes, or in real time that be shared in a timely manner to the fishing fleet, or to the captain onboard the vessel, to avoid areas where large amounts of mixing exist. Electronic recording may be easily installed to avoid interfering with any onboard fishing operations. Could create long-term cost advantages and may reduce or eliminate need for length sampling by port samplers. Industry in other regions have played large role in implementation of EM solutions. Information can easily be kept confidential. May be issues with who runs and maintains programs, data, etc. Would need to make decisions about recording at sea and/or running through AI program at sea in real time.</p> | | | | | | | | | |

| ID # | Potential Solutions* | Overview | Additional Monitoring/Sampling** | Additional Enforcement** | Other Reg. Details | Advantages | Disadvantages | Other Issues | Amendment |
|------|--|---|---|---|--|---|---|---|------------|
| 7 | Modify Regulations to <u>Allow for Mixing</u> (up to X% non-target) within Cages on Vessels with <u>Manual Port Monitoring</u> | Allow mixing of clam species, with additional port monitoring to assess catch composition. | Manually inspect and sample cages on arrival at the port, and record catch composition. | Likely require some kind of enhanced validation/enforcement to ensure the percentage is not exceeded. | Would not change current declaration process for either SC or OQ trips; no mixed trips allowed. Non-target species counted as discards. New program would need new regulations. | Allows for precise/accurate ITQ catch accounting of the mixed landings. | Would require a carefully designed, representative sampling system. Port samplers would need to intercept vessels at the dock to process cage contents (labor intensive). May impact port operations. | Dumping cages and refilling cages for any purpose is challenging. Likely will require a brand new sampling program - industry funded? | Likely yes |
| 8 | Modify Regulations to <u>Allow for Mixing</u> (up to X% non-target) within Cages on Vessels, with <u>Manual Processing Facility Monitoring</u> | Allow mixing of clam species, with manual processing facility monitoring to assess catch composition. | Manually inspect and sample cages prior to processing, and record catch composition. | Likely require some kind of enhanced validation/enforcement to ensure the percentage is not exceeded. | Would change current declaration process to either SC, OQ or Mixed trips allowed. Cages must be tagged as a surfclam cage or an ocean quahog cage. New program would need new regulations. | Allows for precise/accurate ITQ catch accounting of the mixed landings. Only a handful of processors (fewer locations to sample). | May likely require a substantial amount of labor to assess catch composition.** | Industry has indicated that facilities are not set-up for sampling - not the space to dump and sort cages, etc. Likely will require a brand new sampling program - industry funded? | Likely yes |

* Some of these alternatives may result in increased costs to GARFO and/or the industry, depending on the solution identified. **Intercepting vessels on arrival to port, or at processing facilities, to verify and/or sample cage contents would be time consuming and logistically challenging (both for monitoring and/or enforcement).

| ID # | Potential Solutions* | Overview | Additional Monitoring/Sampling** | Additional Enforcement** | Other Reg. Details | Advantages | Disadvantages | Other Issues | Amendment |
|------|--|---|---|---|--|--|---|--|------------|
| 9 | Modify Regulations to <u>Allow for Mixing</u> (up to X% non-target) within Cages on Vessels, with <u>Electronic Processing Facility Monitoring</u> | Allow mixing of clam species, with electronic processing facility monitoring to assess catch composition. | Electronically inspect cage contents prior to processing, and record catch composition. | Likely require some kind of enhanced validation/enforcement to ensure the percentage is not exceeded. | Would change current declaration process to either SC, OQ or Mixed trips allowed. Cages must be tagged as a surfclam cage or an ocean quahog cage. Would need new regulations related to EM program. | Allows for precise/accurate ITQ catch accounting of the mixed landings. Existing electronic recording technology may be easily adapted. Only a handful of processors (lower cost EM solution), and creates fewer logistical challenges.*** | Initial cost may be high and there may be associated data storage costs. Non-real time EM monitoring would likely be lower cost, than real-time approaches. | Industry has indicated that materials on processing belts can be up to 8 inches thick (not feasible for EM). Would need to dump one cage at a time, associate a tag with cage, and separate enough to see the catch. Similar to I6 above, there may be resistance to adopting new technologies but there may be cost offsets related to early technology adoption/research | Likely yes |

