



**Conducting scientific research projects that support sustainable fisheries, aquaculture, and agriculture**

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August 12, 2022

Mr. Michael Pentony  
NOAA Regional Administrator  
55 Great Republic Drive  
Gloucester, MA 01930

Dear Mr. Pentony,

Coonamessett Farm Foundation, Inc. (CFF) requests an exempted fishing permit (EFP) to conduct a benthic habitat assessment in the historically fished clam grounds of the Great South Channel Habitat Management Area (HMA) on Nantucket Shoals. The initial "Phase I" EFP allowed researchers from CFF and partners from Nantucket Sound Seafood (NSS) to develop the methodology for a benthic video survey of the biotic and abiotic features in a small sampling zone of the Rose and Crown exemption area. Analyses primarily evaluated landings of Atlantic surfclam (*Spisula solidissima*) in relation to environmental conditions and benthic features. Results and general conclusions of this study were provided in a final report submitted to the Habitat Plan Development Team on June 15, 2022. The high productivity of surfclams within the Rose and Crown study area, an area representative of less than 1% of the HMA, warrants a follow-up study to assess broader habitat distributions and landings from other areas within the HMA. This EFP request contains the research plan with the methods and objectives explained in detail for "Phase II" of the project in the Davis Bank East exemption area of the HMA.

The fishing vessels in the following list will collect video during the extent of the EFP:

Vessel Name	Permit #	Doc #	Operator	Owner	Owner Phone
F/V Sea Fox	321114	1107736	Steven Wood	Allen Rencurrel	508-951-3137
F/V Miss Kara	251778	919001	Mike O'Brien	Allen Rencurrel	508-951-3137
F/V Miss Iris	310694	1153176	Allen Rencurrel	Allen Rencurrel	508-951-3137

The project coordinator and point of contact for this project is:

Natalie Jennings  
Coonamessett Farm Foundation, Inc.  
277 Hatchville Road  
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Co- Principle Investigators: Luisa Garcia ([lgarcia@cfarm.org](mailto:lgarcia@cfarm.org)), Farrell Davis ([fdavis@cfarm.org](mailto:fdavis@cfarm.org)), and Ryan Munnelly ([rmunnelly@cfarm.org](mailto:rmunnelly@cfarm.org))

## Exemptions Requested

CFF, Inc. is requesting the following exemptions:

- i. Temporary possession of fish with exemption from possession limits and minimum size requirements in 50 CFR 648 subsections B and D through O.
- ii. Select samples will be returned to land for additional sampling following our research plan.
- iii. An exemption from 50 CFR 648.370(h), which defines this HMA.

## Catch Information

- a. Surfclam landings, fishing effort, and values from within the Phase I Rose and Crown study area (**Table 1**).
- b. Estimated incidental catch volume of species within the Rose and Crown study area (**Table 2**).
- c. Surfclam catch will be retained for sale and non-target species catch (bycatch) will be returned to the sea once sampling is complete with the exception of any samples retained for research.
- d. Ronald Smolowitz is the Principal Investigator (PI) on the Coonamessett Farm Foundation ESA Sea Turtle Permit and has been trained in sea turtle handling/sampling. Any sea turtles brought aboard that are comatose or inactive shall be handled in accordance with Sea Turtle Resuscitation Regulations at 50 CFR 223.206(d)(1).

**Table 1:** Summary of proof-of-concept commercial trips made from Phase I in the HMA from June 2020 through February 2022.

Total Number of Trips	Total Number of Tows	Total Area Swept(km <sup>2</sup> )	Total Clam Bushels Landed	Total Clam Weight Landed(kg)	Total Research Funds
104	3,236	3.11	42,000	1,428,000	\$85,000

**Table 2:** Estimated catch data based on the trips executed between June 2020 and February 2022 in Rose and Crown exemption area. Catch rates for winter flounder, windowpane flounder, and skates are extrapolated to the total expected clam catch of approximately 40,000 bu.

Common Name	Scientific Name	Estimated catch
Atlantic Surfclam	<i>Spisula solidissima</i>	40,000 bu
Mussel, Nk	<i>Mytilus edulis</i> , <i>Modiolus modiolus</i>	1,000 bu
Winter Flounder	<i>Pseudopleuronectes americanus</i>	110 ea
Windowpane Flounder	<i>Scophthalmus aquosus</i>	110 ea
Unclassified Skate	<i>Leucoraja erinacea</i> , <i>Leucoraja ocellata</i>	200 ea

## Fishing Effort Specifications

Areas to be harvested is the Davis Bank East exemption area of the HMA. Basic fishing effort information under the proposed EFP is displayed in **Table 3**.

**Table 3:** Estimated Atlantic surfclam catch and revenue for the proposed EFP.

	Number of trips	Bushels per trip	Total bushels harvested	Distance towed per trip (km)	Total distance all trips (km)	Total area swept (km <sup>2</sup> )	Ex-vessel value	Total research value
Surfclam	100	400*	40,000	24	2,400	2.93	40,000 x \$23/bushel = \$920,000	40,000\$2/bushel =\$80,000**

\*Based on Phase I fishing trip average

\*\* The 2 dollars set aside was agreed upon by CFF and industry members

## Background

The HMA closed a historic Atlantic surfclam fishing ground to mobile bottom-tending gear in order to protect potentially complex benthic habitat and associated species, including Atlantic cod (*Gadus morhua*). While regions within the HMA once contained abundant juvenile Atlantic cod, the area also supports the sustained production of surfclams valued at \$3-8 million annually (MAFMC 2018). Despite the creation of this HMA, there is a scarcity of information about the substrate distribution and juvenile fish associations to habitat components within the area. These economic and ecological concerns incentivized the New England Fishery Management Council (Council), to coordinate with surfclam industry stakeholders to establish five exemption areas within the HMA (**Figure A1**).

The benthos within the HMA is spatially and temporally dynamic due to the shifting nature of the surficial sediments of Nantucket Shoals. Substrate complexity adds value to the ecosystem by increasing the habitat options and species richness. However, this area is constantly in flux, with strong tidal currents and frequent storm events (Emery and Uchupi 1965, Twitchell 1983) where substrate complexity might not play as pivotal a role in productivity as compared to less dynamic areas. The benthos is buried and exhumed and sediment scour could be the determining factor in epi- and infaunal species distribution (Harris *et al.* 2012, Powell *et al.* 2020). This project aims to spatiotemporally locate and map the different habitat types within the HMA and determine species' habitat associations by mapping the distribution of substrates using dredge mounted cameras on commercial trips and a towed vehicle on optical survey trips.

