Project Title:

Development of a Marketable Seafood Product from Scup (*Stenotomus chrysops*), an Abundant, Low Value Species in the Northeast and Mid-Atlantic USA

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Project Summary:

This project set out to establish and improve the processing techniques, sustainability credentials, culinary recognition, and market demand of scup (*Stenotomus chrysops*), a highly abundant, yet low value species in the Northeast and Mid-Atlantic regions. The volume and seasonality of scup landings, in combination with the needs of large-scale seafood buyers, requires that scup be provided to the market as a frozen product. Thus, this work developed techniques to produce a frozen, boneless, skinless, scup fillet product that meets the needs of consumers and is endorsed by fishermen, fish processing companies, chefs, and food scientists. This was accomplished by conducting at-sea handling trials with local fishermen determining the best methods of handling scup once caught to preserve the best quality, filleting and freezing trials with the Pier Fish Company to determine the best processing techniques to create high quality products, culinary evaluations and tasting trials with Johnson and Wales University to evaluate the quality of frozen scup fillets cooked using different methods, sustainability evaluation by the Sustainability Incubator to evaluate the scup fishery against the MSC fishery standards, and outreach with directed marketing by Dodge Associates and J.B. Cuisine to promote the scup products at local events and the Seafood Expo North America 2022 event in Boston, MA. The outcome of these efforts resulted in a vacuum sealed frozen fillet scup product that meets the MSC fishery standards. New marketing opportunities from this product and greater awareness of the scup fishery should lead to increased revenue to fishermen and facilitate a greater diversity of species throughout the seafood supply chain, with a focus in the United States on locally landed and processed seafood products versus imported seafood products.

The original project timeline for this project was October 2018 – March 2020; however, multiple no-cost project extensions were granted to help relieve COVID-19 related difficulties experienced by the Pier Fish Company and Johnson & Wales University (JWU) in completing project tasks and to allow for participation in the Seafood Expo North America, which was cancelled in March 2020 and July 2021, then rescheduled and held in March 2022 in Boston, MA.

Final Project Timeline:

1. October 2018 – September 2019: Fishery Improvement Project
2. November 2018 – November 2019: Testing of at-sea handling practices
3. November 2018 – January 2020: Testing of scup processing methods
4. December 2018 – January 2020: Investigation of scup processing byproduct use
5. March 2019 – September 2019: Scup fillet shelf life and nutritional profile laboratory testing
6. March 2019 – March 2020: Culinary and consumer evaluation of refreshed scup fillet product
7. March 2019 – January 2020: Investigation of regional markets for refreshed scup fillets
8. March 2019 – January 2020: Scup fillet marketing
9. October 2018 – March 2022: Administrative project support
10. October 2018 – March 2022: Sharing of project progress and results
11. October 2018 – March 2022: Outreach and marketing tasks

Project Results

At Sea Handling Trials

Given that the scup fishery is restricted to offshore areas due to seasonal distribution patterns and availability, the fishery is relatively slow in the winter months in southern New England, resulting in only offshore vessels landing scup. Smaller inshore vessels typically begin landing scup in late April and early May in southern New England, and they continue to land scup into the fall before the fishery moves back offshore in the winter. Smaller inshore vessels provide more flexibility in fishing and handling techniques used while at-sea, in addition to short times between fish being caught and landed. With this seasonal pattern in the scup fishery, at-sea handling and processing trials were attempted with inshore vessels in the spring and summer. However, local seafood wholesalers were not able to offer incentives with increased prices to specific vessels to land scup that were handled with more labor-intensive methods, and vessels did not want to jeopardize their business relationships with their usual buyers by selling their scup directly to CFRF or Pier Fish. This limited the at-sea handling trials that were able to be directly tested within the project.

Pier Fish noted damage to fish caught in the offshore fishery through early processing trials, proving that scup is a relatively delicate fish. Project staff communicated extensively with local day trawl and fish pot fishermen in Point Judith, RI and surrounding ports who target scup to discuss the overall project and its goals. These fishermen were from the vessels that supplied scup for the processing trials at Pier Fish and were engaged in the project and its goals. Most of these fishermen use practices that already utilize best handling practices to keep their catch at the highest possible quality, and current federal 5” diamond mesh size net requirements in the trawl fishery already promote retention of only legal sized fish. It was also noted that fish pot fishermen generally land better quality fish because their catch is not compressed in the bag of a trawl net, however; trawl vessels can conduct short duration tows to reduce damage to their catch, and fish pot landings of scup are small relative to the landings of the trawl fishery. Both types of vessels can hold scup in iced slurries onboard rather than lumping fish on ice in a hold which results in better quality product. It was proposed that fishermen bleed out or gut scup onboard to improve quality as well; however, it was determined that the high volume of catch and the small size of scup would not make this feasible without substantial financial incentive to the fishermen to handle their catch with those methods. Pier Fish attempted to purchase locally caught fish from smaller day boats when possible, to use in processing and tasting trials so that the best available fish were used in the project.

Processing Trials

The Pier Fish Company, located in New Bedford, MA, conducted all processing and freezing trials for the project. With one of only three BAADER (BA) 153 fillet machines in the country, they were in a unique position to conduct the mechanical fillet trials for the project. Their BA 153 is traditionally used to fillet Acadian Redfish (*Sebastes fasciatus*, Ocean Perch), which is similar in body shape and size to scup, although they are slightly shorter and wider (Figure 1).

Figure 1. Scup (top) and Acadian Redfish (bottom) body size and shape comparison.

Prior to going through the BA 153, scup must first be descaled due to their large and thick scales so the BA 153 guides can grip the fish through the machine. Because Pier Fish was typically using small quantities of scup to calibrate the BA 153, there were not enough fish to run through their Kroma Scalemaster machine, and all fish had to be descaled by hand. Hand scaling is not feasible when larger quantities of scup are processed. After being descaled, whole fish are fed into the BA 153 which removes the head, tail, rack, and pin bone, resulting in two boneless skin-on fillets per fish (Figure 2). After fillets come out of the BA 153, they must be deskinned. The fillets produced in the first fillet trials were deskinned using a BAADER deskinning machine; however, this machine removed too much of the fillet because of aggressive cut angles, so future trials used the Trio FDS 55 skinning machine which is more delicate on the fillets and produced higher quality fillets with less damage.

The first fillet trials began in January 2019. The fillet trials used with different size classes of scup (medium, large, and jumbo), to fine tune blade angles, cut depths, and guide locations for the BA 153 for each size class of scup. Each size class of scup requires different configurations of the BA 153, and

because large scup (12”-15”) produce the most desirable sized fillet (3-5 oz.), the project concentrated on using large scup for the remainder of the project for fillet trials and tastings. Through the early recipe development and tasting trials using fillet product from the early Pier Fish processing trials, JWU chefs noted inconsistencies in the size and quality of scup fillets produced by the Pier Fish processing methods. After discussion between CFRF, JWU, and Pier Fish staff, the inconsistencies were attributed to the wide range in the size of fish that were going through Pier Fish processing with the same BA 153 fillet machine blade and guide configuration. After the decision to use only large size class scup, the occurrence of these inconsistencies was reduced. However, there were still concerns over the overall quality of the fillets produced by the machines.

Figure 2. Filleted scup after going through the BA 153 fillet machine (left) and skin side of fillets after being deskinned (right).

It quickly became apparent through the first Pier Fish processing trials that a fillet and freeze sequence resulted in better quality fish than a freeze and fillet sequence. Pier Fish trials of the freeze and fillet sequence resulted in soft discolored fillets after going through the full processing sequence, which were much lower in quality than the fillets produced through the fillet and freeze sequence. As Pier Fish moved forward in their processing trials, they tested three main freezing methods for the fillets including batch freezing, plate freezing (also known as shatter pack), and Individual Quick Frozen (IQF) (Figure 3). However, all these methods produced undesirable strong taste in the refreshed frozen fillets in the JWU tasting trials, and they were deemed to be unmarketable. All fresh fillets maintained good quality throughout the processing and tasting trials, except for fresh fillets produced in May and June when the quality of fish coming in for processing declined severely. This decreased quality was attributed to the spring and early summer spawning season for scup, a pattern which is also seen in other species. Total percent yield dropped from over 30% prior to the spawn to around 20%, and the fillets were much softer with a greyed discoloration. Pier Fish began to bring in small batches of scup again in late August and September after vessel captains provided feedback that scup was back to better condition. These small batches in late summer had fresh fillets once again back to marketable form with yields over 30% and fillets back to a firm texture.

Figure 3. Frozen IQF (top), layer packed (also referred to as shatter packed, middle), and individual vacuum sealed (bottom) scup fillets.

To resolve the strong undesirable flavor in the three freezing methods, Pier Fish conducted processing trials which used a citrus glaze prior to freezing, in hopes that would prevent the refreshed fillets from developing the undesirable flavor. Pier Fish also attempted to make more aggressive cuts when skinning the fillets to remove more of scup's large blood and fat line which had severe discoloration in the freezing processes. Unfortunately, both attempts were unsuccessful. The refreshed fillets still had the strong flavor even with the citrus glaze, and the aggressive skinning cut processing trials removed too much meat from the fillets which reduced the percent yield down to levels that would not be commercially feasible, especially for smaller sized fish that already had relatively small fillets.

Following the unsuccessful processing and tasting trials of batch freezing, plate freezing, and IQF refreshed fillets, Pier Fish ran processing trials in February 2020 using individual vacuum sealed fillets. These vacuum sealed fillets were the only frozen fillets tested which were comparable in quality to the fresh scup fillets and resulted in a marketable product. However, immediately following the last processing and tasting trials in February 2020 with Pier Fish and JWU, social distancing guidelines from COVID-19 caused JWU to move campus activities to remote instruction, and no further trials could be conducted with the chef instructors and students through the remainder of the project. Although the flavor of the fillets received positive feedback, Pier Fish staff determined that the mechanized processing techniques were too rough on the fillets, caused too much damage, and had too much fillet size variability to produce a marketable product. Therefore, the remainder of the project utilized hand cut processing of all fillets by Pier Fish which reduced damage to the fillet products. This yielded the highest quality frozen product, but the labor associated with hand cut processing runs caused the production costs to increase.

Pier Fish conducted a trial of hand filleting scup to determine the feasible volume of scup that can be produced without mechanized processes to reduce processing damage on the fillets in conjunction with a project outreach event at the 2021 Rhode Island Seafood festival. The processing for the festival yielded approximately 100 lbs of fillet from 450 lbs of fresh scup. This yield of close to 25% was less than the previous yield of 30-35% from mechanized processing.

Production costs were tracked through all processing trials; however, most of those trials were with mechanized processing, which was determined to be unsuccessful for producing a marketable product. The greatest cost of hand filleting is the large number of staff working on the fillet line, and the end market price of scup is dependent on the volume that can be produced given the number of staff working on the fillet production line with large scale production on the order of thousands of pounds of fish and fillets. The estimate is that the vacuum sealed fillets could be sold at $7-8 per a pound. This is well above the target price of $4.50 but was by far the best frozen product in terms of fillet quality and taste.

Culinary Evaluation and Tasting Trials

Johnson and Wales University chef instructors and students led all culinary evaluations and tasting trials for the project. The JWU chefs began the project by developing three recipes for the scup fillets which would be kept consistent throughout the full project. These recipes were created specifically for this project and featured minimal seasoning and additional ingredients to focus on the organoleptic qualities of the fish itself in the comparison trials of fresh and frozen fillets. The three recipes utilized cooking methods of pan-searing, baking, and deep-frying. As part of the JWU cooking and tasting trials, chef instructors and students conducted their first culinary evaluations of scup fillets prepared through all three cooking methods using the evaluation form (Figure 4). These student evaluations were incorporated directly into the JWU culinary student curriculum for a sensory analysis course in which students were instructed on exactly how to compare samples in blind tasting

evaluations while eliminating biases between samples, and in this case, between the fresh and refreshed scup fillets. No fresh fillets were available for the first round of culinary student evaluations at JWU in March 2019, so students were only able to give feedback on a refreshed IQF batch of scup from Pier Fish. Overall, they noted that the IQF refreshed fish had a strong fishy taste, especially with the pan seared preparation method.

Pan-Seared Scup

Instructions: We are interested in your opinion on two samples of pan-seared scup fillets. Please taste the first sample, sample _____, eating at least half a portion, and answer the first 3 questions. Cleanse your palate with water, then taste the second sample, sample _____, again eating at least half, and answer the remaining questions. There are no wrong answers, and you might not even see differences, but do record what you honestly think. Thank you for your help!

Sample _____

1. How would you describe the color of the first sample of pan-seared scup?

☐	☐	☐	☐	☐
much too light		just about right		much too dark

2. How would you describe the *flavor strength* of the first sample of pan-seared scup?

☐	☐	☐	☐	☐
much too low		just about right		much too high

3. How would you describe the *texture* of the first sample of pan-seared scup?

☐	☐	☐	☐	☐
much too soft		just about right		much too firm

Sample _____

4. How would you describe the *color* of the second sample of pan-seared scup?

☐	☐	☐	☐	☐
much too light		just about right		much too dark

5. How would you describe the *flavor strength* of the second sample of pan-seared scup?

☐	☐	☐	☐	☐
much too low		just about right		much too high

6. How would you describe the *texture* of the second sample of pan-seared scup?

☐	☐	☐	☐	☐
much too soft		just about right		much too firm

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7. Of the two samples, which do you prefer, and why?

_____

_____

Figure 4. Scup tasting evaluation form used for trials with Johnson and Wales University instructors and students. The two sample sections are for the fresh and refreshed fillets cooked with the same method.

Johnson and Wales University chef instructors and students completed several rounds of tasting trials with culinary students and public visitors at an Open House event in April and May 2019 which tested IQF, plate frozen, and batch frozen fillets against fresh fillets. With the same results as the first preliminary cooking trials at JWU in March 2019, all refreshed fillets consistently had a strong and undesirable flavor present through all three cooking methods, while the fresh fillets received positive feedback on their quality and flavor. There was high variability in the flavor associated with different pieces of an individual refreshed fillet. Pieces that came from near the bloodline of the fillet had the strongest and most undesirable flavor, but pieces that came from the same fillet further away from the bloodline did not have quite as strong of a flavor, although they were still less desirable than the fresh fillets. Fresh fillets did not have any associated strong or undesirable flavor, regardless of where a piece was taken in relation to the bloodline.

Prior to any cooking taking place, there were also visual differences between the fresh and refreshed fillets (Figures 5 and 6). Refreshed fillets were greyer and duller in appearance compared to the fresh fillets after refreshed fillets were thawed, which would likely be viewed negatively by consumers if fillets are marketed in retail settings in displays where the refreshed fillets are adjacent to fresh fillets of other similar species or products. However, through all three preparation methods of baking, pan-searing, and deep-frying, the visual differences between the refreshed (IQF, plate frozen, and batch frozen) and fresh fillets were lost once the fillets were fully cooked, and the different products were indistinguishable in their visual appearances (Figure 7). In February 2020, JWU chefs and students conducting a tasting trial of individual vacuum sealed frozen fillets, which received nearly unanimous positive feedback from the JWU tasting trial group. The majority of the group of chefs and students provided feedback that they would be willing to consume and use the vacuum sealed refreshed fillet products in their own cooking practices.

Figure 5. Fresh fillet (left) and refreshed IQF fillet (right) showing differences in the two fillet products prior to cooking.

Figure 6. Fresh fillet (left) and refreshed IQF fillet (right) showing differences in the two fillet products during pan-seared cooking.

Figure 7. Fresh fillet (left) and refreshed IQF fillet (right) showing appearances in the two fillet products after baked cooking.

Byproduct Uses

The first steps CFRF and Pier Fish staff took to pursue markets for scup byproducts is with the large scup processing waste. The scup heads, racks, and skins (Figure 8) were used by commercial lobstermen as bait. These bait trials were completed in April 2019 to target American lobster (*Homarus americanus*), Jonah crab (*Cancer borealis*), and rock crab (*Cancer irroratus*). Early feedback from lobster and crab fishermen in Point Judith, RI prior to using the processing byproducts included that they had previously attempted to use whole scup as bait, but they were not satisfied with its effectiveness. However, their feedback on the processing byproducts was positive, likely due to the increased blood and oil released from the processed racks as opposed to whole fish. Their feedback was that the scup processing byproduct performed just as well as their usual bait of skate or menhaden, and in some cases the traps baited with scup heads, racks, and skins had higher catch rates than traps in the same area that had skate as bait.

Figure 8. Scup heads, racks, and skins which will be used in lobster and crab bait trials.

In addition to the lobster and crab bait market for scup racks, project staff explored further opportunities for value added scup products. The results of this work suggest a frozen fillet can be developed from two of the three scup market sizes: large and jumbo. The smallest market size fish, medium, do not have a high enough yield to produce a fillet large enough for the U.S. market. Mincing mechanically deboned and skinned medium scup and scrap pieces from larger filleted fish could be used to create value added products such as fish cakes, sausages, or small breaded fish nuggets. Imperfect fillets or fillets from damaged fish would also be suitable for these uses; the occurrences of these events are typically a small percentage of the total fish that go through processing, but when thousands of pounds are processed it can be a substantial amount of fish. The most likely opportunity will be to create compacted fish blocks that are used in making frozen fish sticks, sandwich fillets, etc. at low prices.