* Some of these alternatives may result in increased costs to GARFO and/or the industry, depending on the solution identified. **Intercepting vessels on arrival to port, or at processing facilities, to verify and/or sample cage contents would be time consuming and logistically challenging (both for monitoring and/or enforcement). ***EM approaches could support large-scale, ongoing data collection on catch of both surfclam and ocean quahog. This could include the collection of length data to support the length-based stock assessment. The technology could be utilized in a way that allows for video review later for accounting purposes, or in real time that be shared in a timely manner to the fishing fleet, or to the captain onboard the vessel, to avoid areas where large amounts of mixing exist. Electronic recording may be easily installed to avoid interfering with any onboard fishing operations. Could create long-term cost advantages and may reduce or eliminate need for length sampling by port samplers. Industry in other regions have played large role in implementation of EM solutions. Information can easily be kept confidential. May be issues with who runs and maintains programs, data, etc. Would need to make decisions about recording at sea and/or running through AI program at sea in real time.

4.0 Recommendations to the Council (Next Steps)

FMAT Recommendation:

The FMAT incorporated input from the October 13 and 15, 2021 Atlantic Surfclam and Ocean Quahog Advisory Panel and Committee Meetings, respectively, into Table 1 above before their meeting on November 17, 2021.

Feedback from industry advisors indicated that they wanted the ability to land mixed trips of surfclam and quahog, and or mixed cages, but were not generally supportive of any monitoring or enforcement approaches that would interfere with their operations. It was clear based on the potential solutions under consideration by the FMAT, that changes to fishing and/or processing operations would be needed to accurately monitor the mix of catch that is presently occurring and is likely to continue to occur (perhaps to a greater extent) in the future due to climate change. The FMAT was supportive of finding a long-term solution to the current inaccurate account for all clam catch, and therefore supportive of the development of technologies and the potential for EM to provide a more permanent and adaptive solution that may actually enhance data collection in the future.

The FMAT also discussed area-based approaches. For example, the FMAT discussed the possibility of closing designated geographic areas to fishing due to high levels of clam mixing, and/or requiring that vessels fishing in specific areas designated as "high mixing areas" be subject to additional monitoring and/or regulations. However, due to the lack of information about the level of mixing across the entire region, how it may be changing, and mixing at the scale of fishing operations (individual clam beds and tow by tow) which may be very heterogeneous, the FMAT did not consider these strategies feasible to implement. In addition, industry has generally not been supportive in the past of area-based approaches such as those under the small clam closure regulations (which were last applied by the Council/NOAA in the 1990s), because of challenges with getting areas reopened in a timely manner.

Given differences in operations for individual vessels and processors, the FMAT could not identify one solution that would address this issue comprehensively. Any approach would require support of the individual vessels and processors and substantial development work. The FMAT recommends that the mixing issue be addressed under a research and development (R&D) type approach (such as an Exempted Fishing Permit (EFP)), as impacted segments of the clam industry can develop feasible solutions while minimizing impacts to their business models and operations. GARFO can then consider the feasibility of these approaches more broadly for the entire industry and consider broader regulatory changes. This is consistent with Option 1 (Table 1). To incentivize participation in R&D, the FMAT recommends that the trip/cage mixing requirements could be suspended under an EFP for participating permitting vessels if specific data collection/monitoring

criteria are met. The FMAT recommends that any research conducted under an EFP must incorporate a robust, feasible long-term catch monitoring component. The FMAT recommends that monitoring strategies presented in Table 1 (Options 5-9) be considered in the development of any mixed clam R&D. Appendix B provides a summary of the types of research permits.

Committee Recommendation: This section contains any proposed recommendations after the Dec. 6 meeting is complete. TBD

5.0 References

Marvin, K.A. 1992 Protecting Common Property Resources Through the Marketplace: Individual Transferable Quotas for Surf Clams and Ocean Quahogs. *Vermont Law Review* 16: 1127-1168.

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Appendix A

Co-occurrence of Atlantic surfclam and ocean quahog in the NEFSC clam survey

Warming oceans have led to shifts in Atlantic surfclam distribution (Hoffman et al., 2018). In general, Atlantic surfclam in the southern area (S. Virginia to S. New England) have shifted to deeper water (Figure 1). This has in turn, led to more overlap in habitat between Atlantic surfclam and ocean quahog.