The research area granted in the prior EFP for the project was located in a sub-area (24km<sup>2</sup>) of the Rose and Crown exemption area (**Figure A2**). The research proposed under this EFP will encompass hydraulic clam dredge fishing activities in a portion of Davis Bank East exemption area (**Figure A2**); coordinates for the areas are listed in **Table B1**. A dredge mounted camera will be used during fishing trips to assess the habitat types affected by clam dredging on a tow and trip basis. A CFF scientist will attend all fishing trips in the area. This research will improve the Council's understanding of the distribution and temporal stability of living and nonliving habitat features within a second area in the HMA. In Phase I, tow locations were

selected by captain's choice. However, under this EFP request, a protocol (described below) was developed for even distribution of the sampling area in both time and space.

## **Research Program**

### **I. Research objectives/goals**

The comprehensive goal of this project is to conduct an ecological survey that assesses habitat types in the HMA and determine spatiotemporal occurrence of species in these habitats that are subjected or adjacent to commercial fishing activities. Specifically, the objectives of this research are:

- 1) Use dredge-mounted video to map benthic substrate composition and biota and assess seasonal trends within the Davis Bank exemption area of the HMA
- 2) Use a non-bottom-tending towed-optical sled to map benthic substrate composition and biota throughout the entire HMA including the exemption areas and assess seasonal trends
- 3) Relate Atlantic surfclam catch-per-unit-effort to habitat complexity within the Davis Bank East exemption area and determine the economic value of surfclams within the HMA
- 4) Synthesize habitat information, species distributions (including cod, black seabass, American lobster), and surfclam catch-per-unit-effort, to inform future management decisions regarding fishing within the HMA

These objectives are driven by the following research questions relevant to the management of the HMA: 1) Did the percent composition of the substrate change over time? 2) Is there a clear relationship between Atlantic cod presence and substrate? 3) Is there a clear relationship between surfclam catch and substrate? 4) How frequently do sandy habitat types shift in the HMA? 5) How can dredge mounted cameras optimize fishing decisions to reduce benthic habitat impact? 6) Is a towed optical vehicle a useful tool to survey this region and will it provide answers to the Council's questions?

### **II. Methods**

#### **a. Fishing Trips**

The Nantucket Shoals is a dynamic shoal complex, characterized by strong bottom currents, high energy sandy environments, large sand dunes, pebbles, cobbles, and boulders; and historically productive fishing grounds. This is an environment requiring careful consideration of fishery-dependent and independent data to assess the effects of fishing interactions with the habitat. The proposed study would be funded by compensation fishing trips occurring within the research exemption area on Davis Bank East (**Figure A1**). The Davis Bank East study area will be 39.7 km<sup>2</sup> (**Table B1**). This is larger than the Rose and Crown area surveyed (**Figure A2**) with

the prior EFP's area, after multiple conversations with industry members determined that more space is required to accomplish the project goals without affecting the abundance of the resource.

The dredge on the F/V Seafox, owned by our industry partner NSS, is 48 inches wide hydraulic surfclam dredge that will be towed between two to three knots for ten minutes per tow. Under the previous EFP tows per trip ranged from 11 to 51, with an average of 31 tows. Similar numbers are expected for this phase of the research. Surfclam catch and bycatch will be documented during each trip. A GoPro camera will be set up to take video of the deck and catch pile as fishing activities occur. Catch pile photographs and video will be retained for future analysis. The CFF scientist present on the fishing trip will take a one-bushel subsample of each tow pile, separating, counting, and weighing all species or substrate components to the nearest 0.1 kg. Substrate components will include shell hash, rock cobbles and mussels; while species caught will include skates, fishes, crabs, and other invertebrates. We will also gather pictures of the state of mussels from the catch subsample, in order to assess if/how they are damaged by the dredge. A subsample of cobble and rock will be photographed to capture the presence of attached bionts and will be recorded as absent, present, or predominant. A water-quality sensor (Lotek) will be attached to the dredge to log depth and temperature every 30 seconds. Start and stop times, GPS points, depth, vessel speed and a surfclam bushel count will be recorded for every tow.

The dredge will be fitted with one forward viewing GoPro camera and two lights to capture video the seafloor in front of the dredge. Video will be collected both day and night, due to the high-powered and long-lasting lights we will use every tow (Trustfire DF300). The goal is to have 75% of every trip recorded. This camera system offers easy troubleshooting for the scientist onboard and minimal interruption to the fishermen's routine. Cameras and lights will be changed every 4-5 hours or as needed, and both can be monitored while on the dredge by a simple visual check from deck.

Survey trips will blend randomized sampling with fishermen's choice. This balanced approach will enable habitat mapping and assessment of fishing preference and catch efficiency. Sampling will occur in the sub-area using numbered grid squares to evenly distribute fishing pressure each season (**Figure A3A**). Each grid square will have 25 stations (**Figure A3B**). These will be treated as mid-points of the tow. The captain can then choose which direction to fish based on tidal state and weather conditions. The average tow length under the prior EFP research was 0.77km, we expect the same to be true for this work. Before each trip, two randomly chosen stations per square for five squares will be chosen; meaning we can cover the whole proposed sampling area in eight trips. This will be repeated once a season. After the first 10 tows each trip, the captain can decide where to fish next. If his choice coincides with squares we still need to cover for that season, two randomly selected points will be chosen to tow first. Depending on the preference of the fishermen, other squares could be covered in one trip. If this happens, the next trip can focus on areas in which no sampling has occurred.

In the second phase of the research project, CFF and NSS have agreed that \$2 per bushel of surfclam landed will be set aside for data analysis. In addition of analysis, these funds will cover at least two optical surveys. The ideal would be to execute four optical surveys (one per season) in order to properly analyze fish and habitat features seasonality in a bigger portion of the HMA; as well as execute at least one trip with baited underwater vehicle (BUV) systems, since

this system would be critical to accurately assess the presence of juvenile Atlantic cod (*Gadus morhua*) within the HMA. To accomplish this, we have applied for outside funding in order to shift resources and gather more information throughout optical surveys within the GSC HMA.

## **b. Optical Survey**

Two three-day optical surveys will be conducted through portions of the HMA using a non-bottom tending towed vehicle. The optical sled will provide comparable benthic habitat information to that obtained using the dredge-mounted video array with higher resolution and the ability to make measurements to a precision of 5 mm. The towed optical sled will be fitted with a lighted stereo camera system with fiberoptic connection to provide a near real-time view of the seafloor. The camera's altitude above the seafloor will be fixed to produce an approximate 1 m<sup>2</sup> field of view. Temperature and depth will be recorded at 30 second intervals during each survey with a Lotek sensor. The optical sled will be towed at 2-3 knots and will take pictures of roughly 219 nautical miles along a linear north to south zigzag transect through the Fishing Rip, McBlair, Old South, Rose and Crown, and Davis Bank East exemption areas, as well as the closed area (**Figure A4**).

If funds are available, two more trips will be executed in order to gather a seasonal representation of fish and habitat features within the HMA. In addition, two baited BUV frames will be deployed for 50-minute soaks in areas with high abundance of juvenile Atlantic cod during cod spawning season (this can be completed in one trip). The areas will be chosen based on numbers of juvenile Atlantic cod caught during the New England Fisheries Science Center fall and spring bottom trawl surveys in and around the HMA (**Figure A5**).