Project staff also hosted members of the Rhode Island Food Policy Council at meetings in June and July 2019 who were interested in increasing the state's seafood processing capacity, which is currently somewhat limited due to wastewater restrictions in many towns and areas. Potential investors at the meeting had experience converting seafood processing waste into protein powder supplements for human consumption. The potential investors also met with Pier Fish staff to view their processing operation and inquire about total quantities of seafood waste they produce on a regular basis to gauge if the local Rhode Island and Massachusetts markets have sufficient potential to warrant expanded growth in this area for the protein powder supplements. Communication is continuing between CFRF and Pier Fish staff on this potential market, and the Rhode Island Food Policy Council released a feasibility report for the potential protein powder development for public review and comment in February 2020, and efforts are continuing to pursue the opportunity.

Similarly, Pier Fish staff is pursuing use of the scup skins for collagen supplements in addition to the protein powder supplements with the Rhode Island Food Policy Council. The Rhode Island School of Design also requested scup skins to be used as part of efforts to use locally sourced products that will be used to create fish leather.

Laboratory Tests

In March 2019, Pier Fish staff sent scup fillet samples to the Analytical Testing Laboratory in Belmont, MA for nutritional profile and shelf-life tests. Upon the first processing trials at Pier Fish with scup caught in the winter, staff noticed large fat lines in the fish, likely due to the fish storing energy and preparing to migrate inshore to spawn in the spring. It is possible that fish caught in different seasons could have highly variable nutritional profiles due to seasonal changes in behavior. Results from the nutritional profile were positive with nutritional levels similar to most other white flesh marine finfish species, however, shelf-life results for both fresh and refreshed fillets showed extremely high levels of bacteria growth. This was believed to be due to a set of contaminated samples with the high bacteria counts, so additional samples were sent for shelf-life retests in September 2019. This second set of shelf-life testing resulted in much lower and acceptable bacteria count levels. However, Analytical Testing Laboratory was only able to conduct two days of samples, rather than the industry accepted three days of samples at six, eight, and ten days after fish were landed. Results of all laboratory tests completed to date are in Appendix 1.

Due to the unexpected strong and undesirable flavor seen in the refreshed fillets frozen by IQF, plate freezing, and batch freezing, JWU food science staff recommended that volatile organic compound tests (also known as volatile flavor tests) be conducted on the refreshed fillets. These tests would reveal exactly what compounds in the refreshed fillets were causing the strong undesirable flavors, which could then inform potential treatments that can be done in processing to prevent or remedy the undesirable flavor. This analysis was not planned in the original project proposal, and quotes obtained from Merieux NutriSciences to perform these tests were beyond the available scope of work for the project, but we beneficial to conduct in the future.

Fishery Improvement Project

The Sustainability Incubator conducted background research for a scup Fishery Improvement Project (FIP) to prepare for a Marine Stewardship Council (MSC) sustainability certification. The first step of the FIP process is a MSC pre-assessment of the scup fishery against the MSC fisheries standards, which was completed in May 2019 with positive results. The FIP pre-assessment is conducted to gather information on the fishery and compare it to the Marine Stewardship Council (MSC) fishery standards, then areas of improvement which need to be addressed are identified for the FIP. However, due largely to the rebuilt status of the scup stock in the early 2000s and the management measures put in place since that time, the scup fishery already meets all MSC fishery standards, without need to conduct a full FIP (Appendix 2). This is extremely rare for a fishery to immediately meet all MSC standards prior to a FIP, and it indicates that the scup fishery is in a favorable position to move towards MSC certification. Specific components of the MSC standards are scored on a scale of 0-100, with all scores required to reach 80 or above to meet the standards. Most scores of the FIP pre-assessment were scored at 80 (Table 1), so there are still areas for improvement in the fishery, but to immediately meet the MSC fishery standards is an exceptional status. The Sustainability Incubator prepared a public release of the FIP pre-assessment results, which was released in conjunction with the Pier Fish refreshed fillet product at the Seafood Expo North America event in March 2022 (Appendix 3).

Table 1. Fishery Improvement Project pre-assessment scores for the scup trawl fishery.

Component	Performance Indicator	2018 Score
Outcome	1.1.1 Stock status	100
	1.1.2 Stock rebuilding	100
Management	1.2.1 Harvest strategy	100
	1.2.2 Harvest control rules and tools	80
	1.2.3 Information and monitoring	80
	1.2.4 Assessment of stock status	80
Primary Species	2.1.1 Outcome	100
	2.1.2 Management	100
	2.1.3 Information	80
Secondary Species	2.2.1 Outcome	80
	2.2.2 Management	80
	2.2.3 Information	100
Endangered, Threatened, and Protected Species	2.3.1 Outcome	80
	2.3.2 Management	80
	2.3.3 Information	80
Habitats	2.4.1 Outcome	80
	2.4.2 Management	80
	2.4.3 Information	80
Ecosystem	2.5.1 Outcome	80
	2.5.2 Management	80
	2.5.3 Information	80
Governance and Policy	3.1.1 Legal and customary framework	80
	3.1.2 Consultation, roles and responsibilities	80
	3.1.3 Long term objectives	80
Fishery Specific Management System	3.2.1 Fishery specific objectives	80
	3.2.2 Decision making processes	80
	3.2.3 Compliance and enforcement	80
	3.2.4 Management performance evaluation	80

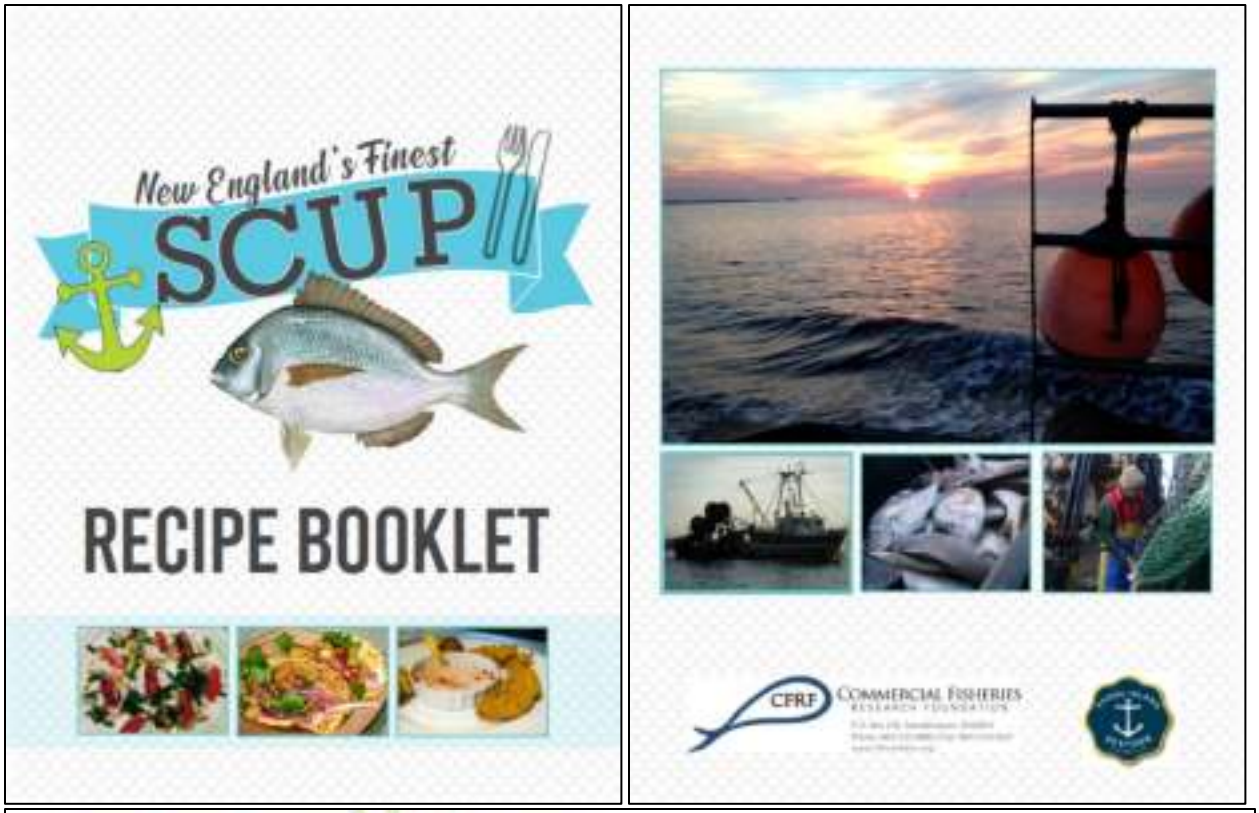
Unrelated to this project, the scup fishery was recently given MSC certification in May 2022 through Lund's Fisheries in Cape May, NJ in partnership with Seafreeze, Ltd. in North Kingstown, RI. Although this is a major accomplishment for the scup fishery, the MSC certification only applies to scup that are caught, landed, and sold through Lund's and Seafreeze, despite the fact that all scup caught on the East Coast of the U.S. are coming from the same fishery and stock. This could create a market advantage for these two companies which sell scup and hinder the overall market potential of the scup fishery if scup caught and sold by fishing vessels and companies outside of the MSC certification are not as desirable by buyers because they do not have the MSC label to accompany the fish.

Market Investigation and Development

The marketing aspect of this project was led by Dodge Associates with collaboration from the full project team to highlight the benefits and appeal of the refreshed scup fillet product. Dodge Associates created marketing and outreach materials for the project which were used at public outreach

and tasting events and for use in distribution to retail market customers (Appendix 4). Two Brown University undergraduate students who were paired with CFRF for an urban agriculture course also developed an informational rack card and recipe booklet (Figures 8 and 9) which were used at public scup tasting events. These efforts included a trip to the port of Point Judith to educate the students on scup and observe boats offloading their catch, as well as a presentation given by the Brown students to their peers which profiled scup and potential marketing strategies.

Figure 8. Scup rack card (left, front; right, back) created by Brown University students for use in tasting events in grocery stores, fish markets, and retail outlets.



ASIAN-STYLE SCUP FISH CAKES

Preparation Time: 30 minutes
Cook Time: 30 minutes
Serves: 3 people

Ingredients

6 SCUP FILLETS
1/2 TEASPOON GROUND CORIANDER
1/2 TEASPOON CHILI POWDER
3 LARGE EGGS
3 CUPS PANKO BREAD CRUMBS
1 CUP FLOUR
1/2 CUP RED BELL PEPPER, DICED
1 1/2 SERRANO PEPPER, DICED, TO TASTE
1 SHALLOT, DICED
1/2 CUP WATER CHESTNUTS, DICED
1/2 CUP FRESH CILANTRO, CHOPPED
1/2 CUP CHIVES OR GREEN ONION
1 GINGER SLICE
2 TABLESPOONS PONZU SAUCE
3 LIMES
3 TABLESPOONS VEGETABLE OIL

POACHING LIQUID INGREDIENTS:
32 OZ FISH OR VEGETABLE STOCK
2 CELERY STALKS, SLICED WIDTHWISE
1 WHITE ONION, CHOPPED
2 BAY LEAVES
1/2 SERRANO PEPPER
7 GINGER SLICES
5 GARLIC CLOVES, CRUSHED

PONZU SAUCE:
1/2 CUP FRESH LIME JUICE
1 TABLESPOON RICE WINE VINEGAR
1/2 CUP SOY SAUCE
1 TABLESPOON SWEET RICE WINE
1 TABLESPOON BROWN SUGAR
1 TEASPOON GINGER, MINCED
PINCH RED PEPPER FLAKES

Recipe by Grissom Fleming

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Directions

ADD POACHING INGREDIENTS INTO A POT AND SIMMER FOR 15 MINUTES. SEASON HEAVILY WITH SALT AND ADD CILANTRO STEMS AND REMAINING LIME IF DESIRED.

SEASON FISH FILLETS WITH CORIANDER, CHILI POWDER, AND SALT & PEPPER. SET ASIDE. MIX TOGETHER PANKO AND 1 EGG TO CREATE BINDING AGENT FOR THE CAKES.

IN SEPARATE BOWL COMBINE PEPPERS, SHALLOTS, ONIONS, WATER CHESTNUTS, LIME JUICE, CILANTRO, GINGER AND PONZU SAUCE. SET ASIDE IN FRIDGE.

POACH FISH IN STOCK FOR 5-8 MINUTES. COOL IN FRIDGE. ONCE FISH IS COOL, ADD PANKO/EGG MIXTURE TO VEGETABLE MIX. THEN GENTLY FOLD IN FISH AND FORM CAKES. LET REST IN FREEZER FOR 10 MINUTES.

IN ORDER, DREDGE CAKES IN FLOUR, BEATEN EGGS, AND PANKO CRUMBS. FRY 4 MINUTES ON EACH SIDE IN VEGETABLE OIL.

SERVE WITH SAUCE AND LIME ZEST.

5

Figure 9. Recipe booklet front cover (top left), back cover (top right), and recipe excerpt (bottom) created by Brown University students for use in tasting events in grocery stores, fish markets, and retail outlets.

CFRF staff were in contact with staff at Dock to Dish in Montauk, NY who provided insight to their marketing of scup, which they successfully rebranded as Montauk Sea Bream and had resulting better acceptance of the fish on restaurant menus by consumers (docktodish.com/species/sea-bream/). Dock to Dish had great success in their rebranding of scup, and after discussion among the scup project team and culinary experts at JWU, project staff attempted to rebrand scup as Atlantic Bream. Similar rebranding efforts have been accomplished with species such as Patagonian Toothfish (*Dissostichus eleginoides*, rebranded as Chilean Sea Bass), Acadian Redfish (*Sebastes fasciatus*, rebranded as Ocean Perch) and spiny dogfish (*Squalus acanthias*, rebranded as Cape Shark). The project team made the formal effort to petition the Food and Drug Administration to add the name Atlantic Bream to the Seafood List of approved marketing names for scup, which now consists only of scup and porgy (www.accessdata.fda.gov/scripts/fdcc/index.cfm?set=seafoodlist&id=Stenotomus_chrysops). The petition for the name update was denied with the justification that they did not believe a rebranding of the species as anything other than scup or porgy would be ensuring the product is honestly labeled, which would then prevent consumers from making informed choices that would be beneficial to their health.

Throughout the project, staff were in contact with several market outlets for refreshed scup fillets. Large scale buyers including Whole Foods Market and Walmart expressed interest in placing orders of several thousands of pounds of scup fillets per week for expansive national distribution and sales. Dave's Marketplace, a local Rhode Island based grocery store chain, has also expressed interest in sales of scup fillets. The Providence, RI public school system also expressed interest in using scup fillets in their cafeterias; however, the increased cost of hand cut scup fillets pushed the price point beyond the range of what was capable for the school system. Due to the COVID-19 related project delays and challenges, along with the strong and undesirable taste difficulties encountered with the early processing and tasting trials of the refreshed fillets, the project was limited in its capabilities to explore these large scale market opportunities until the end of the project at the Seafood Expo North America event in March 2022.

Due to the early refreshed fillet products that were tested in the processing and culinary trials with the undesirable strong flavors, the project team withheld from directly pursuing markets for refreshed scup fillet products until there was a frozen product available to bring to market. Upon the positive results found with the individual vacuum sealed frozen product in the processing and tasting trials, the team also explored and pursued large batch vacuum sealed frozen fillets which would be more appropriate for large scale sales such as restaurants and food service buyers. Following the successful hand cut processing trial for the Rhode Island Seafood Festival in September 2021 in which the fillets were individually vacuum sealed and frozen, it was determined that the individually sealed fillets were inefficient for the festival style event as it took too much time to open and prepare all the individual fillets in large volumes. For the Seafood Expo event processing run, fillets were still hand cut, however the fillets were frozen in five-pound vacuum sealed bags to reduce preparation time rather than frozen as individually vacuum sealed fillets. The overall quality of the fillet was retained with this more efficient packaging based on feedback from tasters at the Expo.

As previously noted, large scale commercial mechanized fillet processing is not recommended for scup. This has caused the project team to reevaluate the intended market for scup fillets to a somewhat smaller scale, with the higher-than-expected processing costs potentially preventing scup fillet products from entering the marketplaces such as schools, university, and hospital marketplaces, but increasing its appeal to seafood retailers as a higher quality, cod or haddock rivaling product. Pier Fish is expecting the end cost of production to be a fillet product in the price range of $7-8 per pound for the hand cut frozen fillets. The hand fillet, high quality approach also may provide more opportunities for small scale processors to produce fillets if market demand can be increased to warrant increased processing levels.

Project staff promoted refreshed scup fillets at the Rhode Island Seafood Festival in September 2021 (Figure 10 as the first large public scale public engagement effort for the project. This was not an original planned venue for the project, but the project team wanted to ensure final product outreach occurred due to the uncertainty of the Seafood Expo North America being held. With JWU participation not possible due to the university COVID-19 protocols, Chef Joshua Berman of Rhode Island based J.B. Cuisine prepared free samples of a Crispy Narragansett Bay Scup Taco dish prepared with refreshed vacuum sealed scup fillets. Approximately 500 tacos were distributed to festival goers while CFRF staff discussed and promoted this project and local sustainable seafood. All patrons gave positive feedback on the scup tacos and indicated that they would be open to buying and cooking scup in the future. Extra frozen scup fillets were also donated to the Jonnycake Center Food Pantry in South Kingstown, RI.

Figure 10. The Commercial Fisheries Research Foundation booth at the Rhode Island Seafood Festival.