In the 2016 stock assessment for Atlantic surfclam (NEFSC, 2016), logistic regression models were used to detect trends in the probability of co-occurrence (surfclam and ocean quahog taken in the same tow) in NEFSC clam surveys during 1982-2011. Survey data collected after 2011 were not included because they involved different survey gear and because too few survey years were available for independent use. Only data from successful random tows were used. Poorly sampled strata with > 2 missing years were omitted (Figure 2).

Results indicated that the probability of co-occurrence increased over time for the New Jersey (NJ) and Long Island (LI) regions of the southern area. Over the period covered by this analysis (<2012), the two increasing regions, NJ and LI, accounted for approximately 80% of the total landings.

In the years following the end of this analysis, the NEFSC clam survey shifted to a different and far more efficient vessel (2012) and re-stratified (2018). Those two changes make it difficult to directly compare recent years to the previous analysis. Rather than attempt to account for the changes in selectivity and capture efficiency that result from a change in survey vessel, and the spatial biases that result from re-stratification, a separate analysis was developed for recent years.

There have not been enough survey years in the southern area using the new survey vessel to create a meaningful time series. It is, however, possible to make inference based on the magnitude of co-occurrence without reference to trends over time.

All tows from 2012 to 2018 (the last complete year of sampling) were analyzed for catch composition. Tows that caught less than 30 surfclam in five minutes were excluded as these represent densities far below what would be considered economically for commercial fishing viable (Powell, et al., 2015). A tow in which at least 5% of the total catch by number was ocean quahog was considered co-occurrence, and less than that proportion was considered a 'surfclam only' tow. Both of these values are conservative and could be reduced, which would tend to lead to higher values of co-occurrence in the results.

The three Atlantic surfclam strata with sufficient tows meeting the 30 animals per 5 five minutes criteria were 3S, 4S and 5S (Figure 3). The proportion of tows in which co-occurrence was observed ranged between about 10% in 5S to over 80% in 4S. The most productive and heavily sampled strata, 3S, showed about 50% co-occurrence.

It is worth noting that the areas in which high co-occurrence was observed (3S and 4S) are also the areas where co-occurrence would be expected since these are the deeper Atlantic surfclam strata in which ocean quahog have traditionally been found. It is, however, equally important to note that only three of the six southern area Atlantic surfclam strata had sufficiently high densities of surfclam aggregations to warrant inclusion in this analysis. These two points reinforce the notion that Atlantic surfclam distribution is shifting into deeper water and that co-occurrence with ocean quahog is already common and likely to increase as ocean temperatures increase.