## **c. Image Analysis**

Recorded dredge-mounted video will be analyzed with the Behavioral Observation Research Interactive Software (BORIS, <http://penelope.unito.it/boris>), an open-source event logging software that utilizes VLC media player (<http://www.videolan.org/vlc>). BORIS provides a simple interface to capture and time-stamp both state (duration) and point (no duration) events from video. Substrate and epifauna will be documented as state events with a start and stop time. Point events will mark fish species, boulders, sand waves and dunes. Substrates will be separated into sand and pebble and cobble. Pebble and cobble percent coverage will be further specified at <25%, 25-50%, 51-75% and >75% coverage. Other layers that can be added to sand or pebble/cobble coverage are shell hash, sand waves and/or sand dunes, rocks and boulders and peat veins. Epifaunal events will include mussel beds, mussel clumps and macroalgal coverage. Macroalgae will be lumped together with bryozoans and hydrozoans in the dredge-mounted video but separated in the towed optical sled imagery. Finfish, flatfish, dogfish and skate will be identified down to species level whenever possible.

After annotation, the data will be transformed into quantitative information. Each annotation will be exported from BORIS to a CSV file where the documented events will be listed along with the time they were marked. The event information will be coupled with start and stop latitudes and longitudes of the associated tow to calculate where geographically the event was documented in the sampling area. After mapping these two pieces of information in ArcMap, the data will transform from a continuous line to points along the tow transect every

three meters. This was the approximate visible distance in the tow videos during annotation. Using this method, the number of data points per categorical event can be calculated and analyzed per grid square and summarized by season. Habitat maps will be generated using this information. Analysis will be completed to discover relationships between surfclam catch species presence with habitat components documented in the annotations. Appropriate statistical tests will be run on the data to provide answers to research questions.

### Literature Cited

Emery, K.O., Uchupi, E., 1965. Structures of Georges Bank. *Mar. Geol.* 3, p 349-358.

Harris, B.P., Cowles, G.W., Stokesbury K.D.E., 2012. Surficial sediment stability on Georges Bank, in the Great South Channel and on eastern Nantucket Shoals. *Continental Shelf Research*, 49, p 65-72.

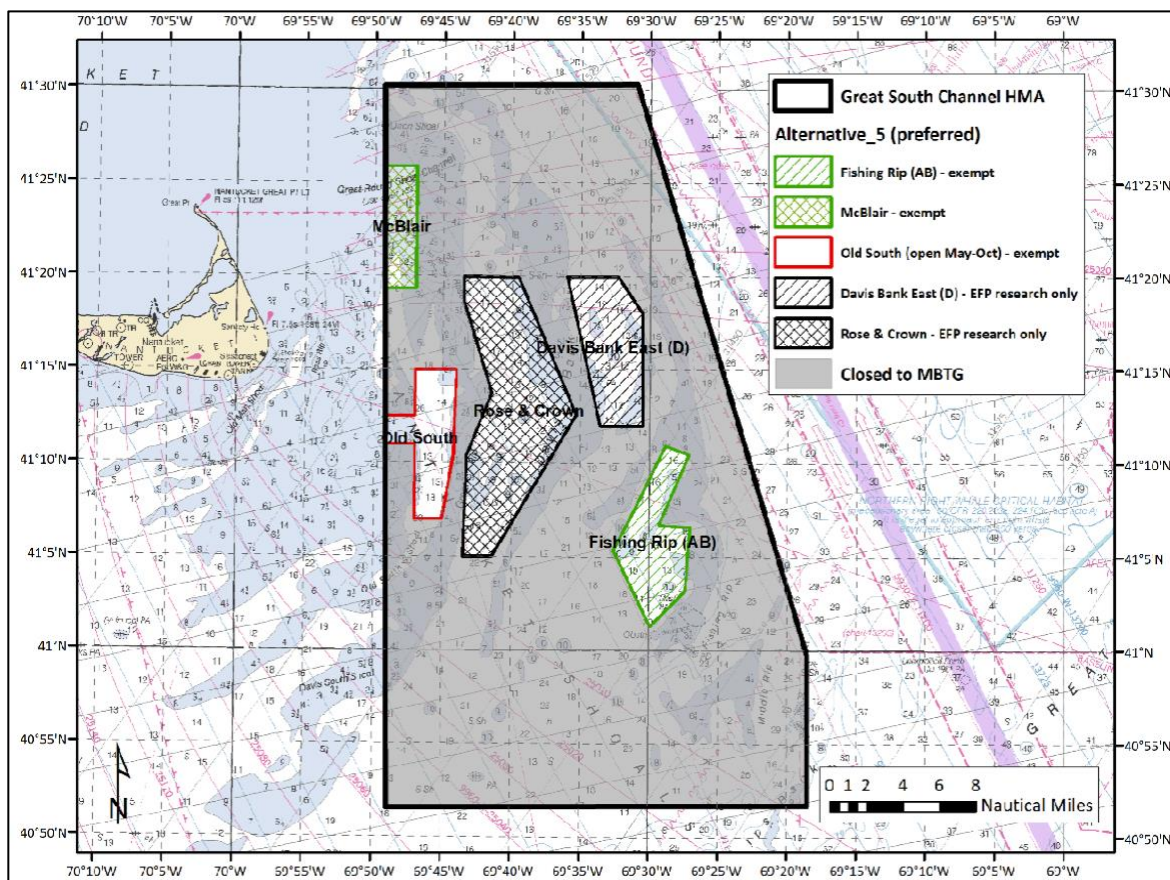
MAFMC 2018. Surfclam and Ocean Quahog Advisory Panel Fishery Performance Report (FPR) April 2018. Accessed: <https://www.mafmc.org/fpr/2018/2018-surfclam-and-ocean-quahog-fishery-performance-report>

Powell, E.N., Mann, R.L., Long, M.C., Timbs, J.R., Kuykendall, K.M. 2021. The conundrum of biont-free substrates on a high-energy continental shelf: Burial and scour on Nantucket Shoals, Great South Channel. *Estuarine, Coastal and Shelf Science*, 249, 107089.