One of the main deliverables of the project was to present refreshed scup fillets at Seafood Expo North America event and include the product in the New Product Showcase at the event. Seafood Expo North America was cancelled in both March 2020 and July 2021 due to COVID-19, but the project team finally debuted the refreshed frozen fillet product at the Expo in March 2022. Outreach at the event included a CFRF and Pier Fish booth to display and promote the vacuum sealed scup fillet product, provide information on the product and scup fishery, and distribute tastings of the scup fillet product (Figures 11 and 12). Chef Joshua Berman of Rhode Island based J.B. Cuisine and JWU students prepared free samples of a Crispy Wild Atlantic Scup Taco dish made with the refreshed vacuum sealed scup fillets. A poster was also created for participation in the Expo's New Product Showcase at the event (Figure 13). Approximately 1,000 tacos were distributed to attendees while CFRF staff discussed the scup fishery and the research project background and Pier Fish Company staff met with potential food service and retail buyers of the scup fillet product. All attendees who tasted the taco samples gave

positive feedback and indicated that they would be open to buying and cooking scup in the future, and Pier Fish staff followed up with many inquiries from large scale potential buyers who were interested in incorporating scup into their businesses. Extra frozen scup fillets were also donated to Boston food pantries through the Seafood Expo event. In addition to the project team's presence at the Seafood Expo event, the Sustainability Incubator preceded the Seafood Expo event with the distribution of a press release (Appendix 2) which promoted the project team's presence at the Expo and featured the scup fillet product. While at the Expo, Rhode Island Public Radio staff visited the project team at their booth and interviewed staff which led to a story that was released shortly after the Expo event (http://www.thepublicsradio.org/article/smaller-fish-to-fry-rhode-island-project-hopes-to-boost-interest-in-scup).

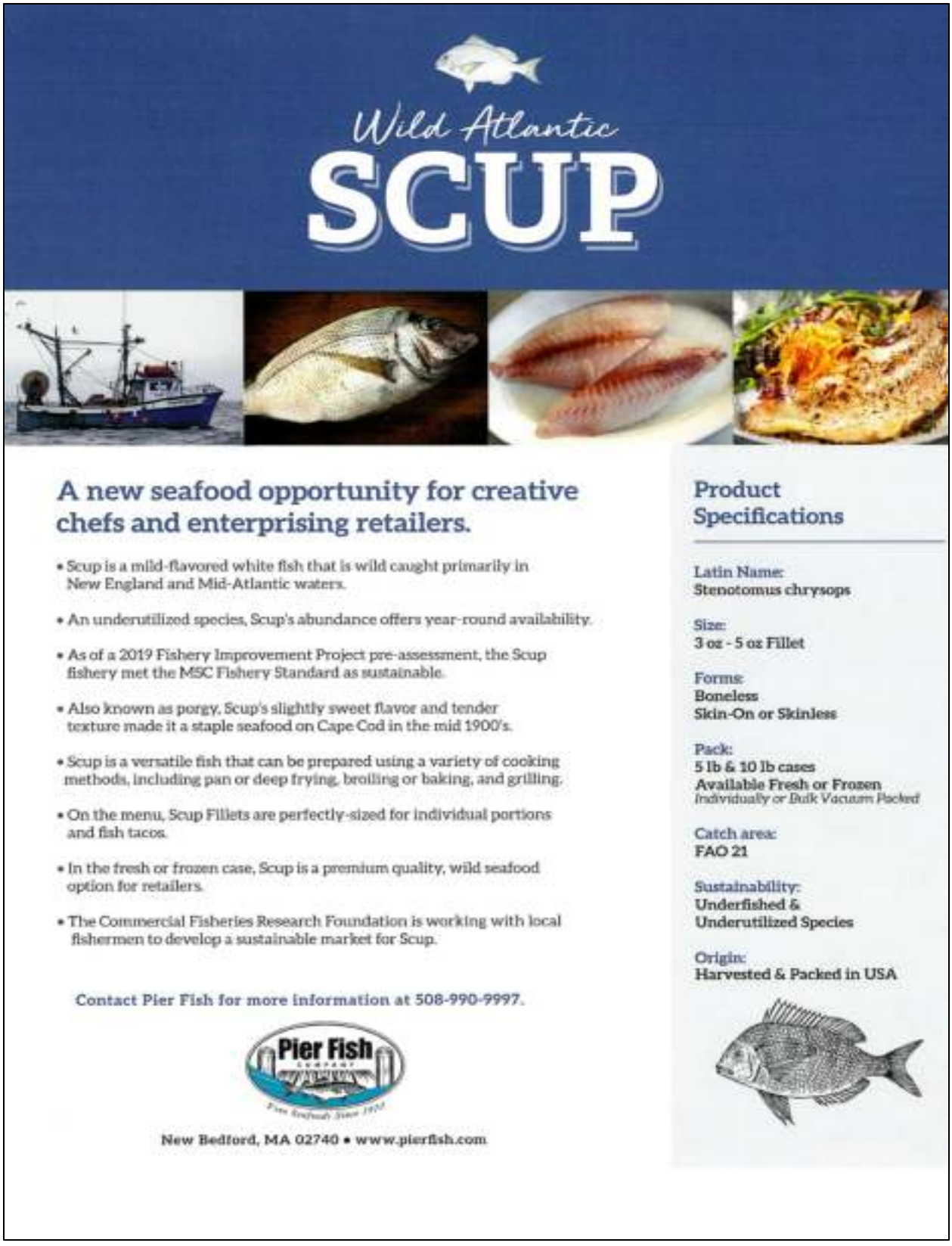

Figure 11. Pier Fish scup information sheet produced for the Seafood Expo North America to be used for retail and wholesale marketing.

Figure 12. The Commercial Fisheries Research Foundation booth and tacos served at the Seafood Expo North America event at the Boston Convention and Exhibition Center in March 2022.

Figure 13. The New Product Showcase poster at the Seafood Expo North America event at the Boston Convention and Exhibition Center in March 2022.

Overall, the project team successfully developed a new refreshed scup fillet product with the individual and bulk vacuum sealed fillets, with strong interest from many buyers indicated at the product release at the Seafood Expo North America event. However, with feedback from potential buyers at the Seafood Expo event and with subsequent follow up from project staff, there was also high demand for headed and gutted fish, particularly to international and some small scale domestic markets. The Seafood Expo event also gave scup more of an international profile, as many of the international attendees at the event had never even heard of scup before. This also gives reason to rebrand scup under a new name, such as Atlantic Bream, which gives the fish more recognition by being in the bream family. The headed and gutted option would also allow for all size of scup to be utilized, not just the large or jumbo sizes needed for the fillet products, while also being at a lower cost than the fillet products with less effort required to produce and better yield without having to remove as much meat around the bloodline through deskinning. There was a general takeaway from the Expo that this project focused too much on the US mainstream market. Perspective international buys seemed to have little concern over the potential strong "undesirable" taste of the non-vacuum sealed frozen products. This may also hold true for US ethic and underserved markets. Nevertheless, it would be prudent for a frozen headed and gutted product to be preliminarily tested in these markets before wide scale distribution of a frozen headed and gutted product.

Dissemination of Project Results

The project team has maintained a project website (www.cfrfoundation.org/scup-fillet) throughout the project which featured a general overview of the project as well as updates as the

project progressed. Communication with fishermen, seafood wholesalers and processers, and culinary professionals who are both directly involved with the project as well as those with general interest in the project was also maintained throughout all phases of the project. Articles on the project's progress was featured in the September 2018, March 2019, November 2019, May 2020, November 2021, and March 2022 CFRF newsletter (Appendix 5). All CFRF newsletters during the project period mentioned the project and pointed interested readers to the project website. CFRF's newsletter reaches over 1,500 individuals involved in the fisheries/seafood system. Three CFRF Facebook posts about the project generated 4,900 views and 465 interactions.

Project staff presented on the project team's efforts to pursue refreshed scup fillet products at the Rhode Island Natural History Survey Climate Change and Rhode Island's Natural History Future Conference in November 2019, the American Fisheries Society Southern New England Chapter Winter Meeting in January 2020, and the Rhode Island Food System Summit in January 2020, Rhode Island Seafood Festival in September 2021, and the Seafood Expo North America event in March 2022. JWU also hosted a high school educator event in February 2019 which was used to train high school culinary educators on the benefits of using sustainable American seafood, which the educators will use in future lessons in their high school culinary programs. CFRF staff attended the event and led presentations on sustainable American seafood, followed by scup cooking demonstrations by JWU chefs alongside tilapia prepared with the same methods to demonstrate the superior organoleptic qualities of local wild caught scup over imported farm raised tilapia. Lastly, project staff updated Rhode Island Congressman Langevin on the project during Food First Advisory Committee meetings. In addition to the project team's own promotion and outreach as part of the project, the project efforts were also focused in several media outlets throughout the project. The project was featured by the following:

- ecoRI News, June 2020 - https://ecori.org/2020-6-24-scup-project-works-to-bring-little-fish-to-the-masses/
- National Fisherman, February 2021 - https://www.nationalfisherman.com/northeast/northeast-scup-with-abundant-biomass-fishermen-look-to-expand-market-post-pandemic
- Seafood News, March 2022 - https://www.seafoodnews.com/Story/1220842/SENA-2022-CFRF-Launching-Boneless-Skinless-Wild-Atlantic-Scup-Fillet-at-Boston
- The Public's Radio, March 2022 - https://thepublicsradio.org/article/smaller-fish-to-fry-rhode-island-project-hopes-to-boost-interest-in-scup

Appendix 1. Analytical Testing Laboratory fillet shelf life and nutritional profile analysis results.

ATL ANALYTICAL TESTING LABORATORY
345 Trapelo Rd. Belmont, MA 02478
Telephone 617 484-7400
Fax 617 484-7403
E-mail atllabfood@verizon.net

Date: May 29, 2019
Report No: 153312
Date Received: 3-May-19

LABORATORY REPORT

To: Pier Fish Co. Inc.
68 Conway Street
New Bedford, MA 02740

NUTRITIONAL INFORMATION

Serving Size for Calculation 112.0 g

PRODUCT IDENTIFICATION	SCup Fillets		
	Per 100 g	Per Serving	% Daily Value
Calories	85	90	
Calories from Fat	21	25	
Total Fat	1.16 g	1.5 g	2
Saturated Fat	50 % of Fat	0.5 g	3
Monounsaturated Fat	40 % of Fat	0.5 g	
Polyunsaturated Fat	10 % of Fat	0 g	
Trans Fat	0 % of Fat	0 g	
Cholesterol	52 mg	60 mg	20
Moisture	79.30 g		
Ash	0.97 g		
Sodium	84.8 mg	95 mg	4
Total Carbohydrates	0 g	0 g	0
Dietary Fiber	0.0 g	0 g	0
Total Sugars	0.0 g	0 g	
Added Sugars	0.0 g	0 g	0
Protein	18.46 g	21 g	
Calcium	10.9 mg	10 mg	0
Iron	0 mg	0 mg	0
Potassium	252 mg	280 mg	6
Vitamin D	0 mcg	0 mcg	0

Digitally signed by Mark DiPietro - Director

ATL ANALYTICAL TESTING LABORATORY
345 Trapelo Rd. Belmont, MA 02478
Telephone 617 484-7400
Fax 617 484-7403
E-mail atllabfood@verizon.net

Date: May 24, 2019
Report No: 153311
Date Received: 3-May-19
Receival Temperature: 10.5°C

LABORATORY REPORT

To: Pier Fish Co. Inc.
68 Conway Street
New Bedford, MA 02740

Shelf Life Study

Attention: Olga DeMelo cc: Benjamin D.

METHOD:	PRODUCT IDENTIFICATION:	SCup Fillets - Fresh		
	ANALYSIS REQUESTED:	RESULTS		
		Test #1 Day 4 5/6/19	Test #2 Day 6 5/8/19	Test #3 Day 8 5/10/19
CMMEF APHA 9	Coliform CFU/gm	23	---	---
CMMEF APHA 9	E.Coli CFU/gm	<10	---	---
CMMEF APHA 8	APC CFU/gm	340,000	47,000,000	40,000,000
CMMEF APHA 21	Yeast CFU/gm	<10	80	760
CMMEF APHA 21	Mold CFU/gm	<10	<10	110
AOAC 2003.08	Staph Spp. CFU/gm	<10	---	---
AOAC 2003.01	Enterobacteriacea CFU/gm	>1,500	---	---
CMMEF APHA 35	Listeria Spp.	Negative	---	---
AOAC 2011.03	Salmonella Spp.	Negative	---	---

<= LESS THAN

Digitally signed by Mark DiPietro - Director

ATL ANALYTICAL TESTING LABORATORY
345 Trapelo Rd. Belmont, MA 02478
Telephone 617 484-7400
Fax 617 484-7403
E-mail atllabfood@verizon.net

Date: May 24, 2019
Report No: 153311
Date Received: 3-May-19
Receival Temperature: 10.5°C

LABORATORY REPORT

To: Pier Fish Co. Inc.
68 Conway Street
New Bedford, MA 02740

Shelf Life Study

Attention: Olga DeMelo cc: Benjamin D.

METHOD:	PRODUCT IDENTIFICATION:	SCup Fillets - Frozen		
	ANALYSIS REQUESTED:	RESULTS		
		Test #1 Day 4 5/6/19	Test #2 Day 6 5/8/19	Test #3 Day 8 5/10/19
CMMEF APHA 9	Coliform CFU/gm	23	---	---
CMMEF APHA 9	E.Coli CFU/gm	<10	---	---
CMMEF APHA 8	APC CFU/gm	1,100,000	31,000,000	60,000,000
CMMEF APHA 21	Yeast CFU/gm	<10	60	580
CMMEF APHA 21	Mold CFU/gm	<10	<10	130
AOAC 2003.08	Staph Spp. CFU/gm	<10	---	---
AOAC 2003.01	Enterobacteriacea CFU/gm	>1,500	---	---
CMMEF APHA 35	Listeria Spp.	Negative	---	---
AOAC 2011.03	Salmonella Spp.	Negative	---	---

<= LESS THAN

Digitally signed by Mark DiPietro - Director

ATL ANALYTICAL TESTING LABORATORY
345 Trapelo Rd. Belmont, MA 02478
Telephone 617 484-7400
Fax 617 484-7403
E-mail atllabfood@verizon.net

Date: September 16, 2019
Report No: 154593
Date Received: 6-Sep-19
Receival Temperature: 4.5°C

LABORATORY REPORT

To: Pier Fish Co. Inc.
68 Conway Street
New Bedford, MA 02740

Shelf Life Study

Attention: Olga DeMelo cc: Benjamin D.

METHOD:	PRODUCT IDENTIFICATION:	SCup Fillets - Fresh	
	ANALYSIS REQUESTED:	RESULTS Test #1 Day 1 9/6/19	Test #2 Day 6 9/9/19
CMMEF APHA 9	Coliform CFU/gm	---	---
CMMEF APHA 9	E.Coli CFU/gm	<10	<10
CMMEF APHA 8	APC CFU/gm	140	400
CMMEF APHA 21	Yeast CFU/gm	<10	<10
CMMEF APHA 21	Mold CFU/gm	<10	<10
AOAC 2003.08	Staph Spp. CFU/gm	---	---
AOAC 2003.01	Enterobacteriacea CFU/gm	---	---
CMMEF APHA 35	Listeria Spp.	Negative	---
AOAC 2011.03	Salmonella Spp.	Negative	---

<= LESS THAN

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Telephone 617 484-7400
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Date: September 16, 2019
Report No: 154593
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Receival Temperature: 4.5˚C

LABORATORY REPORT

To: Pier Fish Co. Inc.
68 Conway Street
New Bedford, MA 02740

Shelf Life Study

Attention: Olga DeMelo cc: Benjamin D.

METHOD:	PRODUCT IDENTIFICATION:	SCup Fillets - Frozen	
	ANALYSIS REQUESTED:	RESULTS	
		Test #1 Day 1 9/6/19	Test #2 Day 6 9/9/19
CMMEF APHA 9	Coliform CFU/gm	---	---
CMMEF APHA 9	E.Coli CFU/gm	<10	<10
CMMEF APHA 8	APC CFU/gm	50	2,400
CMMEF APHA 21	Yeast CFU/gm	<10	<10
CMMEF APHA 21	Mold CFU/gm	<10	<10
AOAC 2003.08	Staph Spp. CFU/gm	---	---
AOAC 2003.01	Enterobacteriacea CFU/gm	---	---
CMMEF APHA 35	Listeria Spp.	Negative	---
AOAC 2011.03	Salmonella Spp.	Negative	---

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Digitally signed by Mark DiPietro - Director

FISHERY IMPROVEMENT PROJECT FOR NEW ENGLAND SCUP (TRAWL)

SCORES SUMMARY FOR 2019

Scup
Stenotomus chrysops

This document provides the scoring results for the New England Scup fishery.

Since 2011, commercial scup landings have been 20-47% below the commercial quota. The U.S. scup fishery extends from the U.S.- Canadian border to Cape Hatteras, North Carolina.

The fishery was reviewed against all indicators of the Marine Stewardship Council (MSC) standard and scored against its 60, 80 and 100 score posts.

Results will support a fishery improvement project (FIP) for New England scup hosted by the Commercial Fisheries Research Foundation (CFRF) of Saunderstown, Rhode Island. The FIP launch is a part of the project, *Development of a Marketable Seafood Product from Scup (Stenotomus chrysops), an Abundant, Low Value Species in the Northeast and Mid-Atlantic USA*, supported by the US Department of Commerce through a Saltonstall-Kennedy award.

The FIP is coordinated by the CFRF. The Sustainability Incubator of Honolulu, Hawaii is providing support for the launch, including the preparation of this assessment and the FIP workplan and FIP documents.

TABLE OF CONTENTS

FISHERY OVERVIEW

The 2017 stock assessment update indicated the scup stock is considered rebuilt.

Scup are found in the Northwest Atlantic Ocean, primarily between Cape Cod, Massachusetts, and Cape Hatteras, North Carolina. Scup prefer temperatures greater than 45 degrees F and are most frequently encountered in water temperatures from 55 to 77 degrees F.