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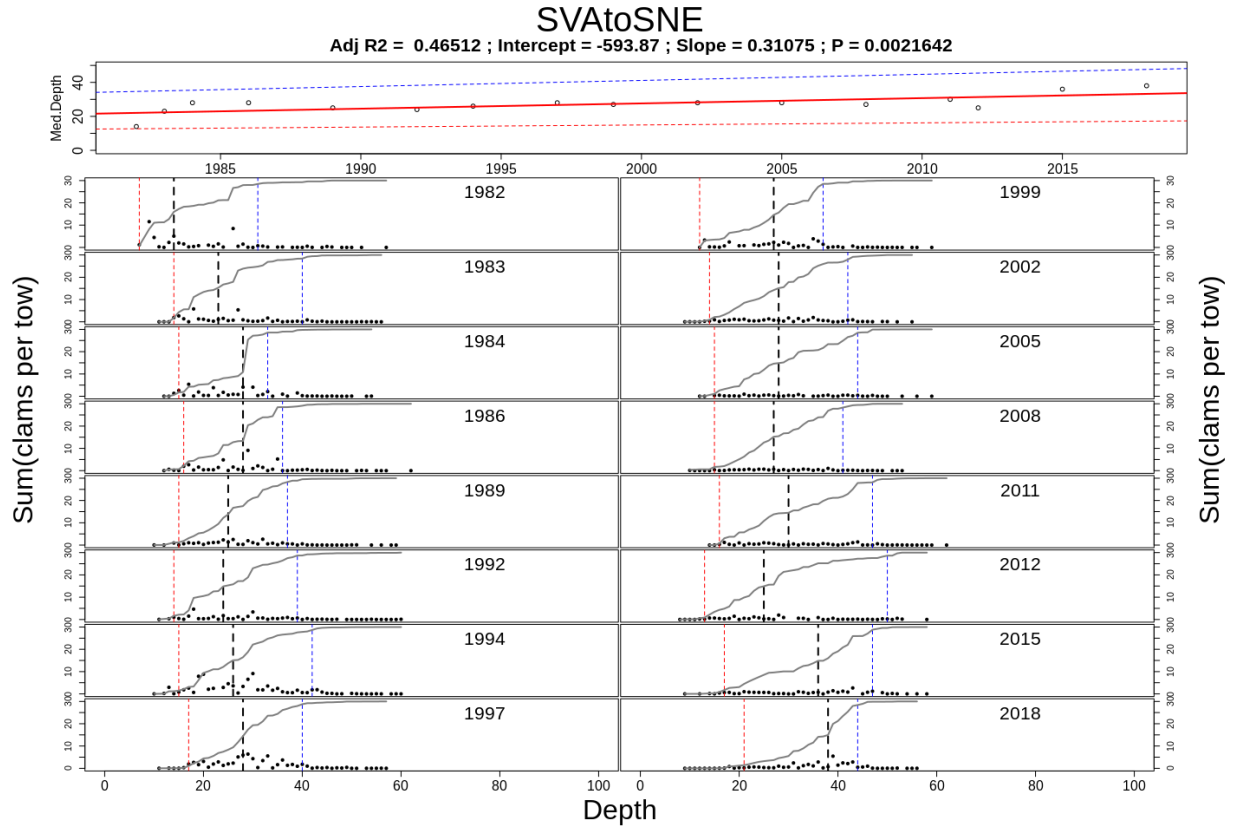


Figure 1. Total surfclam caught at depth by year in SVA to SNE. The points are clams caught aggregated by depth and the gray line is the cumulative sum of clams caught at depth. The black dashed vertical line is the depth at which half of the cumulative total clams caught in that survey were taken. If the black dashed vertical line is further to the right, it indicates that more clams were caught in deeper water in that year. The red and blue dashed vertical lines represent the 5th and 95th percentiles of the cumulative total. The top panel is a simple linear regression of median depth (the black dashed vertical lines in each annual plot) over time. A positive slope indicates that a higher proportion of the total clams in a region were caught in deeper water in recent years.