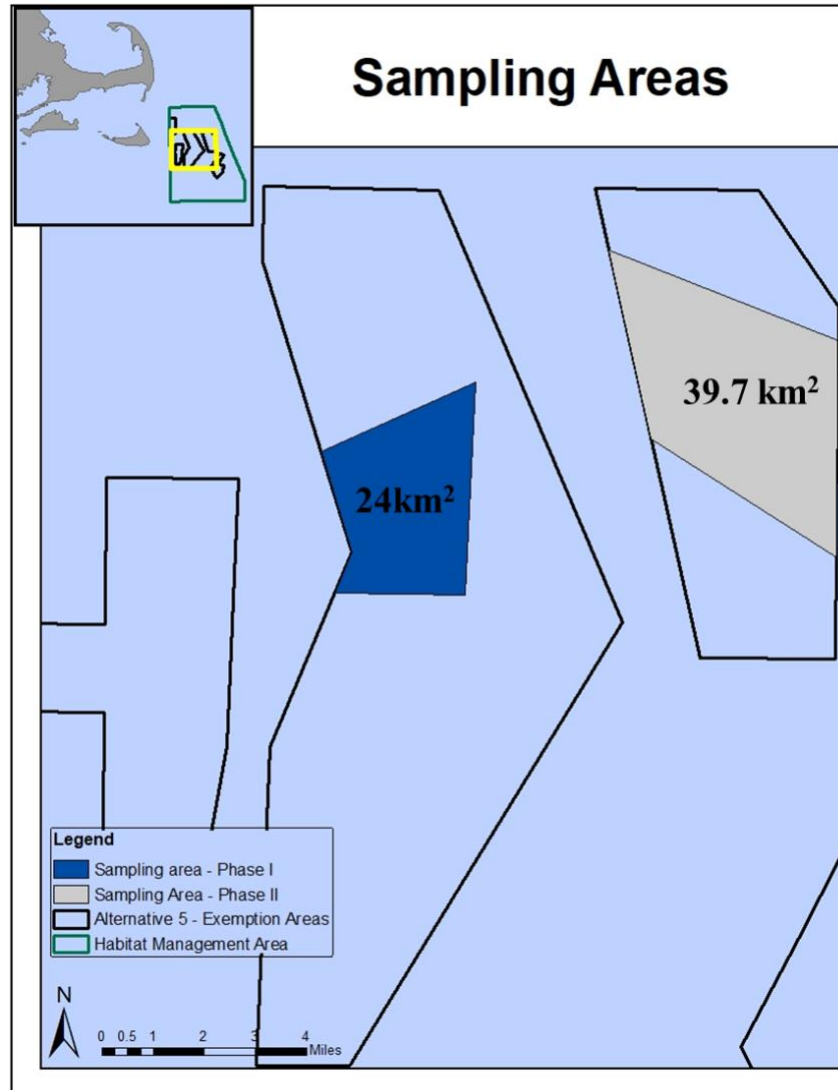
Twichell, D.C., 1983. Bedform distribution and inferred sand transport on Georges Bank, United States Atlantic continental shelf. *Sedimentology*, 30(5), p 695-710.



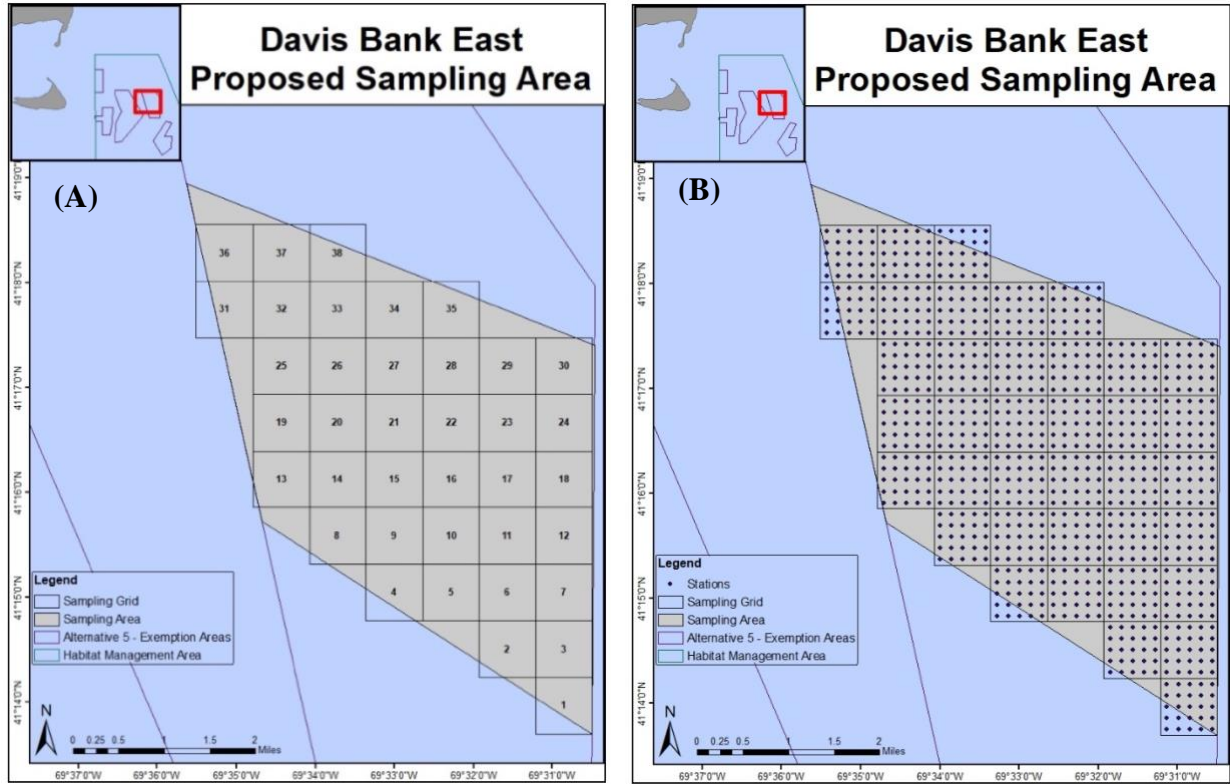
## Appendix A: Figures



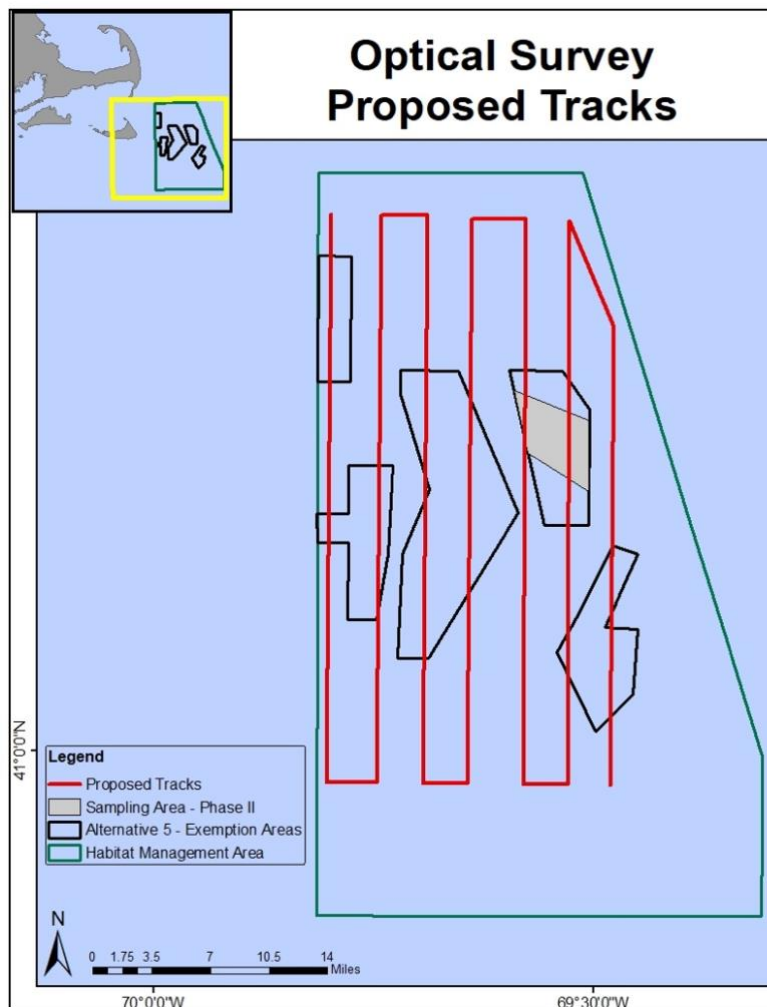
**Figure A1.** Clam dredge exemption areas in the Great South Channel Habitat Management Area (from NEFMC 2018).