With greatly improved reproduction and survival rates and low fishing rates since 1998, the Mid-Atlantic spawning stock biomass (a measure of the amount of scup able to reproduce) has steadily increased since the mid-1990s (NOAA 2019).

The Federal commercial scup fishery is closed coast wide when the allocation for a given quota period are reached. Any overages during a given quota period are subtracted from that period's allocation for the following year. Implementing regulations are found at 50 CFR part 648 subpart H.

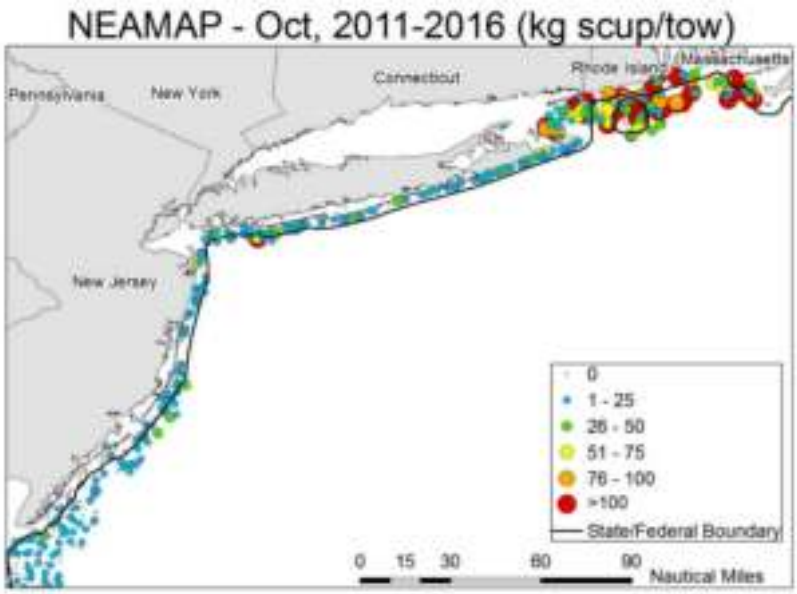


Figure 5. Scup catch per tow in October, 2011-2016, in the NEAMAP trawl survey off the states of Massachusetts through New Jersey.

Commercial catches of scup are concentrated in the waters of Rhode Island, New York, and New Jersey.

More scup are migrating to New England waters from south Atlantic populations with warming ocean conditions (GMRI 2014).

Source: ASMFC 2017

The otter trawl is the principal commercial fishing gear. NOAA Fisheries, the Mid-Atlantic Fishery Management Council, and the Atlantic States Marine Fisheries Commission cooperatively manage the scup fishery north of Cape Hatteras, North Carolina. Scup is managed under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan. The commercial quota is divided into state-by-state quotas based on historical landings. Annual commercial quota is divided into three harvest periods: Winter I (January–April), Summer (May–October), and Winter II (November–December). The Summer quota is managed by the New England states individually. Minimum size limits prevent the harvest of young fish that likely haven't yet reproduced. Minimum mesh size requirements for trawl nets reduce bycatch of undersized scup.

The FMP uses output controls (catch and landings limits) as the primary management tool, with landings divided between the commercial and recreational fisheries. The FMP also includes minimum fish sizes, bag limits, seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability.

The NEFSC Northeast Fishery Observer Program (NEFOP) has collected information on landings and discards in the commercial fishery since 1989. The Observer data have provided evidence that the Gear Restricted Areas (GRAs) implemented in 2000-2001 have been effective in reducing the scup discard percentage.

SCORES IN 2019 & FISHERY IMPROVEMENT PRIORITIES

The 2019 results for the fishery relative to the Marine Stewardship Council standard show a rebuilt healthy stock and fishing at levels below the maximum sustained yield.

Preliminary Scores against the Marine Stewardship Council standard

Key to scoring levels and shading

Information suggests fishery is not likely to reach SG60 and therefore would fail on this PI	**<60**
Information suggests fishery will reach SG60 but may need a condition for this PI	**60-79**
Information suggests fishery is likely to exceed SG80 resulting in an unconditional pass for this PI	**≥80**
Improvements are not necessary for this area at this time.	
Improvements are planned for the near-term	
Improvements are planned 2020-2022	

Summary of pre-assessment scoring

P	Component	PI	Performance Indicator	2018 Score	Improvement recommendation
1	Outcome	1.1.1	Stock status	100	
		1.1.2	Stock rebuilding	100	
	Manage-ment	1.2.1	Harvest Strategy	100	
		1.2.2	Harvest control rules and tools	80	
		1.2.3	Information and monitoring	80	
		1.2.4	Assessment of stock status	80	
2	Primary species	2.1.1	Outcome	100	
		2.1.2	Management	100	
		2.1.3	Information	80	
	Secondary species	2.2.1	Outcome	80	
		2.2.2	Management	80	
		2.2.3	Information	100	
	ETP species	2.3.1	Outcome	80	
		2.3.2	Management	80	
		2.3.3	Information	80	
	Habitats	2.4.1	Outcome	80	

		2.4.2	Management	80	
		2.4.3	Information	80	
	Ecosystem	2.5.1	Outcome	80	
		2.5.2	Management	80	
		2.5.3	Information	80	
3	Governance and Policy	3.1.1	Legal and customary framework	80	
		3.1.2	Consultation, roles and responsibilities	80	
		3.1.3	Long term objectives	80	
	Fishery specific management system	3.2.1	Fishery specific objectives	80	
		3.2.2	Decision making processes	80	
		3.2.3	Compliance and enforcement	80	
		3.2.4	Management performance evaluation	80	

SUMMARY OF IMPROVEMENTS RECOMMENDED

The preliminary results of this assessment suggest that the New England scup fishery meets the standard of the Marine Stewardship Council for sustainable fisheries. Continuous improvement is a vital principle in fisheries management however the assessment results do not show areas of deficiency to the 3 principles and 80 score guideposts of the MSC standard at this time, therefore not specific improvements are recommended.

Rationale for Scores by MSC Indicators

MSC Principle 1: Conservation of Target Stocks

MSC Indicator 1.1.1 specifies that the stock is at a level that maintains high productivity and has a low probability of recruitment overfishing.

The 80 score for MSC Indicator 1.1.1 requires that the stock is highly likely to be above the point where recruitment would be impaired, and that the stock be at or fluctuating around the level of a target reference point.

The 60 score for MSC indicator 1.1.1 requires that It is likely that the stock is above the point where recruitment would be impaired.

The existing reference points for scup are:

- F40% = 0.177 as the proxy for FMSY, and
- the corresponding SSBF40% = 92,044 mt as the proxy for SSBMSY, and
- the proxy estimate for MSY = MSY40% = 16,161 mt,
- as recommended by the 2008 DPSWG Peer Review Panel.

The F40% proxy for FMSY = 0.177, the proxy estimate for SSBMSY = SSB40% = 92,044 mt = 202.922 million lbs, and the proxy estimate for MSY = MSY40% = 16,161 mt = 35.629 million lbs (13,134 mt = 28.956 million lbs of landings and 3,027 mt = 6.673 million lbs of discards).

The existing model updated with new data indicated that the scup stock was not overfished and overfishing was not occurring in 2014 relative to the existing biological reference points established in the 2008 Data Poor Stocks Working Group assessment (NEFSC 2009).

The fishing mortality rate (F) was estimated to be 0.049 in 2014, below the fishing mortality threshold reference point = FMSY = F40% = 0.177. Spawning Stock Biomass (SSB) was estimated to be 219,066 metric tons (mt) = 483 million lbs in 2014, above the biomass target reference point = SSBMSY = SSB40% = 92,044 mt = 203million lbs. b) The scup stock was not overfished and overfishing was not occurring in 2014 relative to the new biological reference points recommended by the Stock Assessment Review Committee (SARC). The fishing mortality rate (F) was estimated to be 0.127 in 2014, below the fishing mortality threshold reference point = FMSY = F40% = 0.220. Spawning Stock Biomass (SSB) was estimated to be 182,915 metric tons (mt) = 403 million lbs in 2014, above the biomass target reference point = SSBMSY = SSB40% = 87,302 mt = 192 million lbs.

The scup stock has a low probability of becoming overfished in the short term (2016-2018) given recent trends in productivity and the responsiveness of the management regime.

Historically, scup's spawning stock biomass (SSB) decreased from about 68,000 mt in 1963 to about 5,000 mt in 1969, then increased to about 27,000 mt during the late 1970s. SSB declined through the 1980s and early 1990s to less than about 4,000 mt in the mid-1990s. With greatly improved recruitment and low fishing mortality rates since 1998, SSB increased to about greater than 100,000 mt = 220 million lbs since 2003. SSB was estimated to be 182,915 mt = 403 million lbs in 2014. There is a 90% probability that SSB in 2014 was between 153,000 and 222,000 mt (337/489 million lbs).

The degree of certainty is high that the stock is consistently above the Maximum Sustained Yield. SG60, SG80 and SG100 requirements are met.

1.1.1 2019 Score: 100

MSC indicator 1.1.2 for stock rebuilding looks at the timeframe and evidence of rebuilding.

The 100 score guidepost requires the shortest practicable rebuilding timeframe which does not exceed one generation of the stock. It also requires strong evidence the strategies are working to rebuild the stock and it is highly likely it will be rebuilt within the specified timeframe.

The 2017 stock assessment update indicated the scup stock is considered rebuilt. The fishery is governed by the Magnuson-Stevens Act and its requirements to stop overfishing, rebuild overfished stocks, and establish annual catch limits (ACLs). The time period provided by the MSA for rebuilding stocks is "as short as possible".

1.1.2 2019 Score: 100

MSC indicator 1.2.1 for harvest strategy looks at the harvest strategy design, evaluation, monitoring and review, including alternative measures, and shark finning.

The 80 scoring guidepost requires that the harvest strategy is expected to achieve stock management objectives reflected in target and limit reference points. The harvest strategy is likely to work based on prior experience or plausible argument. Monitoring in place to determine whether the harvest strategy is working.

The 60 scoring guidepost requires that the harvest strategy is responsive to state of stock, and that elements of the harvest strategy work together towards achieving the management objectives reflected in target and limit reference points. Although the harvest strategy may not have been fully evaluated, monitoring is in place and evidence exists that it is achieving its objectives.

The harvest design strategy is current to 2017.

The harvest strategy is expected to achieve stock management objectives reflected in target and limit reference points. Stochastic projections were made to provide forecasts

of stock size and overfishing level (OFL) catches in 2016-2018 consistent with the 2015 SAW 60 assessment biological reference points. The cumulative distribution function of the 1984-2014 recruitments (corresponding to the period of available fishery catches at age) was re-sampled to provide future recruitment estimates (mean = 109 million age 0 fish) for projections. The SWG conducted two sets of projections. Option A is proposed as the most realistic and assumes that given recent patterns in the fishery, it is likely that 75% of the 2015 ACL will be caught. Projection option B assumes that 100% of the 2015 ACL will be caught.

The instantaneous natural mortality rate (M) for scup has been assumed to be 0.20 in all previous stock assessments, including the 2015 and 2017 assessments. The ASAP model structural configuration and settings were significantly revised for the 2015 SAW 60 assessment. The ASAP model structural configuration and settings however were significantly revised for the 2015 SAW 60 assessment.

Reference points were calculated using the non-parametric yield and SSB per recruit/long-term projection approach adopted for summer flounder and the New England groundfish stocks. For the estimation of MSY (Maximum Sustainable Yield) and SSBMSY (Spawning Stock Biomass at Maximum Sustainable Yield), the cumulative distribution function of the 1984-2007 recruitments (corresponding to the period of available fishery catches at age) was re-sampled to provide future recruitment estimates (mean = 117 million age 0 fish) for biomass reference point estimation.

The harvest strategy is likely to work based on prior experience or plausible argument. The biological inputs to the scup stock assessment are based on well-founded assumptions (e.g., for M, for discard mortality in the fisheries) and precisely estimated biological parameters (e.g., growth, age, maturity, and mean weights). Further, the research survey index CVs used in model calibration have been increased by 50-100% (depending on assessment model fit diagnostics) to account for process error.

A broad set of model configurations produced a range about +/-40% in the average estimate of terminal year SSB of about 180,000 mt (396 million lbs). The internal retrospective average error (for the terminal 7-years) of the assessment is low, at less than 10% for both SSB and F. The analytically derived CV for the 2014 SSB is 11%, the CV for the 2014 F is 15%, and the CV for the 2014 age 1 and older stock size total number is 15%. Given these properties of the 2015 scup stock assessment, it was concluded that an approximate doubling of the analytically derived 2016-2018 OFL CVs to 30% is a reasonable and sufficient adjustment to account for additional uncertainty in the assessment such as the magnitude of domed fishery selection, the magnitude of commercial fishery discards and recreational catch during the early part of the assessment model time series, and potential error in the aging process.

Supporting the notion that the harvest strategy is working long-term, the stock rebounded when commercial fishery quotas were implemented in 1997, and landings then ranged between 1,200 mt and 8,100 mt and averaged 4,000 mt during 1997-2014. Previously, commercial landings of scup had peaked in 1960 at 22,200 mt, then decreased during the 1960s and ranged between 5,000 and 10,000 mt until the late 1980s.

Monitoring is in place to determine whether the harvest strategy is working. Despite changes in model assumptions, configurations, and estimation procedures, the

'historical' retrospective analysis indicates that the general trends in stock biomass, recruitment, and fishing mortality have been consistent for the last decade. Estimates of SSB are in line with previous 2009-2012 projections, F is lower than from the 2011-2012 projections, and catch is lower than from the 2011-2012 projections, with the fishery in 2014 taking about 75% of the ACL.

There is a strong basis for confidence in the harvest strategy and it meets the 80 score.

1.2.1 Score for 2019: 80

MSC indicator 1.2.2 requires that there are well-defined and effective harvest control rules in place.

To meet the 80 scoring guidepost requires that well-defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. Selection of harvest control rules takes into account main uncertainties, and the available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.

To meet the 60 scoring guidepost requires there to be generally understood harvest control rules in place that are consistent with harvest strategy and which act to reduce the exploitation rate as limit reference points are approached, and some evidence that tools used to implement harvest control rules are effective in controlling exploitation.

As stated in 1.1.1, the existing reference points for scup are the 2008 DPSWG Peer Review Panel recommended F40% as the proxy for FMSY, and the corresponding SSBF40% as the proxy for SSBMSY. The F40% proxy for FMSY = 0.177, the proxy estimate for SSBMSY = SSB40% = 92,044 mt = 202.922 million lbs, and the proxy estimate for MSY = MSY40% = 16,161 mt = 35.629 million lbs (13,134 mt = 28.956 million lbs of landings and 3,027 mt = 6.673 million lbs of discards).

Reference points were calculated using the non-parametric yield and SSB per recruit/long-term projection approach adopted for summer flounder and the New England groundfish stocks. For the estimation of MSY (Maximum Sustainable Yield) and SSBMSY (Spawning Stock Biomass at Maximum Sustainable Yield), the cumulative distribution function of the 1984-2007 recruitments (corresponding to the period of available fishery catches at age) was re-sampled to provide future recruitment estimates (mean = 117 million age 0 fish) for biomass reference point estimation.

The current overfished and overfishing definitions are based on revisions to the FMP through Framework 7 (2007) and use the values established in Amendments 12 (1998) and 14 (2007) as follows: "The maximum fishing mortality threshold for each of the species under the FMP is defined as FMSY (the Fishing mortality producing Maximum Sustainable Yield or a reasonable proxy thereof) as a function of productive capacity, and based upon the best scientific information consistent with National Standards 1 and 2. Specifically, FMSY is the fishing mortality rate associated with MSY. The maximum fishing mortality threshold (FMSY) or a reasonable proxy may be defined as a function of

(but not limited to): total stock biomass, spawning stock biomass, total egg production, and may include males, females, both, or combinations and ratios thereof which provide the best measure of productive capacity for each of the species managed under the FMP. Exceeding the established fishing mortality threshold constitutes overfishing as defined by the Magnuson-Stevens Act (NEFSC 2018).

The biological inputs to the scup stock assessment are based on well-founded assumptions (e.g., for natural and discard mortality) and precisely estimated parameters (e.g., growth, age, maturity, and mean weights). Further, the research survey index CVs used in model calibration have been increased by 50-100% (depending on assessment model fit diagnostics) to account for process error. Twenty-five alternative configurations of the assessment base model were examined to evaluate robustness, including starting years, impact of NEFSC calibration factors, natural mortality, fishery selectivity, and time-varying survey catchability. This broad set of configurations produced a range about +/-40% in the estimate of terminal year SSB of about 180,000 mt (= 396 million lbs). The internal retrospective average error (for the terminal 7-years) of the assessment is low, at less than 10% for both SSB and F. The analytically derived CV for the 2014 SSB is 11%, the CV for the 2014 F is 15%, and the CV for the 2014 age 1 and older stock size total number is 15%. Given these properties of the 2015 scup stock assessment, it was concluded that an approximate doubling of the analytically derived 2016-2018 OFL CVs to 30% is a reasonable and sufficient adjustment to account for additional uncertainty in the assessment such as the magnitude of domed fishery selection, the magnitude of commercial fishery discards and recreational catch during the early part of the assessment model time series, and potential error in the aging process (NEFSC 2018).