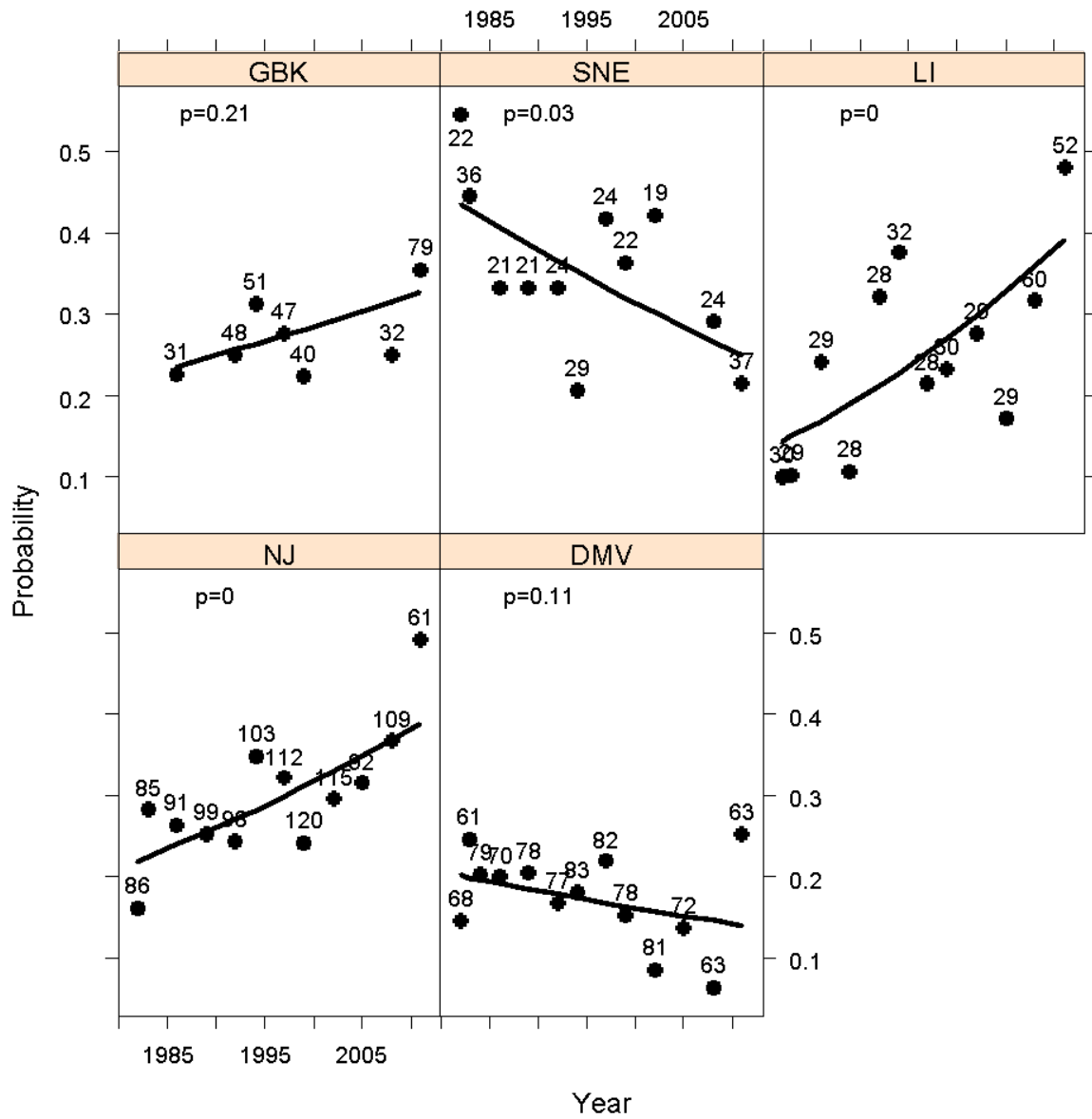


Figure 2. Trends in co-occurrence of surfclam and ocean quahog by region with p-values from a logistic regression (top of each panel) and sample sizes in each year.