**Figure A2.** Phase I and phase II research areas located in the Rose and Crown and Davis Bank East areas, respectively.

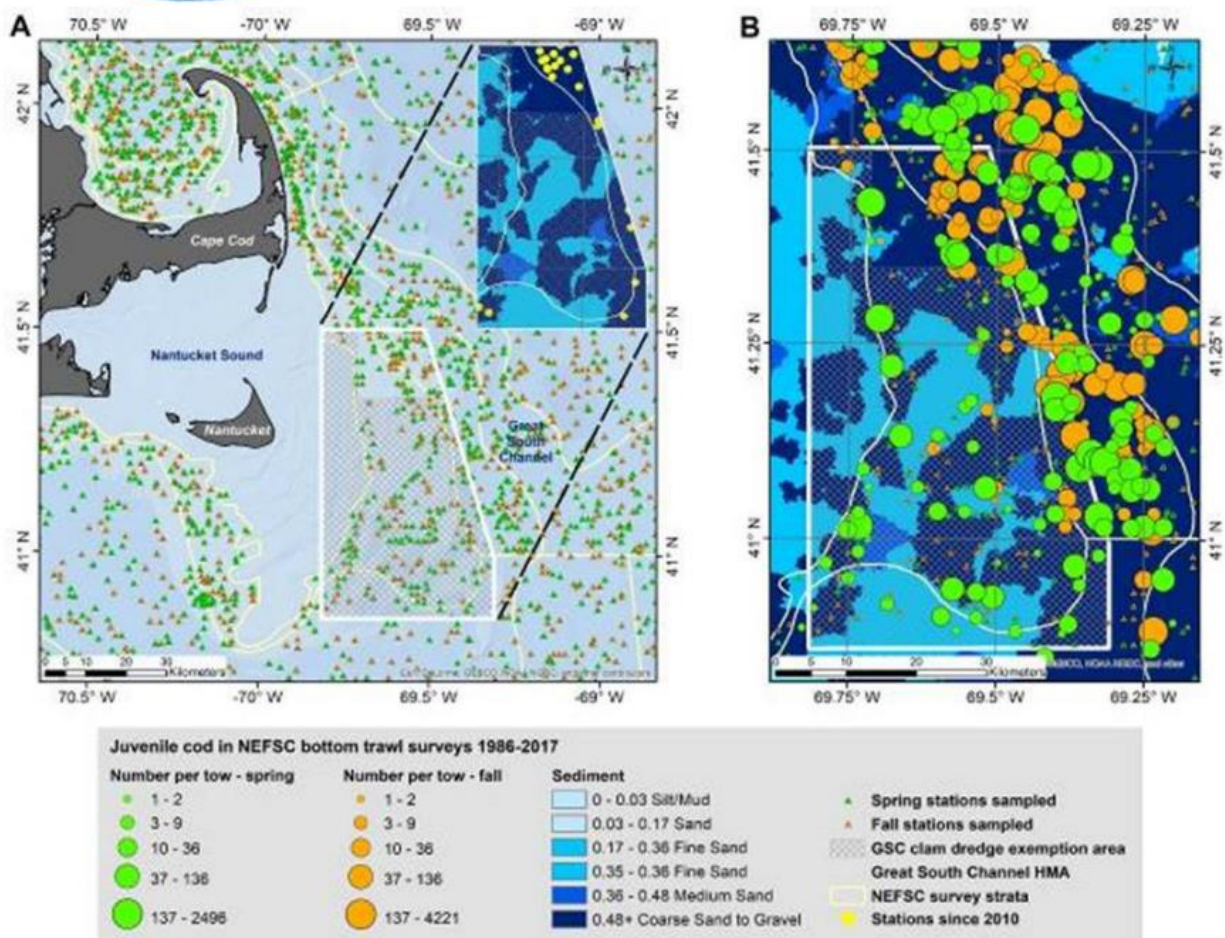


**Figure A3.** Phase II research area located in the Davis Bank East exemption area. The area was divided in 38 1km<sup>2</sup> square grids (A). Each grid will have 25 stations to randomly choose from before each fishing trip(B).



**Figure A4.** Tow tracks in red for optical surveys through the HMA including the fishing area in Davis Bank East.





**Figure A5.** The location of the GSC HMA relative to Cape Cod and Nantucket, with the locations of all NEFSC trawl survey stations since 1986 and the locations of stations since 2010 (inset, A). The numbers of juvenile Atlantic cod caught during the NEFSC fall and spring bottom trawl surveys since 1986 in and around the Great South Channel Habitat Management Area overlaid on map layers of sediment type B). Catch data downloaded from <https://catalog.data.gov>. Benthic map layers downloaded from the Northeast Ocean Data Portal at <https://www.northeastoceandata.org/>.

## Appendix B: Tables

*Table B1: Coordinates for the Davis Bank East proposed sampling area.*

Area	Latitude	Longitude	Km <sup>2</sup>
DBE	41.31592	-69.5946	39.75
	41.29054	-69.508	
	41.22881	-69.5084	
	41.26203	-69.5778	



**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

December 27, 2022

Natalie Jennings  
Research Biologist  
Coonamessett Farm Foundation, Inc.  
277 Hatchville Road  
East Falmouth, MA 02536

Dear Ms. Jennings,

We have reviewed your most recent application for an Exempted Fishing Permit (EFP) for a project to conduct a benthic habitat assessment in the Davis Bank East exemption area of the Great South Channel Habitat Management Area (GSC HMA) on Nantucket Shoals. This project would be a follow up to the EFP that we approved in May 2020 (EFP #19066). The 2020 EFP was intended to be a proof-of-concept project to determine if the proposed methods addressed Council research objectives<sup>1</sup> for the area, and future phases of the project would be considered based on how well Phase 1 addressed these objectives. Because of the importance of this area and the intended research objectives, we consulted with the Council to help evaluate the utility of the Phase 1 methods and results and inform our review of your new application. After reviewing input and findings from the New England Fishery Management Council, its Habitat Plan Development Team (PDT), and Habitat Committee, we encourage you to revise your EFP application and modify the project methods and sampling design to incorporate these findings.