Atlantic groundfish fisheries, including the New England scup fishery by otter trawl, are required to conform to commercial sector ACLs (comprised of both landings and discards) with accountability measures (AM). Basically, the industry is required to 'pay-back' any fish taken that exceed the ACLs, whether landings or discards. The fishery prepares alternatives that would result in indirect impacts by potentially modifying the magnitude of any paybacks and reductions to the established commercial quotas due to higher than anticipated discards. They do not result in any direct impacts like changes in commercial fishing effort.

The consequences for vessel owners for overages are defined in Amendment 16 Final Rule (2010) in May 2010. Its implementation has included a broad range of measures designed to achieve mortality targets for species managed by the NE Multispecies FMP, make substantial changes to sector management, and implement Magnuson-Stevens Fishery Conservation and Management Act (MSA) requirements regarding the establishment of ACLs and AMs. All fishing vessels for scup are subject to accountability measures that are implemented to prevent ACLs from being exceeded. In 2018, Framework 13 - Commercial Accountability Measures Framework modified the accountability measures required for overages not caused by directed landings (i.e., discards) in the summer flounder, scup, and black sea bass fisheries. Final Rule.

The fishery's harvest control rules (HCRs) take into account a wide range of uncertainties including the ecological role of the stock and there is evidence they are robust to uncertainties. Evidence clearly shows that tools in use have rebuilt the stock and are keeping it fluctuating well above the reference points and MSY all of the time.

The scup fishery meets the 100 guidepost in 2019.

1.2.2 Score for 2019: 100

MSC Indicator 1.2.3 requires that the information needed for the harvest strategy is being collected.

To meet the 80 scoring guidepost requires that relevant information is available related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy. Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule one or more indicators available and monitored with sufficient frequency to support the harvest control rule. There is good information on all other fishery removals from the stock.

To meet the 60 scoring guideposts requires that some relevant information is available related to stock structure, stock productivity, and fleet composition to support the harvest strategy. Also, that stock abundance and fishery removals are monitored at least one indicator available and monitored with sufficient frequency to support the harvest control rule.

The scup fishery catch is modeled as four fleets: commercial landings, recreational landings, commercial discards and recreational discards (NOAA 2017, 60th SAW Assessment Report). The assessment model for scup changed in 2008 from a simple index-based model to a complex statistical catch at age model. The most recent benchmark peer review of the scup assessment was conducted by the 2008 Northeast Data Poor Stocks Working Group (DPSWG).

Fishery removals are monitored by the Northeast Fisheries Science Center (NEFSC). Both the NEFSC spring and fall indices indicate an increasing trend in scup abundance since the late 1990s. Scup survey catches are also conducted by coastal State institutes in the region from Rhode Island, Connecticut, Massachusetts, New York, New Jersey and Virginia.

Compiling the results reveals variable and complex temporal and spatial properties of scup in survey catches. Examination of patterns in the survey catch, for spring and fall and day and night, confirms the irregular distributions of catch by temperature, salinity and depth and portend the difficulties of modeling the scup survey catch data. No well-defined relationships are evident; i.e., small catches are as likely to be taken at shallow depths as large depths and at both warm and cold temperatures and large catches can occur over a relatively large range of depth and temperature.

There is good information on fishery removals to support the harvest design strategy and the fishery meets the 80 scorepost.

The scup fishery meets the 80 guidepost in 2019.

1.2.3 2019 score: 80

MSC Indicator 1.2.4 requires there to be adequate assessment of the target stocks.

To meet the 80 scoring guideposts requires that the assessment is appropriate for the stock and for the harvest control rule. The assessment should evaluate stock status relative to reference points. It takes account of uncertainty and is checked with peer review.

To meet the 60 scoring guideposts requires there to be a stock assessment that is relative to reference points, with major sources of uncertainty identified.

The scup fishery is managed with a Fishery Management Plan that meets the Magnuson Stevens Act reauthorization and

The minimum stock size threshold for each of the species under the FMP is defined as one-half BMSY (or a reasonable proxy thereof) as a function of productive capacity, and based upon the best scientific information consistent with National Standards 1 and 2. The minimum stock size threshold (one-half BMSY) or a reasonable proxy may be defined as a function of (but not limited to): total stock biomass, spawning stock biomass, total egg production, and may include males, females, both, or combinations and ratios thereof which provide the best measure of productive capacity for each of the species managed under the FMP.

The minimum stock size threshold is the level of productive capacity associated with the relevant one-half MSY level. Should the measure of productive capacity for the stock or stock complex fall below this minimum threshold, the stock or stock complex is considered overfished. The target for rebuilding is specified as BMSY (or reasonable proxy thereof) at the level of productive capacity associated with the relevant MSY level, under a definition of productive capacity specified for the minimum stock size threshold.

The SARC recommended F40% as the proxy for FMSY, and the corresponding SSBF40% as the proxy for the SSBMSY biomass target. The F40% proxy for FMSY = 0.220; the proxy estimate for SSBMSY = SSB40% = 87,302 mt = 192.468 million lbs; the proxy estimate for the ½ SSBMSY biomass threshold = ½ SSB40% = 43,651 mt = 96.234 million lbs; and the proxy estimate for MSY = MSY40% = 11,752 mt = 25.909 million lbs (9,445 mt = 20.823 million lbs of landings and 2,307 mt = 5.086 million lbs of discards) (NOAA 2017, 60th SAW Assessment Report)..

The scup fishery meets the 80 guidepost.

1.2.4 2019 score: 80

MSC Principle 2: Maintenance of Ecosystem Integrity

The MSC standard uses a number of terms to describe the animals in the fish catch that are not the primary target of commercial fishing. Under the CR v.2.0 (MSC 2014),

- **Primary species** are defined as those species that are in scope but not target (Principle 1) species "where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit or target reference points".
- **Secondary species** are then defined by the MSC as fish/shellfish species that do not meet the definition of primary species, or species that are out of scope of the program but where the definition of endangered, threatened or protected (ETP) species is not applicable (MSC 2014).
- For primary and secondary species, a **main** designation is then given where either i) "the catch of a species by the Unit of Assessment (UoA) comprises 5% or more by weight of the total catch of all species by the UoA", ii) "the species is classified as 'less resilient' and the catch of the species by the UoA comprises 2% or more by weight of the total catch of all species by the UoA", or iii) in cases where a species does not meet the 2% or 5% designated weight thresholds, a species is main if the total catch of the UoA is exceptionally large, such that even small catch proportions of a P2 species significantly impact the affected stocks/populations.
- The other species in the catch are therefore **minor**.

Non-target species comprise a relatively small portion of the overall catch in the commercial scup trawl fishery. The otter trawl fishery for scup in New England is highly selective. The species that dominates scup bycatch in the scup fishery is scup. According to fishery representatives there is no other primary main species in the catch in this fishery. This is supported by an intensive literature review of catch data, scientific findings and the biological opinion for the fishery. All non-target species identified in the scup fishery, except northern and striped sea robins, are managed by the Mid-Atlantic or New England Fishery Management Councils and/or the ASMFC.

Bycatch in the fishery is very low and catches do not include primary species at this time. In future, bycatch could presumably include new primary species and they will be detected because catch rates including discards are carefully monitored.

Spiny dogfish appear in about 5-12% of the catch. Spiny dogfish is landed rarely when the price is high but otherwise discarded. For purposes of assessment, spiny dogfish is a secondary main species. Black sea bass (*Centropristis striata)* appear in 0-3% of the catch and are a secondary main species for purposes of assessment.

The species found in the catch that account for less than 2% by weight are Northern sea robin (*Prionotis carolinus*), Striped sea robin (*Prionotis evolans*), Summer flounder (*Paralichthys dentatus)*, and Little skate (*Leucoraja erinacea*). In the scup fishery these species are largely not retained but discards are accounted for in the observer program and ACLs/AM process.

The species that are "less resilient" were identified in the current biological opinion. Loggerhead turtles and Atlantic sturgeon are species that are less resilient that could

have consequential interactions with the fishery, according to the latest Biological Opinion for the fishery (2013). No sturgeon interactions are documented in the scup fishery, but Atlantic sturgeon is very vulnerable to fishing and the effects of urban development. The fishery is subject to total incidental take of both species that has been set for the region as a whole and all fisheries operating within it. Sturgeon takes in the scup fishery are rare to none therefore the species are secondary and minor, but also endangered, threatened or protected species therefore assessed under principle 2.3.

Species	Primary or Secondary, Major or minor	Catch
Spiny dogfish	Secondary main	5-12%
Black sea bass	Secondary main	0-3%
Striped sea robin	Secondary minor	0-2%
Northern sea robin	Secondary minor	0-2%
Little skate	Secondary minor	0-2%
Summer flounder	Secondary minor	0-2%
Atlantic sturgeon	Endangered, Threatened or Protected	0%
Loggerhead sea turtle	Endangered, Threatened or Protected	0% with rare entanglement

MSC Indicator 2.1.1 requires that the fishery not pose serious harm to the primary species retained by the fishery nor, where applicable, hinder recovery of depleted retained species.

To score 80 on the guideposts requires that the main retained species highly likely to be within biologically based limits. If outside the limits, there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.

To score 60 on the guideposts requires that the main retained species are likely to be within biologically based limits. If outside the limits, there is a partial strategy in place designed to ensure that the fishery does not hinder recovery and rebuilding of the depleted species. If status is poorly known, there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.

Concerning minor species in assessment, the minor species is scored at 100 if highly likely to be above the PRI or, if below, there is evidence the fishing in scope does not hinder its recovery or rebuilding.

Bycatch in the fishery is very low and catches do not include other primary species at this time. This is because rebuilding the scup stock involved a number of measures to reduce scup bycatch and discards. The fishery removed a minimum size restriction, for example, to eliminate the discard of undersized fish that were close to the minimum size previously established in the fishery. A 2004 scup bycatch study by Rutgers University

(Bochevek 2004) had found high discard rates of juvenile and undersized scup. That study utilized data from the NOAA scup net testing study. It had found high discards in directed scup tows regardless of cod-end mesh. The median length of scup discards was about 19.83 cm TL and the legal size for scup had been 22.86. The commercial fishery took up the recommendation to eliminate the size restriction to greatly reduce discard mortality in the directed scup fishery.

For the purposes of this assessment, juvenile or undersized scup would be included as a primary main species under Principle 2 but the discard component of the scup catch is factored into the harvest strategy and calculations for the status of the target stock. As a result, the entire scup catch including discards were assessed in Principle 1.

In future, bycatch could presumably include new primary species managed with reference points. If so, they will be detected because catch rates of all non-target species are monitored and major ones (>1%) including discards are considered annually in management.

The fishery scores 100 because the main retained species are within biologically based limits with a high degree of certainty (and there are no minor primary species in the fishery).

2.1.1 2019 score: 100

MSC Indicator 2.1.2 requires that the fishery must avoid harm to populations by managing the retained species to remain at levels within biological limits.

To score 80 on the scoring guideposts requires that a partial strategy be in place that is expected to maintain main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. There must be some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. Some evidence that the partial strategy is being implemented successfully.

To score 60 on the scoring guideposts requires that measures are in place that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. Also, that measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).

Atlantic groundfish fisheries, including the New England scup fishery by otter trawl, are required to conform to commercial sector ACLs (comprised of both landings and discards) with AMs. Basically, the industry is required to ‘pay-back’ any fish taken that exceed the ACLs, whether landings or discards. The fishery prepares alternatives that would result in indirect impacts by potentially modifying the magnitude of any paybacks and reductions to the established commercial quotas due to higher than anticipated discards. They do not result in any direct impacts like changes in commercial fishing effort.

The fishery scores 100 because the fishery includes a strategy for managing the main retained species within biologically based limits with a high degree of certainty and it is supported with testing and generates evidence it works (MAFMC 2018).

2.1.2 2019 Score: 100

MSC Indicator 2.1.3 requires that sufficient information is collected to help the fishery to understand its impacts on retained species and the effectiveness of its management strategy for species kept by the fishery after capture.

To score 80 on the scoring guideposts requires that qualitative information and some quantitative information are available to describe the amount of main retained species taken by the fishery. Information is sufficient to estimate outcome status with respect to biologically based limits. Information is adequate to support partial strategy to manage main retained species. Sufficient data will continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).

To score 60 on the scoring guideposts requires that qualitative information is available on the amount of main retained species taken by the fishery. The information is adequate to qualitatively assess outcome status with respect to biologically based limits. The information is adequate to support measures to manage main retained species.

For the purposes of this assessment, scup is the target and primary species. There is adequate and quantitative information and monitoring to support all primary species (here scup, see Principle 1.3). The fishery's information regime for scup meets the 80 guidepost for information and monitoring.

2.1.3 2019 score: 80

MSC Indicator 2.2.1 requires that the fishery does not pose a risk of serious or irreversible harm to the main secondary retained species, and where a species caught in the fishery bycatch is already depleted, that it does not hinder its recovery.

To score 80 on the scoring guideposts requires that the main secondary species are highly likely to be within biologically based limits. If outside such limits, a partial strategy of demonstrably effective mitigation measures must be in place such that the fishery does not hinder recovery and rebuilding.

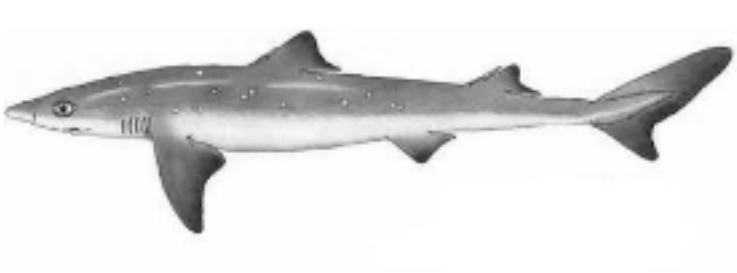
To score 60 on the scoring guideposts requires that the main secondary species are likely to be within biologically based limits. If outside such limits, mitigation measures must be in place to ensure that the fishery does not hinder recovery and rebuilding. If status is poorly known, measures or practices must be in place in the fishery to show it is not causing bycatch species to be fished above biologically based limits or in a manner that is hindering recovery.

Spiny dogfish is present in about 5-12% of the catch. It is landed rarely when the price is high but otherwise discarded. Spiny dogfish is highly likely to be above biologically based limits. The status of the stock is Not Overfished and overfishing is not occurring.

The updated estimate of SSB for 2018 is 106,753 MT(235Mlb), about 33% below the target of 159,288 mt (SSBmax). For 2019 the SSC calculated the overfishing level point estimate would be 47.5 million pounds(21,549 mt). For the most recent full year of catch data (2017), the estimated F was .202 so confirmed that overfishing is not occurring.

In 2018, the NEFSC updated their assessment of the spiny dogfish stock using updated catch and survey data. The Bmsy reference point defines when the stock is rebuilt (above Bmsy) and overfished (below ½ Bmsy). For spiny dogfish, Bmsy (proxy) is the spawning stock biomass that maximizes recruitment (SSBmax) in a Ricker type (dome-shaped) stock-recruitment model(Rago and Sosebee 2010). SSBmax is estimated to be 159,288 mt (351 million pounds (Mlb)) with ½ of that target corresponding to the biomass threshold (79,644 mt; 176Mlb).

The spawning stock biomass is below the target but growing. The tolerated risks of overfishing in each year are relatively low: 26.9%, 27.4%, and 29.6% for 2019, 2020, and 2021. The tolerated risk of overfishing and acceptable biological catch (ABC) increase each year because the stock size is growing. Since there have been no recent quota overages there is no deduction for management uncertainty. The stock should increase for the next 4-6 years until approaching the target biomass and then should remain near the target biomass.



The Specifications and Management Measures For Spiny Dogfish (2019-2021) includes a draft Environmental Assessment (EA).

It is prepared by the Mid-Atlantic Fishery Management Council (MAFMC) in collaboration with the National Marine Fisheries Service (NMFS). Published in late March 2019, its purpose is to support the adoption of fishery specifications based on updated stock information that will avoid overfishing and achieve optimum yield. In other words, its purpose is to inform the dedicated dogfish fishery. It is helpful for learning about dogfish status and biological characteristics and interaction effects. However, the management specifications and EA do not govern the scup fishery, at least not directly, and rather provide a window to its stock and management status.

The most recent benchmark stock assessment for Black sea bass was completed in December 2016. This assessment indicated that the black sea bass stock north of Cape Hatteras, NC was not overfished and overfishing was not occurring in 2015. A data update (i.e. updated catch, landings, and survey indices through 2016) was conducted in 2017 and indicates that black sea bass biomass continues to be high, and the 2015 year class appears to be above average.