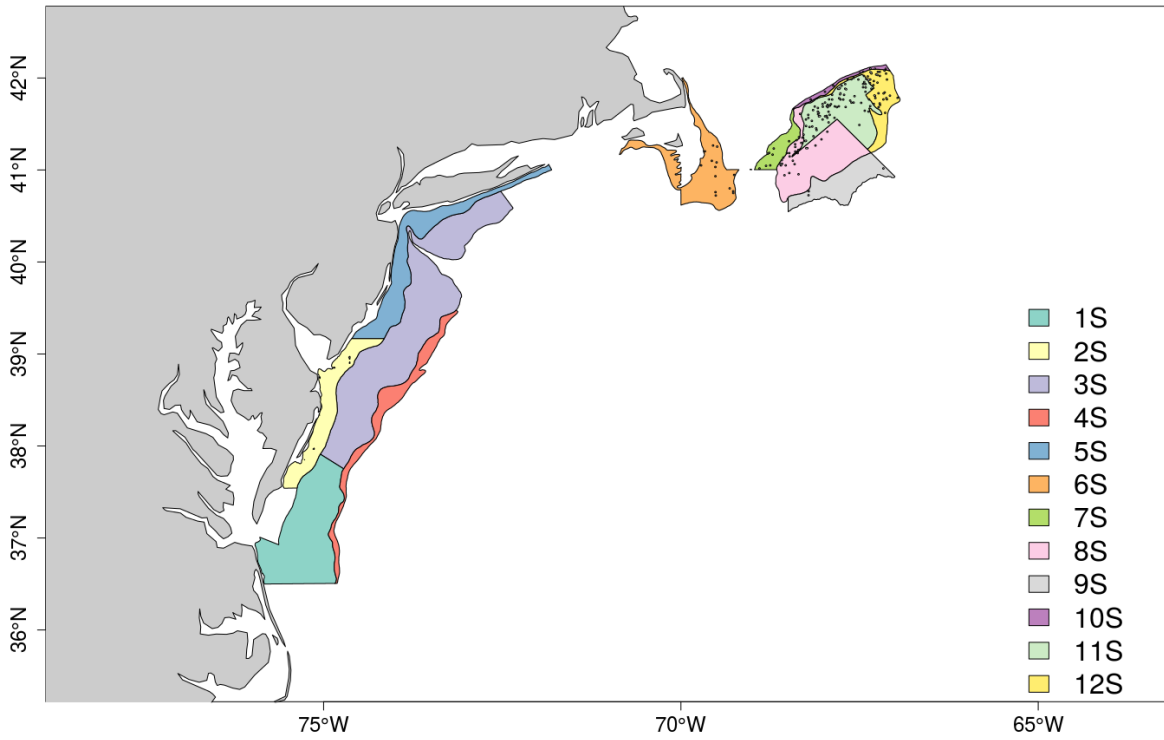


Figure 3. Atlantic surfclam strata used in the NEFSC clam survey. The southern area strata are 1 – 6S.