CFF outlined several objectives for the pilot project, including the use of dredge-mounted cameras to document substrate, habitat features (e.g., sand waves, mussel beds), fishes, and invertebrates within the Rose and Crown area of the HMA and to create spatiotemporal distributions of biotic and abiotic habitat features to be used to inform future management actions regarding the HMA. The final report for the pilot project indicated that complex habitat is widespread throughout the project area, that clam dredges operate in areas with complex pebble-cobble bottom, and that the habitat is very heterogenous, even on small spatial scales. Catch per unit effort of clams during the study also increased with increased habitat complexity.

Based on a review of the Phase 1 results, and feedback from the PDT, the Habitat Committee, and the Council, this project provided limited information that the Council was looking for to address the research objectives for the area. While the project provided some information, and can help inform the design of future research, the limitations of the study design and sampling approach reduce the utility of this information, and the potential to characterize and map habitat, which is necessary to inform future management decisions. Feedback from the PDT and Habitat Committee on the Final Report for EFP #19066 noted concerns about the methods and sampling design that make these results difficult to use for understanding habitat complexity. The PDT noted, and we agree, that fishery-dependent data collection is not ideal as a sampling method to

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<sup>1</sup> <https://s3.amazonaws.com/nefmc.org/190612-GSC-HMA-Research-Planning-Document.pdf>

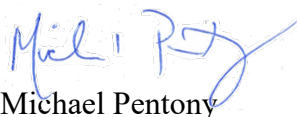


achieve the Council's research objectives, given that it is biased towards locations where clams are more abundant, and because the act of fishing alters the habitats sampled (i.e., future mapping of habitat should not be done with clam dredges). The Committee concluded, and the Council concurred, that future projects should focus more on fishery-independent sampling.

While the new EFP application includes a slightly improved sampling design to incorporate randomized sampling, it still relies heavily on the same fishery-dependent methods used in the pilot project. These methods are not effective to generate habitat maps for this area and do not fully address the Council's research objectives or the data and information needed to inform future management decisions. We are also concerned about the potential impacts of these methods on habitat that the HMA was designed to protect. Further, based on the results and outcome of Phase 1, it is unclear how the new EFP application could sufficiently support or achieve the proposed fisheries-independent sampling. We acknowledge the funding challenges in completing more fishery-independent sampling, and we encourage you to continue to seek additional funding sources to support necessary work. Demonstrating that sufficient funding will be available to complete the proposed fisheries-independent sampling is important in order to evaluate the need, scope, and appropriateness of any fisheries-dependent sampling, and likely success of research, which should rely primarily on fisheries-independent methods. We encourage you to consider all of these trade-offs when revising and re-submitting your EFP application, balancing the amount and location of any compensation fishing based on Phase I results and the Council, Committee, and PDT feedback.

We attached the recommendations and feedback on the pilot project (EFP #19066) from the Habitat PDT, the Habitat Committee, and the Council for your reference. For the reasons outlined above, and based on EFP regulations at 50 CFR 600.745 (b)(3)(i), I encourage you to revise the application consistent with the Council and PDT input, as well as secure external funding to ensure completion of fishery-independent research. At this time, our staff is extremely resource limited and will not be able to provide the level of engagement we provided for the formulation of EFP #19066. If you have any questions, please contact Jay Hermsen at [jerome.hermsen@noaa.gov](mailto:jerome.hermsen@noaa.gov) or 978-281-9137.

Sincerely,

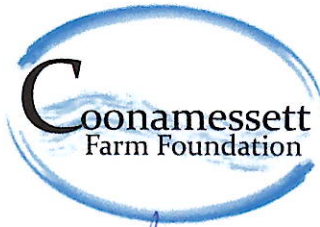


Michael Pentony  
Regional Administrator

cc: Eric Reid, NEFMC Chair  
Tom Nies, NEFMC Executive Director

Attachments





**Conducting scientific research projects that support sustainable fisheries, aquaculture, and agriculture**

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January 9, 2023

Dear Mr. Pentony, *Mike*

Thank you for your response letter to our application for the second phase of research in the Great South Channel Habitat Management Area. We acknowledge your comments and appreciate the opportunity to respond to each. Coonamessett Farm Foundation Inc. (CFF), with our industry partners, plans to submit a new Exempted Fishing Permit (EFP) application that addresses the Greater Atlantic Regional Fisheries Office concerns described in your letter and includes the use of multibeam sonar coupled with optical survey tools and compensation fishing.

1) Letter Comment

After reviewing input and findings from the New England Fishery Management Council, its Habitat Plan Development Team (PDT), and Habitat Committee, we encourage you to revise your EFP application and modify the project methods and sampling design to incorporate these findings.

CFF Response

The methodology outlined in the recent EFP was modified from those of the original (#19066). In the current EFP, we addressed the primary concern of the PDT related to site selection. Our past project relied too heavily upon a fisherman's choice site selection. In our recent EFP we proposed using a stratified-random survey approach. The use of some dredging is important for this research because it directly links habitat associations to surfclam productivity, and fisheries value. Because surfclams are infaunal, non-extractive stock assessment options are not viable.

2) Letter Comment

CFF outlined several objectives for the pilot project, including the use of dredge-mounted cameras to document substrate, habitat features (e.g., sand waves, mussel beds), fishes, and invertebrates within the Rose and Crown area of the Great South Channel Habitat Management Area (HMA) and to create spatiotemporal distributions of biotic and abiotic habitat features to be used to inform future management actions regarding the HMA. The final report for the pilot project indicated that complex habitat is widespread throughout the project area, that clam dredges operate in areas with complex pebble-cobble bottom, and that the habitat is very heterogenous, even on small spatial scales.

CFF Response

The establishment of the HMA was based upon the premise that "complex habitat" was known to exist within the area. It was, therefore, unsurprising to us, or the PDT, that the pilot study documented pebble and cobble substrates, rocks, boulders, and mussel beds within the area. While habitat heterogeneity was high in some portions of the study area, it was low in others. The study showed that the eastern portion of the study area was predominantly characterized by sandy substrates, while the western portion contained high spatial heterogeneity with greater proportions of pebble/cobble substrates. These are benthic features that are not unusual in continental shelf waters off Massachusetts; therefore, the use of the term "complex habitat" is vague.