Centropristis striata

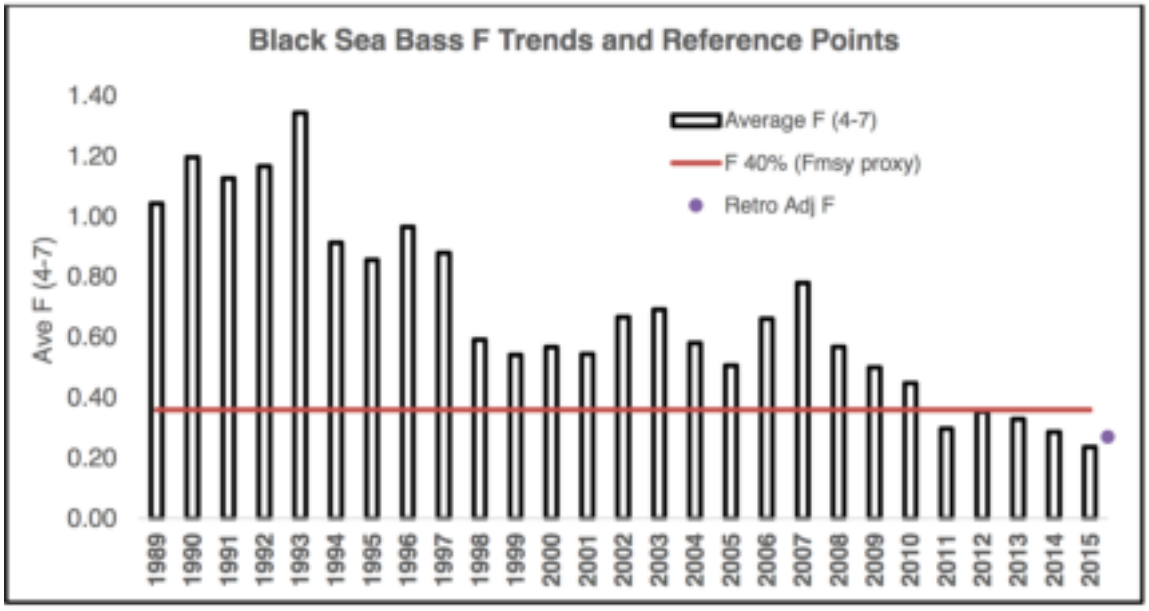


Figure 5: Fishing mortality rate on black sea bass ages 4-7 and the $F_{MSY\ PROXY}$ reference point
Source: MAFMC 2018

As main secondary species, spiny dogfish and black sea bass are highly likely to be above biologically based limits.

Prionotus evolans

Prionotus carolinus

Northern sea robin and Striped sea robin are listed as Least Concern species by the International Union for the Conservation of Nature. “There are no known major threats. This species could be susceptible to localized exploitation, however, there are no reports of population declines or status.” The species are also green on FishBase. The species are highly likely to be above biologically based limits.

The management unit for summer flounder (*Paralichthys dentatus*) consists of the U.S. waters in the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border. The most recent stock assessment for summer

flounder was completed in July 2016 (Terceiro 2016). This update indicated that the summer flounder stock was not overfished, but overfishing was occurring in 2015 relative to the biological reference points from the 2013 benchmark assessment. A data update completed in 2017 with catch, landings and survey indices data through 2016 indicates that there is little likelihood that a substantial change in stock status occurred since the 2016 assessment update (Terceiro 2017a). The species is being managed to restore the Spawning Stock Biomass in an established process for specifying initial annual commercial summer flounder catches. Catch limits are strictly set to maintain a healthy stock in the ACL/AM process.

Skates are currently managed under the New England Fishery Management Council's Skate Fishery Management Plan implemented in 2003. The stock status for each skate species relies entirely on the annual NMFS trawl survey and the fishing mortality reference points are based on changes in survey biomass indices. According to the latest survey index information available (NEFMC 2018), none of these four species is overfished and overfishing is not occurring.

The fishery scores 80 on this guidepost.

2.2.1 2019 score: 80

MSC Indicator 2.2.2 requires that there is a strategy in place for managing secondary species to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.

To score 80 on the scoring guideposts requires that there be a partial strategy in place, if necessary, for managing secondary retained species. It should maintain main bycatch species at levels highly likely to be within biologically based limits and, where a bycatch species is depleted, ensure that the fishery does not hinder their recovery. There must be some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. There must be some evidence that the partial strategy is being implemented successfully.

To score 60 on the scoring guideposts requires that measures are in place to maintain main secondary species at levels highly likely to be within biologically based limits, or for a depleted bycatch species, measures are in place that ensure the fishery does not hinder its recovery. The measures should be considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).

All non-target species identified in the scup fishery, except northern and striped sea robins, are managed by the Mid-Atlantic or New England Fishery Management Councils and/or the ASMFC.

Management measures for the Mid-Atlantic and New England Fishery Management Council managed species include accountability measures (AMs) which address overages in annual catch limits (ACLs) through reductions in landings limits in following years. AMs for all these species take discards into account. These measures help to

mitigate negative impacts from discards in the commercial fishery. The calculations include spiny dogfish, black sea bass, sea robins multispecies and the other bycatch or discard species caught in the fishery. Basically, the industry is required to 'pay-back' any fish taken that exceed the ACLs, whether landings or discards. Part of the management process involves the preparation of alternative scenarios for indirect impacts based on modifying the magnitude of any paybacks and reductions to the established commercial quotas due to higher than anticipated discards.

Spiny dogfish is jointly managed by the MAFMC and the NEFMC; the Commission also has a complementary FMP for state waters. In the scup fishery, the catch of dogfish, and discards of dogfish, are governed by limits that are calculated for the dogfish stock for the region, including an exploitable biomass and a total female spawning stock biomass.

These findings are utilized in the assessment and prediction reports for the stock and these are utilized in management in fisheries in the region with an incidental catch of dogfish, including the scup fishery.

Table 8b. Summary of mean swept area biomass estimates (mt) based on stochastic population estimator, 2017-2018, omitting 2017 from the three-year average. Exploitable biomasses are based on year-specific selectivity functions based on 3 year moving averages. Female spawning stock biomass is based on sum of female spiny dogfish above 80 cm TL. The target spawning stock biomass is 30,343 kg/tow or 159,288 mt (using the 0.0119 nm^2 trawl footprint). The threshold spawning stock biomass is 79,644 mt. An alternative estimate for 2018 is also provided using the Kalman smoother with and without 2017.

Terminal Year	Mid Year	Total Exploitable Biomass	Exploitable Female Biomass	Exploitable Male Biomass	Tot Biomass	Female Spawning Stock Biomass
2017	2016	480,650	87,697	392,453	641,132	160,351
2018	2017	495,102	86,134	408,468	692,428	146,738
2018Kalman with 2017	2017	319,082	46,764	271,817	439,236	77,220
2018 Kalman without 2017	2017	610,671	106,362	503,809	854,068	181,115

This satisfies the requirement for a partial strategy to maintain or not hinder rebuilding of the dogfish stock. The stock is rebuilding and is not overfished neither is there overfishing occurring on it (see 2.2.1). The monitoring, modelling, EA, and new management specifications (including a draft EA) provide an objective basis for confidence.

Black sea bass and summer flounder are managed with quotas like scup (NOAA 2018) in addition to ACLs and AMs, and backed by an FMP, scientific stock assessment, and excellent data from logbooks, fishery observers, and NEFSC spring and fall trawls.

Skates are currently managed under the New England Fishery Management Council's Skate Fishery Management Plan implemented in 2003. This plan includes mandatory reporting by species, possession prohibitions on barndoor, thorny, and smooth skates, trip limits for winter skate, and Annual Catch Limits (ACL) for the wing and bait fisheries. The stock status relies for each skate species entirely on the annual NMFS trawl survey and the fishing mortality reference points are based on changes in survey biomass indices. According to the latest survey index information available (NEFMC 2018), none of these four species is overfished and overfishing is not occurring.

Sea robins (multispecies) are not managed directly at the federal or state level. Science on sea robins has focused on their impacts as predator species on other commercial species. Field and laboratory observations indicate that striped sea robins consume large numbers of winter flounder in vulnerable size classes (15–70 mm TL) in habitats where the two species co-occur.

The fishery scores 80 on this guidepost.

2.2.2 Score for 2019: 80

MSC Indicator 2.2.3 requires that information is available on the nature and amount of bycatch. The information must be adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.

To score 80 on the scoring guideposts requires that qualitative information and some quantitative information are available on the amount of main bycatch species affected by the fishery. Information is sufficient to estimate outcome status with respect to biologically based limits. Information is adequate to support a partial strategy to manage main bycatch species. Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).

To score 60 on the scoring guideposts requires that qualitative information is available on the amount of the main bycatch species affected by the fishery. Information must be adequate to broadly understand the outcome status of bycatch species with respect to biologically based limits. Information should be adequate to support measures to manage bycatch.

Data from the Northeast Fisheries Observer Program (NEFOP) are used to identify all species caught incidentally >1% on commercial trawl trips in the scup fishery and to enumerate all discards by gear type and commercial fishery. Total landings and discards by sex and length are also monitored across the region in NEFSC bottom trawl surveys (1968-2018) and data are utilized to detect increases in risk to non-target species (MAFMC 2018).

Catches of all secondary species, including discards, are accounted for in a strategy to manage bycatch and discards in fishery ACLs and accountability measures (AMs). Management measures for the Mid-Atlantic and New England Fishery Management Council managed species include accountability measures (AMs) which address overages in annual catch limits (ACLs) through reductions in landings limits in following years. AMs for all these species take discards into account. These measures help to mitigate negative impacts from discards in the commercial fishery. The calculations include all non-target species caught as bycatch and retained or discarded. The management process involves the preparation of alternative scenarios for indirect impacts based on modifying the magnitude of any paybacks and reductions to the established commercial quotas due to higher than anticipated discards. Basically, the industry is required to 'pay-back' any fish taken that exceed the ACLs, whether landings or discards.

This annual process utilizes logbook data supplemented by observer data and NEFSC trawl data) to manage the status of all secondary species; for example, for skate. This satisfies the MSC requirement for some quantitative information adequate to estimate the fishery's impact on main and minor secondary species.

For main secondary species, quantitative information is also adequate to assess the impact of the scup fishery with a high degree of certainty (MAFMC 2018). For example for spiny dogfish, data are applied to a model to generate an exploitable biomass and a total female spawning stock biomass. The dogfish catch and discards contribution from commercial scup fishing are factored into the Specifications and Management Measures For Spiny Dogfish (2019-2021). The scup fishery is required to adhere to any limits applied to dogfish catches and discards that may be published for the coming fishing season (2019) and in the future. It is an integrated system.

For black sea bass, the 2016 benchmark stock assessment working group (NEFSC 2017) spent a great deal of time analyzing and simulating various datasets to gain a better understanding on how life history characteristics impact the assessment and the black sea bass population (MAFMC 2018). They utilized age data from the NEFSC winter and spring trawl survey to determine sex ratios within the north Atlantic black sea bass stock (Cape Hatteras, NC to Canada). A simulation model was also developed (Blaylock and Shepherd 2016) that evaluated black sea bass vulnerability to fisheries exploitation given its unique life history characteristics. Results from this analysis highlight the importance of secondary males, and therefore less reliance on dominant males, in the spawning success of black sea bass.

The fishery scores 100 on this guidepost.

2.2.3 Score for 2019: 100

MSC Indicator 2.3.1 requires that the fishery meets national and international requirements for protection of endangered, threatened and protected species (called ETP species in the MSC program). It must be shown that the fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of any ETP species that are depleted.

To score 80 on the scoring guideposts requires that the main impacts of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species. The known impacts are highly unlikely to create unacceptable impacts to ETP species. Indirect effects are also considered and thought to be unlikely to create unacceptable impacts.

To score 60 on the scoring guideposts requires that any known effects of the fishery on ETP species are likely to be within limits of national and international requirements for the protection of ETP species, and are unlikely to create unacceptable impacts to ETP species.

For purposes of this assessment, loggerhead turtles and Atlantic sturgeon are species that are less resilient that could have consequential interactions with the scup otter trawl fishery, according to the latest Biological Opinion for the fishery (2013).

The scup fishery is batched with six other New England fisheries in the process of making a biological opinion about its impacts on marine species. According to the latest

Biological Opinion for the fishery (2013), the direct and indirect effects of the seven fisheries on ESA listed species in the action area have been summarized as impacts resulting from: (1) entanglement, capture, or hooking of these species in fishing gear, (2) the operation of vessels in the fisheries, and (3) changes to these species' habitats and prey as a result of bottom trawl and gillnet gear used in the fisheries.

No sturgeon interactions are documented in the scup fishery, but Atlantic sturgeon is very vulnerable to fishing and the effects of urban development. The fishery is subject to total incidental take of both species that has been set for the region as a whole and all fisheries operating within it.

Loggerhead sea turtles are also known to interact with non-shrimp trawl, gillnet, longline, dredge, pound net, pot/trap, and hook and line fisheries. The reduction of sea turtle captures in fishing operations is identified in recovery plans and five-year status reviews as a priority for the recovery of all sea turtle species. According to the latest Biological Opinion for the fishery (2013), the status of NWA DPS of loggerheads over the next ten years will be no worse than it is currently. Recent actions have taken significant steps towards reducing the recurring sources of mortality and improving the status of all nesting stocks. For example, TED, chain mat, and TDD regulations represent a significant improvement in the baseline effects of trawl and dredge fisheries on loggerheads in the Northwest Atlantic.

Of the other Atlantic sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear, particularly trap/pot gear. There have been no observations of interactions with leatherback turtles in the scup otter trawl fishery.

According to the Biological Opinion, the status of Kemp's Ridley and green sea turtles over the next ten years will be no worse than it is currently and that the species may actually be in the early stages of recovery.

Atlantic sturgeon were listed 'endangered' on April 6, 2012 in the Federal Register for New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs and as "threatened" for the Gulf of Maine DPS (77 FR 5880 and 77 FR 5914). The spawning areas in most U.S. rivers have not been well defined, but the habitat characteristics of spawning areas have been identified based on historical accounts of where fisheries occurred, tracking and tagging studies of spawning sturgeon, and physiological needs of early life stages.

Sturgeon interact with a number of fisheries. Atlantic sturgeon are particularly sensitive to bycatch mortality because they are a long-lived species, have an older age at maturity, have lower maximum fecundity values, and a large percentage of egg production occurs later in life. Based on these life history traits, Boreman (1997) calculated that Atlantic sturgeon can only withstand the annual loss of up to 5% of their population to bycatch mortality without suffering population declines.

The NEFSC prepared an estimate of the number of encounters of Atlantic sturgeon in fisheries authorized by Northeast FMPs. The estimates from 2006 through 2010 averaged 1,569 encounters per year in observed trawl fisheries. Mortality rates in otter trawl gear were generally low at approximately 5%.

According to the latest Biological Opinion for the fishery (2013), there is a lack of any evidence that fishing practices affect habitats in degrees that harm or harass ESA-listed species, we find that while continued fishing efforts may potentially alter benthic habitats, these alterations will be insignificant to ESA-listed species.

It is the conclusion of the current biological opinion that the continued operation of the seven fisheries under their respective FMPs over the next ten years may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right whales, humpback whales, fin whales, and sei whales, or loggerhead (specifically, the NWA DPS), leatherback, Kemp's Ridley, and green sea turtles, any of the five DPSs of Atlantic sturgeon, or GOM DPS Atlantic salmon. It is also the biological opinion that it is not likely to adversely affect hawksbill sea turtles, shortnose sturgeon, smalltooth sawfish DPS, Acroporid corals, Johnson's seagrass, sperm whales, blue whales, designated critical habitat for right whales in the Northwest Atlantic, or designated critical habitat for GOM DPS Atlantic salmon.

The impacts of the scup fishery for loggerhead turtles are adequately known from observed trips. They were determined in the biological opinion to be highly likely to be within limits and not to hinder recovery.

The impacts of the scup fishery for sturgeon are potential only, because no catches or interactions have been recorded. They were determined to be highly likely to be within limits in the latest biological opinion and highly likely not to hinder recovery.

2.3.1 2019 score: 80

MSC Indicator 2.3.2 requires that the fishery has in place precautionary management strategies designed to: (1) meet national and international requirements, (2) ensure the fishery does not pose a risk of serious or irreversible harm to endangered, threatened or protected (ETP) species, (3) ensure the fishery does not hinder recovery of ETP species, and (4) minimize mortality of, or injuries to, ETP species.

To score 80 on the scoring guideposts requires that there be a strategy in place for managing the fishery's impact on ETP species, including measures to minimize mortality and designed to achieve the ETP Outcome PI 80 level of performance or above. There must be an objective basis for confidence that the strategy will work, based on some information directly about the fishery and/or the species involved. There must be evidence that the strategy is being implemented successfully.

To score 60 on the scoring guideposts requires that measures be in place that minimize mortality and injury, and are generally expected to achieve the ETP Outcome PI 80 level of performance or above. The measures must be considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).

U.S. fisheries, including the New England scup fishery by otter trawl, are required to conform to take limits of endangered, threatened or protected species that are based on

biological opinions by the federal government. The take limits in the Biological Opinion for the fishery (2013) include zero take or prohibitions.

Prohibitions against incidental take are currently in effect for all four species of sea turtles, endangered whales, the GOM DPS of Atlantic salmon, and all DPSs of Atlantic sturgeon that are listed as endangered, according to the latest biological opinion. There are currently no ESA-prohibitions for the GOM DPS of Atlantic sturgeon that is listed as threatened.

Fisheries are also required to conform to prudent and reasonable measures taken by fishery regulators. They include requirements for handling the animals in a way as to minimize stress to the animal and increase its survival rate, and for complying with gear modifications and fishing location to minimize interactions and investigations into incidents.

For the seven groundfish fisheries batched in the latest Biological Opinion combined, the annual take anticipated for loggerhead sea turtles from groundfish trawl fisheries is up to 213 individuals, of which up to 71 per year may be lethal.

For Atlantic sturgeon, the annual take is estimated at up to 175 individuals of which up to 6 adult equivalents per year may be lethal.

After reviewing the current status of the species, the environmental baseline, climate change, cumulative effects in the action area, and the effects of the continued operation of the seven fisheries under their respective FMPs over the next ten years, the latest Biological Opinion for the fishery (2013), is that the proposed action may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right whales, humpback whales, fin whales, and sei whales, or loggerhead (specifically, the NWA DPS), leatherback, Kemp's Ridley, and green sea turtles, any of the five DPSs of Atlantic sturgeon, or GOM DPS Atlantic salmon. It is also our biological opinion that the proposed action is not likely to adversely affect hawksbill sea turtles, shortnose sturgeon, smalltooth sawfish DPS, Acroporid corals, Johnson's seagrass, sperm whales, blue whales, designated critical habitat for right whales in the Northwest Atlantic, or designated critical habitat for GOM DPS Atlantic salmon.