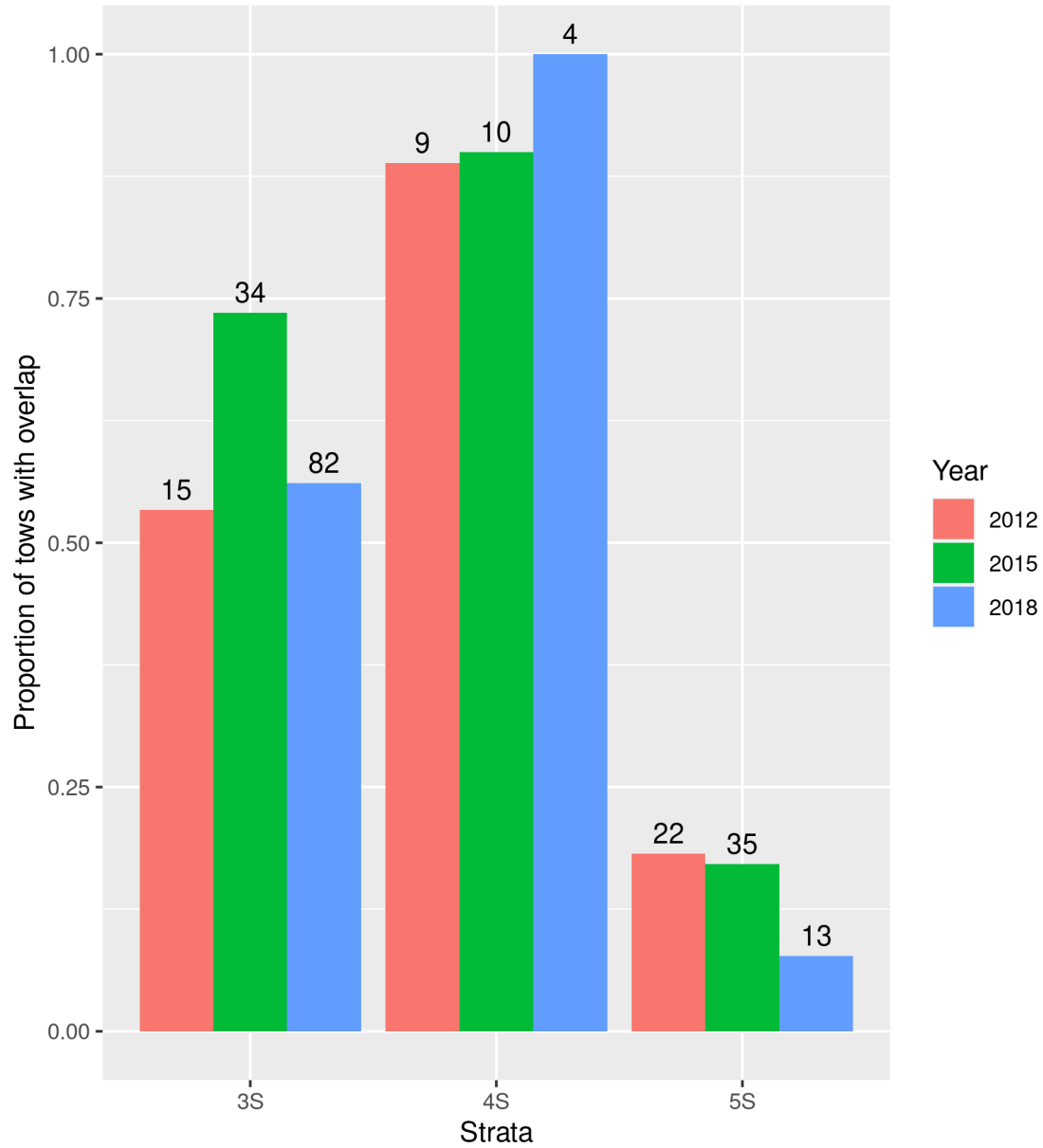


Figure 4. Proportion of all tows with 30+ total Atlantic surfclam containing at least 5% ocean quahog by number. Sample sizes are printed above each bar. Other strata in the southern area did not have sufficient tows that captured more than 30 surfclam to be included in this analysis.

Appendix B

Types of Research Permits

Undertaking scientific research on regulated fisheries may require special permits, as required by experimental fishing regulations established under the Magnuson Stevens Fishery Conservation and Management Act (Magnuson Act). There are three main permit types for exemption from Greater Atlantic Region fishery regulations, and an acknowledgement letter that may be applicable to scientific research being conducted:

- Exempted Fishing Permit (EFP),
- Temporary Possession Letter of Authorization,
- Exempted Educational Activity Authorization (EEAA), and
- Letter of Acknowledgment (LOA).

Description of Exempted Fishing Permits

From <https://www.fisheries.noaa.gov/new-england-mid-atlantic/sustainable-fisheries/scientific-research-and-exempted-fishing-permits>

"Online applications are submitted through our [Fish Online](#) portal. For help with Fish Online, please contact our Helpdesk at (978) 281-9188. We will contact you after you submit your application so you know who is processing your request."

Exempted Fishing Permit

An Exempted Fishing Permit (EFP) is a permit issued by the Greater Atlantic Regional Fisheries Office (Regional Office) that authorizes a fishing vessel to conduct fishing activities that would otherwise be prohibited under the regulations at 50 CFR part 648 or part 697. Generally, EFPs are issued for activities in support of fisheries-related research, including landing undersized fish or fish in excess of a possession limit for research purposes, seafood product development and/or market research, compensation fishing, and the collection of fish for public display. Anyone that intends to engage in an activity that would be prohibited under these regulations (with the exception of scientific research on a scientific research vessel, and exempted educational activities) is required to obtain an EFP prior to commencing the activity.

Review Timeline

An EFP application should be submitted at least 60 days before the desired effective date. If you submit your EFP application less than 60 days before needed, you may not receive it in time. Please make sure you have submitted all of the required material in your initial application. Our 60-day target for processing EFP applications does not begin until we have a complete application. Applicants should also be aware that large scale projects, projects with uncertain resource impacts, or controversial exemption requests may take longer than 60 days to process.

Application Review and Issuance

The Regional Administrator will review each application and make a preliminary determination on whether the application contains all of the required information and constitutes an activity appropriate for further consideration. If the Regional Administrator finds that any application does not warrant further consideration, both the applicant and the affected Council(s) will be notified in writing of the reasons for the decision. If the Regional Administrator determines that an application warrants further consideration, notification of receipt of the application will be published in the Federal Register with a brief description of the proposal. There will be a 15- to 45-day comment period on the notice of receipt of the EFP application.

As soon as practicable after considering comments and conducting required analyses and consultations (e.g., NEPA, EFH, ESA and MMPA), the Regional Administrator will make a determination on whether to approve or deny the EFP request.

If approved, the Regional Administrator will attach terms and conditions to the EFP, consistent with the purpose of the exempted fishing and as otherwise necessary for the conservation and management of the fishery resources and the marine environment. EFP recipients and vessel operators must sign the EFP acknowledging the terms and conditions, and are responsible for adhering to these terms and conditions. Failure to do so may result in permit revocation.