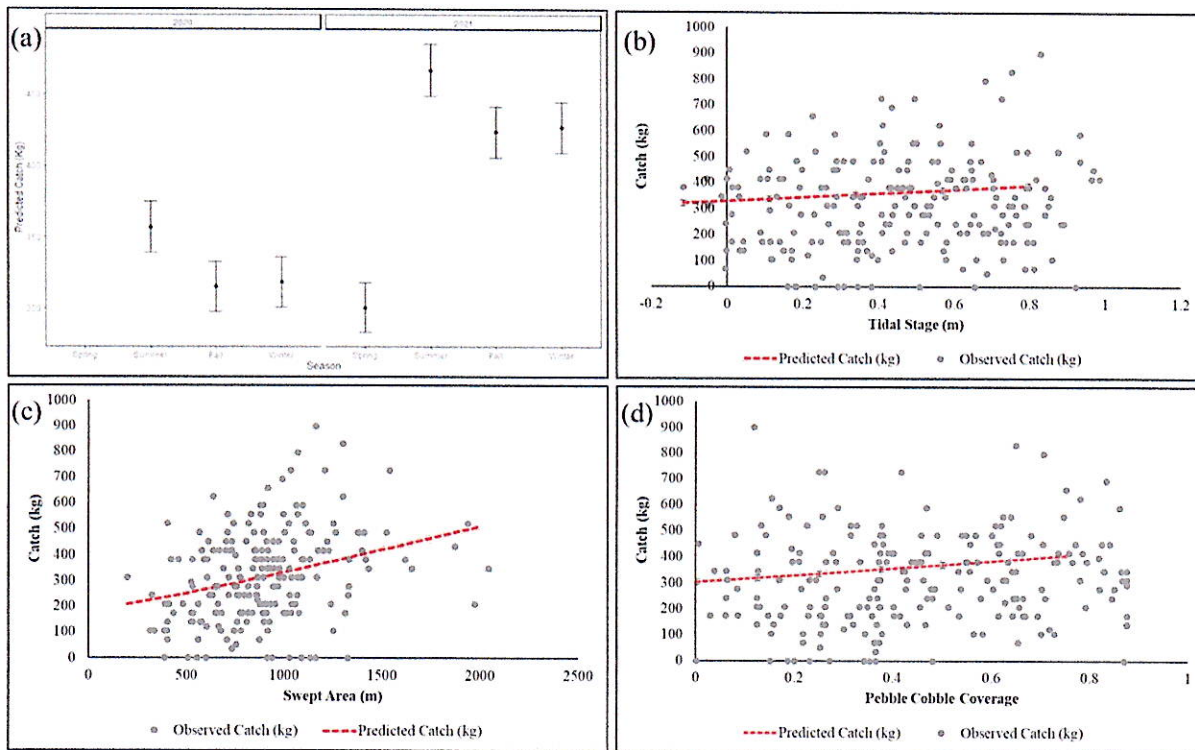
Our study area was 24 km<sup>2</sup> which represented less than 1% of the entire HMA (2566 km<sup>2</sup>). There are undoubtedly portions of the HMA where “complexity” will be higher and lower. Because the PDT does not have a clear definition of what is considered to be “complex habitat”, we intentionally avoided the use of this terminology within the final report from our study funded by EFP #19066, other than while citing the policy of the Habitat Management Council. A mixed sand/pebble/cobble sediment composition is typical of the entire region and does not in and of itself suggest a greater level of complexity than the surrounding waters.

### 3) Letter Comment

Catch per unit effort (CPUE) of clams during the study also increased with increased habitat complexity.

#### CFF Response

CPUE was high throughout the study area which is expected from an established surfclam fishing ground. It should be noted that CPUE of surfclams was also high in areas of predominantly sandy sediments and increased by 1.45 kg for every percent increase in pebble/cobble composition. The mean CPUE over sandy substrates without pebble/cobble was ~300 kg and increased to 400 kg at the highest fished level of pebble/cobble composition (85%). The CPUE of surfclams within the study area was, therefore, high over featureless sandy substrates. Our modelling indicates that in areas accessible to surfclam dredges, CPUE increases with increased pebble/cobble composition. However, a mixed sand/pebble/cobble sediment composition does not in and of itself suggest a greater level of “complexity.” Without a viable non-extractive stock assessment tool to survey areas inaccessible to surfclam dredges, it is not appropriate to generalize the model results to “complex habitat”. **Figure 1** from the report (Figure 11 in the final report) is provided below:



**Figure 1.** Surfclam catch prediction by season (a), tidal amplitude (b), swept area (c), and pebble/cobble coverage(d).



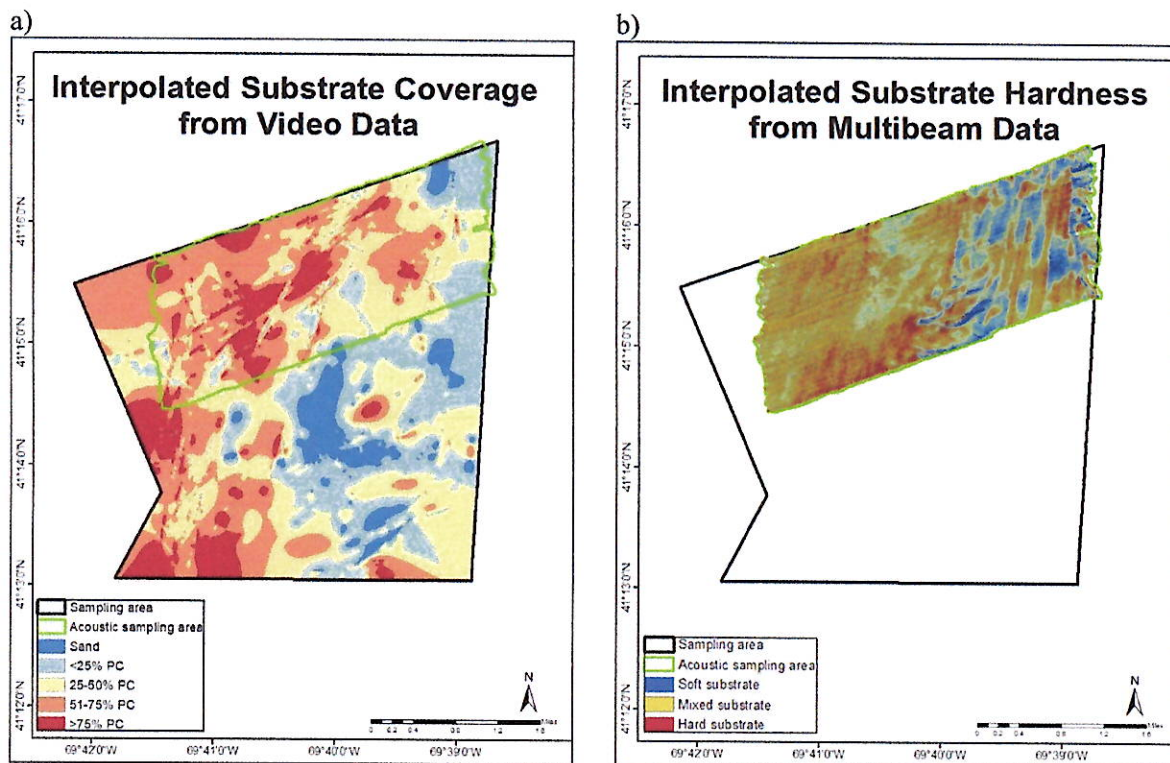
#### 4) Letter Comment

Based on a review of the Phase 1 results, and feedback from the PDT, the Habitat Committee, and the Council, this project provided limited information that the Council was looking for to address the research objectives for the area. While the project provided some information, and can help inform the design of future research, the limitations of the study design and sampling approach reduce the utility of this information, and the potential to characterize and map habitat, which is necessary to inform future management decisions.