2.3.2 2019 score: 80

MSC Indicator 2.3.3 requires that relevant information is collected to support the management of fishery impacts on ETP species, including (1) information for the development of the management strategy, (2) information to assess the effectiveness of the management strategy, and (3) information to determine the outcome status of ETP species.

To score 80 on the scoring guideposts requires that information be sufficient to determine whether the fishery may be a threat to recovery of the ETP species and if so, to measure trends and support a full strategy to manage impacts. Sufficient data must be available to allow mortality rate, injuries and the impact of fishing to be quantitatively estimated for ETP species.

To score 60 on the scoring guideposts requires that information is adequate to broadly understand the impact of the fishery on ETP species, that information is adequate to support measures to manage the impacts on ETP species, and information is sufficient to qualitatively estimate fishery – related mortality of ETP species.

The information needed to support ETP catches in the fishery is available in the federal biological opinion, which is a review of the current status of the species, the environmental baseline, climate change, cumulative effects in the action area, and the effects of the continued operation of the fishery under their respective FMPs over the next ten years. The scup fishery is part of a batch of seven groundfish fisheries served by the latest Biological Opinion for the fishery (2013).

According to the Biological Opinion, the annual take anticipated for loggerhead sea turtles from groundfish trawl fisheries is up to 213 individuals, of which up to 71 per year may be lethal. For Atlantic sturgeon, the annual take is estimated at up to 175 individuals of which up to 6 adult equivalents per year may be lethal.

Takes of both species are prohibited in the scup fishery on this basis.

Quantitative information is available to assess the fishery's impacts with a high degree of certainty, and to support a comprehensive strategy minimizing fishing mortality and injury to ETP species.

For 2013-2023, the Biological Opinion for the fishery (2013) established the basis for a federal decision to authorize the fishery based on the opinion that it is not likely to jeopardize, the continued existence of North Atlantic right whales, humpback whales, fin whales, and sei whales, or loggerhead (specifically, the NWA DPS), leatherback, Kemp's Ridley, and green sea turtles, any of the five DPSs of Atlantic sturgeon, or GOM DPS Atlantic salmon. It is not likely to adversely affect hawksbill sea turtles, shortnose sturgeon, smalltooth sawfish DPS, Acroporid corals, Johnson's seagrass, sperm whales, blue whales, designated critical habitat for right whales in the Northwest Atlantic, or designated critical habitat for GOM DPS Atlantic salmon. The biological opinion also provides a strategy for fishery regulators and vessel owners to follow to minimize the mortality and injury of ETP species.

The scup fishery meets the 100 scoring guidepost.

2.3.3 2019 score: 100

MSC Indicator 2.4.1 requires that the fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function, in relation to ecosystem services.

To score 80 on the scoring guideposts requires that the fishery is highly unlikely to reduce habitat structure and function to point where there would be serious or irreversible harm.

To score 60 on the scoring guideposts requires that the fishery is unlikely to reduce habitat structure & function to point where there would be serious or irreversible harm.

Bottom habitat in the action area may be adversely affected by the otter trawl gear used in the scup fishery. A panel of experts has previously concluded that the effects of even lightweight otter trawl gear would include: (1) scraping or plowing of the doors on the bottom, sometimes creating furrows along their path; (2) sediment suspension resulting from the turbulence caused by the doors and the ground gear on the bottom; (3) removal or damage to benthic or demersal species; and (4) removal or damage to structure forming biota. The panel also concluded that the greatest impacts from otter trawls occur in high and low energy gravel habitats and in hard clay outcroppings, and that sand habitats were the least likely to be impacted (Northeast Region Essential Fish Habitat Steering Committee 2002).

However, the commercial scup fishery operates in areas that have been fished for many years and any possible changes in fishing effort associated with any alternative are unlikely to further degrade habitat beyond its current state. The fishery is highly unlikely to reduce structure and function of the habitats with serious or irreversible harm.

Habitat impacts from the scup fishery are intensively monitored for all primary, secondary and ETP species. Habitat characteristics, impacts from, and status in the scup fishery are described in pages 40 – 50 in the 2018 Summer Flounder, Scup and Black Sea Bass Commercial Accountability Measure Framework Adjustment (Framework Adjustment 13) (MAFMC 2018). These include designations of Essential Fish Habitat (EFH).

The current evidence suggests that the scup fishery is unlikely to reduce structure and function including to the foraging habitats. Otter trawl fishing off the coast of New England does not likely impact the foraging habits of the protected species on the current list with the exception of the possibility of Atlantic sturgeon. Because Atlantic sturgeon spawn in rivers, the gear deployed by the seven fisheries under discussion are not expected to have any effect on sturgeon spawning activity or on early life stages (Biological Opinion for the fishery (2013); page 149).

The fishery meets the 80 scoring guidepost.

2.4.1 2019 score: 80

MSC Indicator 2.4.2 requires there to be a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.

To score 80 on the scoring guideposts requires there to be a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above. There must be some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved. There must be some evidence that the partial strategy is being implemented successfully.

To score 60 on the scoring guideposts requires there to be measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance. The measures must be considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).

Essential Fish Habitat (EFH) for the commercial scup fishery is described in the 2018 Summer Flounder, Scup and Black Sea Bass Commercial Accountability Measure Framework Adjustment (Framework Adjustment 13) (MAFMC 2018). The Magnuson Stevens Act defines Essential Fish Habitat as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (MSA section 3). The MSA requires that Councils describe and identify EFH for managed species and "minimize to the extent practicable adverse effects on such habitat caused by fishing and identify other actions to encourage the conservation and enhancement of such habitat" (MSA section 303 (a)(7)).The broad definition of EFH has led the Mid-Atlantic and the New England Fishery Management Councils to identify EFH throughout most of the Northeast U.S. Shelf Ecosystem, ranging from areas out to the shelf break to wetlands, streams, and rivers.

Not surprisingly, habitat impacts are a factor in the consideration of accountability measures in the Atlantic groundfish fisheries, including the New England scup fishery by otter trawl. They are factored into ACLs and AMs as a strategy to conserve fish habitat.

Vessel owners in the fishery are required to conform to commercial sector ACLs (comprised of both landings and discards) with accountability measures (AM) for indirect impacts, including to habitat structure and foraging habitats for animals in the fishing area. These are defined in the the Summer Flounder, Scup and Black Sea Bass Commercial Accountability Measure Framework Adjustment (Framework Adjustment 13) that was published in July 2018, by the Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service (NMFS). The MAs do not change fishing effort but rather require the fishers to pay for adverse impacts with fish as a deterrent or corrective or incentive for innovative or rethought practices.

The scup fishery meets the 80 guidepost.

2.4.2 2019 score: 80

MSC Indicator 2.4.3 requires that information be available that is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types.

To score 80 on the scoring guideposts requires that the nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery. Sufficient data must be available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent, timing and location of use of the fishing gear. Sufficient data must continue to be collected to detect any increase in risk to habitat (e.g.

due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).

To score 60 on the scoring guideposts requires there to be a basic understanding of types & distribution of main habitats in area of fishery. Information must be adequate to broadly understand main impacts of gear use on main habitats, including spatial extent of interaction.

The fishery is managed with a habitat analysis based on NEFSC winter, spring and fall trawl survey environmental data. The data collected are predominantly concerned with the status of scup in different habitat conditions as an aide to fishing, although the information is also helpful for areas to avoid for the conservation of scup habitat, nursery areas, and juvenile scup. A description of the thermal habitat and its influence on the distribution and abundance of scup was included in the 2015 stock assessment. The environmental factors were surface air temperature in degrees Celsius, surface and bottom water temperature in degrees Celsius, and bottom water salinity in parts per thousand (PPT). Examination of patterns in the survey catch, for spring and fall and day and night, confirmed the irregular distributions of catch by temperature, salinity and depth.

As mentioned, habitat impacts are a factor in the accountability measures in all Atlantic groundfish fisheries including the New England scup fishery by otter trawl. The information is drawn from fish habitat reports and the biological opinion, which are findings based on empirical data (trawl surveys, observer data, logbooks) and scientific assessment.

Information on the distribution and habitat characteristics of scup can be found in the Essential Fish Habitat tables, Biological Opinion for the fishery (2013), and source documents for the species (Packer et al. 1999; Steimle et al. 1999; Drohan et al. 2007). Specific information on habitat for ETP species affected by the fishery is also found in the Biological Opinion for the fishery (2013).

Species level information is also available for secondary species. For example, information on spiny dog fish habitat requirements can be found in the documents titled, "Essential Fish Habitat Source Document: Spiny Dogfish", *Squalus acanthias*, Life History and Habitat Characteristics". Dogfish are born and live in pelagic and epibenthic habitats primarily in deep water on the outer continental shelf and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine. The fishing area for scup overlaps with the nursery and grow-out areas of the dogfish stock.

Black sea bass are protogynous hermaphrodites, meaning the majority are born females and some individuals later transition to males. Black sea bass are commonly associated with physical structures such as reefs, although they utilize a variety of habitats including open bottom. The 2016 benchmark stock assessment working group (NEFSC 2017) spent a great deal of time analyzing and simulating various datasets to gain a better understanding on how these life history characteristics impact the assessment and the black sea bass population (MAFMC 2018). They utilized age data from the NEFSC winter and spring trawl survey to determine sex ratios within the north Atlantic black sea bass stock (Cape Hatteras, NC to Canada). A simulation model was also developed

(Blaylock and Shepherd 2016) that evaluated black sea bass vulnerability to fisheries exploitation given its unique life history characteristics. Results from this analysis highlight the importance of secondary males, and therefore less reliance on dominant males, in the spawning success of sea bass.

The current evidence suggests that the scup fishery is unlikely to reduce structure and function including to the foraging habitats. Otter trawl fishing off the coast of New England does not likely impact the foraging habits of the protected species on the current list with the exception of the possibility of Atlantic sturgeon. Because Atlantic sturgeon spawn in rivers, the gear deployed by the seven fisheries under discussion are not expected to have any effect on sturgeon spawning activity or on early life stages (Biological Opinion for the fishery (2013); page 149).

2.4.3 2019 score: 80

MSC Indicator 2.5.1 requires that the fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.

To score 80 on the scoring guideposts requires that the fishery is highly unlikely to disrupt key elements underlying ecosystem structure and function to point where there would be serious or irreversible harm.

To score 60 on the scoring guideposts requires that the fishery is unlikely to disrupt key elements underlying ecosystem structure and function to point where there would be a serious or irreversible harm.

A “Finding of No Significant Impact” was published for the fishery in July 2018. The finding is backed by an analysis of the impacts of the alternatives presented for fishing on the biological environment, physical habitat, protected species, and human communities. When considered in conjunction with all other impacts from past, present, and reasonably foreseeable future actions, scup fishing is not expected to result in any significant impacts, positive or negative; therefore, there are no significant cumulative effects on the human environment associated with the proposed action (section 7.3).

A description of the expected environmental impacts, as well as any cumulative impacts resulting from each of the alternatives considered in this document, are provided in section 7. The preferred alternatives are not associated with significant impacts to the biological, socioeconomic, or physical environment individually or in conjunction with other actions; therefore do not require changes in commercial fishing effort.

The fishery meets the 80 score guidepost.

2.5.1 2019 score: 80

MSC Indicator 2.5.2 requires that there are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.

To score 80 on the scoring guideposts requires that there be a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. The partial strategy must be considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems). There must be some evidence that the measures comprising the partial strategy are being implemented successfully.

To score 60 on the scoring guidepost requires that measures be in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem. The measures must be considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).

As mentioned above, cumulative ecosystem impacts are assessed in the New England scup fishery by otter trawl in the consideration of accountability measures and harvest scenarios. For each scenario, the expected environmental effects and cumulative effects are calculated. The information for ecosystem impacts, which include effects from fishing for the biological, socioeconomic and physical environments, is drawn from NEFSC surveys, EAs and the biological opinion. This functions as a partial strategy to restrain the impacts of the fishery on the ecosystem. Each scenario is science-based and considered carefully by fishery stakeholders and therefore can be considered likely to work based on plausible argument.

The fishery meets the 80 score guidepost.

2.5.2 2019 score: 80

MSC Indicator 2.5.3 requires that there is adequate knowledge of the impacts of the fishery on the ecosystem.

To score 80 on the scoring guideposts requires information is available that is adequate to broadly understand key elements of ecosystem, that the main impacts of fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail, and that the main functions of components (target, bycatch, retained, ETP, habitats) in the ecosystem are known. There must be sufficient information available on impacts of fishery on these components to allow some of main consequences for ecosystem to be inferred, and sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).

To score 60 on the scoring guideposts requires that information is adequate to identify key elements of ecosystem, and the main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.

The fishery is supported by a regular mechanism, the Fishery Management Plan process, which integrates scientific and stakeholder knowledge. The process requires

the calculation of fishery impacts to the ecosystem. Major management decisions are made on the basis of minimizing the fishery's impacts to the ecosystem. As described in 2.5.2, fishing scenarios are considered in conjunction with all other impacts from past, present, and reasonably foreseeable future actions., To be selected, the scenario must not be expected to result in any significant impacts, positive or negative. There may not be significant cumulative effects on the human environment associated with the proposed action.

The fishery meets the 80 guidepost currently.

2.5.3 2019 score: 80

MSC Principle 3: Management Institutions

MSC Indicator 3.1.1 requires that the fishery is managed with an appropriate and effective legal and customary framework for governance.

To score 80 on the scoring guideposts requires that the management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2. The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery. The management system or fishery should be attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges. The management system observes the legal rights created explicitly or by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

To score 60 on the scoring guideposts requires that the management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2. The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system. Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery. Management system generally recognizes and respects the legal rights created explicitly or by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

Scup are present in offshore waters of the U.S. Atlantic Ocean throughout the winter and migrate into and occupy inshore waters throughout the summer. Scup stocks are managed collaboratively between the MAFMC and NMFS in federal waters (3-200 nautical miles offshore) and the individual states from Maine to North Carolina through the ASMFC, whose jurisdiction is for state waters (0-3 nautical miles offshore).

Access to the commercial sector of each State's fishery is limited by moratorium permits. Permits for commercial fishing for scup are issued based on the fishery's limited access eligibility requirements. Fishing access is perfectly in line with the federal legal framework. NMFS implemented ACLs and AMs for scup through the Mid-Atlantic Annual Catch Limit/Accountability Measure (ACL/AM Omnibus Amendment. Recommendations for acceptable biological catch (ABC are provided on an annual basis by the MAFMC's SSC, which sets ABC based on scientific uncertainty associated with catch levels that would result in overfishing the stock. For consistency with the requirements of the reauthorized MSA, the ACLs for scup cannot be greater than the ABCs. Annual Catch Targets (ACTs) are set equal to or lower than the ACLs to account for management uncertainty in the fisheries before sector-specific landing limits (i.e., quotas) are derived for the commercial and recreational sectors. The commercial quota for scup is divided into three harvest periods. Federal waters are managed on a coastwide basis for each quota period and on a state-by-state basis by the ASMFC during the summer quota period and coastwide during the winter quota periods. Quota specifications for scup are regulated under the FMP and generally set on an annual basis, but may be proposed for a three-year period. New York, Rhode Island and New Jersey fisheries account for most of the coastwide scup landings.

The scup fishery demonstrates organized and effective cooperation with the federal fishery rules and a transparent mechanism for setting quotas. Permitting and partial quota-setting at the State level upholds local fishing rights. The scup fishery meets the 80 score guidepost.

3.1.1 2019 score: 80

MSC indicator 3.1.2 requires that the management system offer effective consultation processes that are open to fishery stakeholders and to other interested and affected parties. The management roles and responsibilities must be clear and easily understood.

To score 80 on the scoring guideposts requires that the organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction. The management system includes consultation processes that regularly seek and receive relevant information, including local knowledge. The management system has a transparent mechanism for settling disputes and demonstrates consideration of the information obtained. The consultation process provides opportunity for all interested and affected parties to be involved.

To score 60 on the scoring guideposts requires that the organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood. The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.

Consultation with stakeholders on scup runs through federal and state decision-making processes. Federally, the Mid-Atlantic Fishery Management Council is comprised of fishery representatives and stakeholders. It meets periodically and provides a public portal where all fishery rules, documents, decisions and research findings are accessible. The Council has elected members representing different aspects of the fishery and it provides for fisheries advisory panels. The scup advisory panel has a portal and its members are named on the website. The Council also operates a Scientific and Statistical Committee, Monitoring Committee, Species Committee, Functional Committee, and Fishery Management Action Teams, which are formed by the Council to develop alternatives and provide technical analysis in support of a specific, major Council action. They work closely with Council Committees to refine options and evaluate management proposals to ensure they are consistent with Council goals and any statutory or regulatory requirements and their meetings are open to the public. Team members are named on the website. There is no team currently for scup but there is one for standardized bycatch reporting methodology whose work may apply. The meetings and reports of the Scientific and Statistical Committee are also published on the portal and accessible by the public. Functions, roles and responsibilities are well defined for all aspects of the Council.

Public comments are solicited during the development of management actions. NMFS' Greater Atlantic Regional Fisheries Office lists public notices with comment opportunities relevant to Mid-Atlantic and New England Fisheries. Guidance for participating is also provided.

The fishery meets the 80 scoring guidepost.

3.1.2 2019 score: 80

MSC Indicator 3.1.3 requires that there be long-term objectives for the fishery that reflect a precautionary approach and are consistent with the MSC principles and criteria.