#### CFF Response

In some cases, the PDT has stated that our previous study methodology from EFP #19066 was insufficient to draw conclusions about the study area, while in other cases the PDT states that our findings showed that the area is “too complex” for fishing activity to occur. The primary critique of our study methodology from the PDT was that the site selection was based on fisherman choice rather than a stratified-random approach. In order to address this issue, we proposed a spatially- and temporally-stratified subsampling approach that provided even comparisons across all observed sources of variation. This eliminated much of the bias introduced in the overall dataset due to fisherman’s choice.

On November 15, 2022, we conducted a multibeam sonar mapping survey of a portion of the area to verify the patterns observed from our video mapping. The results are provided below, and are very similar overall, although the results from the video survey were able to provide higher resolution on substrate composition and habitat patches (**Figure 2**).



**Figure 21.** Interpolated substrate coverage map from the final report (a), interpolated backscatter from sonar data where the blue is the softest, least reflective substrates and red is the harder, most reflective substrates (b).

Additionally, as stated in our response to comment 1 above, our recent EFP request was modified based on concerns about fisherman's bias. In our recent EFP request we incorporated a stratified-random sampling approach that completely resolves this issue.

#### 5) Letter Comment

Feedback from the PDT and Habitat Committee on the Final Report for EFP #19066 noted concerns about the methods and sampling design that make these results difficult to use for understanding habitat complexity. The PDT noted, and we agree, that fishery-dependent data collection is not ideal as a sampling method to achieve the Council's research objectives, given that it is biased towards locations where clams are more abundant, and because the act of fishing alters the habitats sampled (i.e., future mapping of habitat should not be done with clam dredges). The Committee concluded, and the Council concurred, that future projects should focus more on fishery-independent sampling.

#### CFF Response

See our response to Comment 4, we propose a spatially- and temporally-stratified subsampling approach that provided even comparisons across all observed sources of variation.

#### 6) Letter Comment

While the EFP application includes a slightly improved sampling design to incorporate randomized sampling, it still relies heavily on the same fishery-dependent methods used in the pilot project. These methods are not effective to generate habitat maps for this area and do not fully address the Council's research objectives or the data and information needed to inform future management decisions.

#### CFF Response

Due to the consequential misuse of terminology throughout the decision letter, we find it necessary to clarify the distinction between the use of compensation fishing and fisheries dependent and independent sampling. This letter contends that the act of fishing would make the proposed study a fisheries-dependent survey design. We disagree. Statistically randomizing dredging locations provides a fisheries independent survey using a clam dredge as the survey gear. Fisheries independent data can be collected while providing compensatory fishing where landings are retained.

#### 7) Letter Comment

We are also concerned about the potential impacts of these methods on habitat that the HMA was designed to protect.

#### CFF Response

This is a valid concern, but one which is currently uncertain and requires research. The Nantucket Shoals system is high-energy and temporally dynamic. The high degree to which natural disturbances within the area effects the seafloor, the effects incurred by fishing with a dredge have not been noted thus far beyond a 24-hour period. We saw evidence of this based upon seasonal trends within our previous study funded by EFP #19066. During our study, we were also not able to reliably detect dredge scars beyond 24 hours after the surfclam fishing occurred. Our video-based observations were deemed as insufficient evidence of this and suggested that acoustic methods were the only acceptable tool to investigate dredge-scar persistence. Our recent multibeam sonar survey (see our response to comment 4) showed no indication of dredge scars within the area less than one year following the dredging study.



8) Letter Comment

Further, based on the results and outcome of Phase 1, it is unclear how the new EFP application could sufficiently support or achieve the proposed fisheries-independent sampling.

CFF Response

See our response to comment 6, data simply collected with commercial equipment and landed for sale does not classify the data as fishery dependent if the sampling design is statistically valid.

9) Letter Comment

We acknowledge the funding challenges in completing more fishery-independent sampling, and we encourage you to continue to seek additional funding sources to support necessary work. Demonstrating that sufficient funding will be available to complete the proposed fisheries-independent sampling is important in order to evaluate the need, scope, and appropriateness of any fisheries-dependent sampling, and likely success of research, which should rely primarily on fisheries-independent methods.

CFF Response

Using landings to help fund research within the HMA does not preclude fisheries independent sampling (see our response to comment 6). Compensation fishing where landings are retained is still the most logical, efficient, inclusive, and immediate means to conduct research within the HMA. Research into the functionality of the HMA is necessary for Massachusetts residents' food and job security. While securing additional funding through a grant program could eliminate the necessity for compensation fishing, non-extractive methods cannot be used to relate surfclam distribution to substrate composition (see our response to Comment 1). Therefore, CFF would still be required to submit either an EFP or an LOA application to conduct the research.

10) Letter Comment

We encourage you to consider all of these trade-offs when revising and re-submitting your EFP application, balancing the amount and location of any compensation fishing based on Phase I results and the Council, Committee, and PDT feedback.

CFF Response

See our response to comment 1, site selection will be chosen in a stratified-random approach due to our own concerns and feedback we have received.

11) Letter Comment

We attached the recommendations and feedback on the pilot project (EFP #19066) from the Habitat PDT, the Habitat Committee, and the Council for your reference. For the reasons outlined above, and based on EFP regulations at 50 CFR 600.745 (b)(3)(i), I encourage you to revise the application consistent with the Council and PDT input, as well as secure external funding to ensure completion of fishery-independent research.

CFF Response

Our recent EFP request addressed the primary concern regarding the site selection from our first study under EFP #19066 (See our response to comment 1). A clarification needs to be made regarding compensation fishing as a mechanism to fund fisheries independent stock or habitat assessment. Fishing

gears are commonly used for fishery-independent assessments that incorporate stratified-random site selection. The act of landing catch does not in and of itself constitute a fisheries dependent methodology. We contend that using landings to help fund project-related tasks is still the most logical, efficient, inclusive, and immediate means to conduct research within the HMA. This is also the only option to directly link habitat associations to surfclam productivity, and fisheries value of these infaunal animals.

Thank you,

A handwritten signature in blue ink, appearing to be 'F. Almeida', with a long horizontal stroke extending to the right.

Frank Almeida  
President, Board of Directors, Coonamesett Farm Foundation