To score 80 on the scoring guideposts requires that clear long-term objectives are in place for the fishery to guide decision-making. They must be consistent with MSC Principles and Criteria and the precautionary approach. They must be explicit within and required by the management policy.

To score 60 on the scoring guideposts requires that long-term objectives are in place to guide decision-making, consistent with MSC Principles and Criteria, and the precautionary approach, are implicit within management policy.

The Magnuson–Stevens Fishery Conservation and Management Act, which has been reauthorized twice since it was originally passed by the Congress in 1976, is the principal federal legislation governing fisheries management in the United States.

The key objectives of the Magnuson-Stevens Act are to:

1. Prevent overfishing.
2. Rebuild overfished stocks.
3. Increase long-term economic and social benefits.

Currently, the MSA includes requirements to stop overfishing, rebuild overfished stocks, and establish annual catch limits (ACLs). The time period for rebuilding stocks is "as short as possible". The most recent reauthorization requires the federal government to:

1. Act to conserve fishery resources
2. Support enforcement of international fishing agreements
3. Promote fishing in line with conservation principles
4. Provide for the implementation of fishery management plans (FMPs) which achieve optimal yield
5. Establish Regional Fishery Management Councils to steward fishery resources through the preparation, monitoring, and revising of plans which (A) enable stake holders to participate in the administration of fisheries and (B) consider social and economic needs of states.
6. Develop underutilized fisheries
7. Protect essential fish habitats

Additionally, the law calls for reducing bycatch and establishing fishery information monitoring systems.

US fishery management systems, including for scup, are designed to implement the MSA law. In other words, the long-term objectives are explicit in the management strategies and rules and also in the organizational structure.

The scup fishery meets the 80 score guidepost.

3.1.3 2019 score: 80

MSC Indicator 3.2.1 requires that the fishery has clear and specific objectives designed to achieve the outcomes of MSC Principles 1 and 2.

To score 80 on the scoring guideposts requires that short and long term objectives are explicit within the fishery management plan. The objectives should be consistent with MSC Principles 1 and 2 and be explicit in the fishery management system.

To score 60 on the scoring guideposts requires that objectives are implicit in the fishery management plan and broadly consistent with MSC Principles 1 and 2 and implicit in the fishery management system.

The Fishery Management Plan for scup clearly states the long and short term objectives, for example to rebuild the scup stock. As in 3.1.3, the objectives are explicit in the management strategies and rules and also in the organizational structure. Stakeholders are involved in all decision-making processes, which are publicly accessible. The

objectives stated in law (MSA) serve MSC principles 1 and 2 to maintain at sustainable levels the target and non-target stocks, ETP species, habitats, and ecosystems affected by fishing.

The scup fishery meets the 80 score guidepost.

3.2.1 2019 score: 80

MSC Indicator 3.2.2 requires that the fishery have effective ways for decisions to be made that result in fishing measures and strategies to meet the objectives.

To score 80 on the scoring guideposts requires that there are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. Decision-making processes respond to serious and other significant issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. Decision-making processes use the precautionary approach and are based on best available information. Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.

To score 60 on the scoring guideposts requires that there are informal decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.

Decision-making in the fishery is established, transparent, responsive and precautionary. It includes open and regular consultation with stakeholders on scup in federal and State decision-making processes.

Federally, the Mid-Atlantic Fishery Management Council is comprised of fishery representatives and stakeholders. Information on the fishery's performance and management action is available 24/7 at a public portal where all fishery rules, documents, decisions and research findings are accessible. The Council has elected members representing different aspects of the fishery and it provides for fisheries advisory panels. Fishing is limited by quotas and quotas are limited by the stock assessment result (responsive) and biological opinion (precautionary) among other factors, including legal actions which may stop or temporarily restrict fishing activity.

The scup advisory panel has a portal and its members are named on the website. The Council also operates a Scientific and Statistical Committee, Monitoring Committee, Species Committee, Functional Committee, and Fishery Management Action Teams, which are formed by the Council to develop alternatives and provide technical analysis in support of a specific, major Council action. They work closely with Council Committees to refine options and evaluate management proposals to ensure they are consistent with

Council goals and any statutory or regulatory requirements and their meetings are open to the public. Team members are named on the website. There is no team currently for scup but there is one for standardized bycatch reporting methodology whose work may apply. The meetings and reports of the Scientific and Statistical Committee are also published on the portal and accessible by the public. Functions, roles and responsibilities are well defined for all aspects of the Council.

Public comments are solicited during the development of management actions. NMFS' Greater Atlantic Regional Fisheries Office lists public notices with comment opportunities relevant to Mid-Atlantic and New England Fisheries. Guidance for participating is also provided.

The scup fishery meets the 80 score guidepost.

3.2.2 2019 score: 80

MSC Indicator 3.2.3 requires that monitoring, control and surveillance mechanisms ensure there is compliance with the fishery's management measures and also enforcement with the measures.

To score 80 on the scoring guideposts requires that a monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules. Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence. Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of fishery. There is no evidence of systematic non-compliance.

To score 60 on the scoring guideposts requires that monitoring, control and surveillance mechanisms exist and are implemented in the fishery under assessment. Sanctions to deal with non-compliance exist and there is some evidence that they are applied. Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of fishery

The fishery utilizes many of the available features of fisheries Monitoring, Control and Surveillance including log books, landing restrictions, fishery observers, Coast Guard inspections of vessel conditions and trip certificates, and VMS. Sanctions are applied for overfishing through a payback scheme. It works by tying the ACL's to Accountability Measures, where catch overages must be "paid back" with deductions from future catches, as described earlier, and there are financial and legal penalties for overfishing (and demonstrated recently by the seizure of boats, assets and fish in other New England groundfish fisheries). This scheme also generates evidence that fishers are complying with the management system.

The FMP uses output controls (catch and landings limits) as the primary management tool, with landings divided between the commercial and recreational fisheries. The FMP also includes minimum fish sizes, bag limits, seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability of the fisheries.

Also unique to the region, under the Mid-Atlantic Research Set Aside (RSA) program, 3% of scup Total Allowable Landings (TAL) will continue to be set aside for research and improved data collection. Research Set-Aside (RSA) programs are unique to Federal fisheries in the Greater Atlantic Region. No Federal funds are provided to support the *research*. Instead, research funds are generated through the sale of set-aside allocations for quota managed or days-at-sea (DAS) managed fisheries.

The scup fishery meets the 80 score guidepost.

3.2.3 2019: 80

MSC Indicator 3.2.4 requires that the fishery have monitoring and management performance evaluation.

To score 80 on the scoring guideposts requires that the fishery has mechanisms in place to evaluate key parts of the fishery specific management system and that it is subject to regular internal and occasional external review.

To score 60 on the scoring guideposts requires mechanisms to evaluate some parts and that the fishery specific management system is subject to occasional internal review.

Annually, the Atlantic States Marine Fisheries Commission completes an independent and external review of the Fishery Management Plan for scup for the upcoming year, as illustrated in the 2018 report.

The Mid-Atlantic Fishery Management Council's Science and Statistical Committee utilizes peer-reviewed biological reference points that also take into account the results of external evaluations (biological opinion and EA).

The Federal commercial scup fishery is closed coast wide when the allocation for a given quota period are reached. Any overages during a given quota period are subtracted from that period's allocation for the following year. Implementing regulations are found at 50 CFR part 648 subpart H.

The scup fishery meets the 80 score guidepost.

3.2.4 2019 score: 80


Sustainability
Incubator

Appendix 3. Press Release for Seafood Expo North America.

Press Release, 10 March 2022, Sustainability Incubator, Pier Fish Company, and Commercial Fisheries Research Foundation:

New England's sustainable scup is launching at the Boston Seafood Expo to meet the growing demand for local, healthy, and wild-caught sustainable seafood.

New England scup, or porgy, is a familiar sight in harbors and regional fine dining venues, typically served whole roasted or grilled. The New York Times featured this tasty fish in August, 2021. Categorized as an underutilized species, until now scup was available only as whole fish, a form that does not fit the requirements of most large-scale US seafood retailers, institutions, and consumers. The launch of sustainable refreshed boneless and skinless scup fillets at the Boston Seafood Expo 2022 is a culmination of 5 years of testing new techniques in a community-based initiative led by the Commercial Fisheries Research Foundation (CFRF), the culinary arts program at Johnson and Wales University, J.B. Cuisine, and Pier Fish Company with funding from a NOAA Saltonstall-Kennedy grant. Considerable R&D led to success with vacuum sealed frozen fillets. In a breakthrough worth celebrating, the Pier Fish/CFRF booth will showcase 5 and 10 lb cases of vacuum sealed frozen boneless and skinless fillets.

CFRF developed a scup fillet concept after their previous research revealed that large institutions, including Rhode Island hospitals and universities, have the desire to utilize more local seafood and could easily incorporate scup – if it was available at an affordable price. From both biological and fishery perspectives, New England scup represents a healthy seafood resource that is suitable for expanded harvest. Previously under a stock rebuilding strategy, the fishery was declared rebuilt in 2009 (MAFMC 2014). The 2021 scup stock assessment found that scup is not overfished and overfishing is not occurring relative to biological reference points (ASMFC 2022). The 2020 Commercial Annual Catch Limit for scup was 27.9 million pounds, but the commercial landings for that year were only 13.58 million pounds (MAFMC 2021). This trend of under-harvesting scup has been persistent for years and resulted in scup being classified as an underutilized species. Limited demand for whole fish had resulted in unpredictable, and often unprofitable, ex-vessel prices, leading to minimal effort in the scup fishery.

CFRF set a goal to raise the fishery's standing in the US market for sustainable seafood and to raise ex-vessel prices to a level that would incentivize fishermen to target scup, leading to benefits for fishing businesses in the Northeast and Mid-Atlantic, as well as seafood consumers nationwide. Several rounds of test filleting, freezing, tasting and analyses were supported by the JWU culinary arts program and Pier

Fish Company. CFRF also began preparations for a Fishery Improvement Project with Sustainability Incubator, and the fishery was assessed preliminarily against the MSC standard in early 2019. It scored 100 on stock, primary species management, secondary species information, and 80 on every other indicator. Fishermen report that scup are readily available year-round, with inshore harvest from May to November and offshore harvest from December to April. New England Sustainable Scup offers a much-needed option for fishermen forced to shift away from depleted groundfish and a historic Made-In-USA option for grocers and food service.
END

For more information please contact:
Commercial Fisheries Research Foundation, Executive Director, David Bethoney, PhD, dbethoney@cfrfoundation.org
Commercial Fisheries Research Foundation, Research Biologist, Michael Long, mlong@cfrfoundation.org
Website: http://www.cfrfoundation.org/scup-fillet
Press Release Author, Katrina Nakamura PhD, Sustainability Incubator, katrina@sustainability-incubator.com

33.5” width

.5” bleed area

89.75” total height

up to 83.25” visual height

Wild Atlantic SCUP

AN EXCITING OPPORTUNITY FOR RETAIL & FOODSERVICE

A locally abundant, underutilized species

Wild caught & sustainable

Attractive pricing compared to other seafoods

Year-round availability

Product of USA caught in North Atlantic

Processing partner Pier Fish Company — Fine Seafoods Since 1910

CFRF
COMMERCIAL FISHERIES RESEARCH FOUNDATION

6” bleed area

BLEED AREA
will not be visible when mounted into bannerstand

33.5” width

.5” bleed area

89.75” total height

up to 83.25” visual height

Wild Atlantic SCUP

A SUSTAINABLE CHOICE FOR SEAFOOD CONSUMERS

Mild, sweet flavor & tender texture

An affordable seafood option

Good source of healthy vitamins & minerals

Quick & easy to prepare

Supports local fishermen and fishing communities

Marketed by Pier Fish Company — Fine Seafoods Since 1910

CFRF
COMMERCIAL FISHERIES RESEARCH FOUNDATION

6” bleed area

BLEED AREA
will not be visible when mounted into bannerstand

Wild Atlantic SCUP




A new seafood opportunity for creative chefs and enterprising retailers.

- Scup is a mild-flavored white fish that is wild caught primarily in New England and Mid-Atlantic waters.
- An underutilized species, Scup's abundance offers year-round availability.
- As of a 2019 Fishery Improvement Project pre-assessment, the Scup fishery met the MSC Fishery Standard as sustainable.
- Also known as porgy, Scup's slightly sweet flavor and tender texture made it a staple seafood on Cape Cod in the mid 1900's.
- Scup is a versatile fish that can be prepared using a variety of cooking methods, including pan or deep frying, broiling or baking, and grilling.
- On the menu, Scup Fillets are perfectly-sized for individual portions and fish tacos.
- In the fresh or frozen case, Scup is a premium quality, wild seafood option for retailers.
- The Commercial Fisheries Research Foundation is working with local fishermen to develop a sustainable market for Scup.

Contact Pier Fish for more information at 508-990-9997.

Pier Fish COMPANY
Fine Seafoods Since 1910

New Bedford, MA 02740 • www.pierfish.com

Product Specifications

Latin Name:
Stenotomus chrysops

Size:
3 oz - 5 oz Fillet

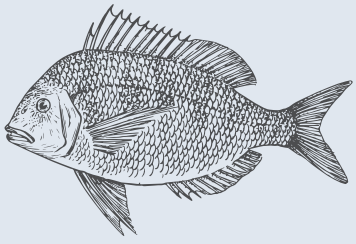
Forms:
Boneless
Skin-On or Skinless

Pack:
5 lb & 10 lb cases
Available Fresh or Frozen
Individually or Bulk Vacuum Packed

Catch area:
FAO 21

Sustainability:
Underfished &
Underutilized Species

Origin:
Harvested & Packed in USA



TRY SCUP AT BOOTH 146

From New England and Mid-Atlantic waters,

Wild Atlantic

SCUP

is ready to make a splash.

Abundant & Underutilized | Wild & Sustainable | Great Tasting & Easy-to-Cook

— Now offered in Frozen Fillet form —

PROCESSING PARTNER Pier Fish Company — Fine Seafoods Since 1910

CFRF
COMMERCIAL FISHERIES RESEARCH FOUNDATION

Introducing

TRUE TIDES™

SEAFOOD

Premium quality, sustainably harvested from the Atlantic Ocean.

SCUP

SUSTAINABLE - HARVESTED & PACKED IN USA

Species: Stenotomus chrysops
Harvest: WILD CAUGHT
Catch Area: FAO 21

AVAILABLE FRESH

NATURAL SKINLESS

10 lb NET WEIGHT STYRO FILLET
WET ICE
3 oz - 5 oz FILLET

AVAILABLE FROZEN

NATURAL SKINLESS

10 lb IQF
3 oz - 5 oz FILLET

Pier Fish COMPANY

One Family ♦ One Century ♦ One Mission

Contact Pier Fish for more information at
508-990-9997 or info@pierfish.com
New Bedford, MA. 02740

COMMERCIAL FISHERIES RESEARCH FOUNDATION

CFRF NEWSLETTER

SEPTEMBER 2018 **ISSUE 9**

COMMERCIAL FISHERIES RESEARCH FOUNDATION

The Commercial Fisheries Research Foundation is a non-profit, private research foundation founded and directed by members of the commercial fishing industry. The CFRF's primary mission is to conduct collaborative research and education projects that assist in the achievement of sustainable fisheries and vibrant fishing communities.

MESSAGE CORNER:

The CFRF is pleased to welcome Chris Lee, Mike Marchetti, and Norbert Stamps to the Board of Directors! They all have unique sets of experience and expertise that will enhance CFRF's vision and research development. Visit CFRF's website for their bios!

In August, over 30 fishermen, scientists, and managers gathered at CFRF to discuss the value of the Lobster and Jonah Crab Research Fleet, from the collaborative approach to the robust data produced. The CFRF is extremely proud of this program and the dozens of fishermen that have collected data for the past 5 years. As Al Eagles, F/V Catherine Ann, put it "*We have the opportunity to collect this data, so I think it is a great opportunity for us to give back to the industry and supply the data that is needed for the biologists to do the stock assessments and management. I think it is just a terrific program, and I am really proud to be a part of it"*. The CFRF strives to provide opportunities for members of the fishing community to get involved in research that benefits their fisheries and businesses and we hope to continue to do so for many years to come.

Fred Mattera, CFRF President

NEW PROJECT: DEVELOPMENT OF A MARKETABLE SEAFOOD PRODUCT FROM SCUP

Every year, less than 50% of the scup quota is harvested, primarily due to restricted markets and unpredictable ex-vessel prices. This fall, the CFRF will launch a new project that seeks to develop a novel refreshed (previously frozen) scup fillet product that meets consumer demand, results in higher ex-vessel prices, and justifies expanded harvest of this underutilized species. Specifically, the project will: 1) Determine the at-sea handling, shore-side processing, and storage techniques that produce a high quality, fully traceable refreshed scup fillet product, 2) Determine the economic viability of producing refreshed scup fillets, including production costs, byproduct utilization, and retail price, 3) Certify the sustainability, organoleptic quality, and nutritional value of refreshed scup fillets to ensure suitability for retail markets, and 4) Introduce and market refreshed scup fillets to food businesses and consumers, highlighting the traceability from fisherman to consumer, the sustainability of the scup resource, and the health benefits and culinary versatility of the product. Project partners include Pier Fish Company, Sea Freeze Ltd., Johnson and Wales University, and The Sustainability Incubator. We can't wait to scup it up! Follow along at www.cfrfoundation.org/scup-fillet/.

PROJECT UPDATE: BLACK SEA BASS RESEARCH FLEET

As expected, the Black Sea Bass Research Fleet diligently picked up sampling as the summer came into full swing and vessels began fishing more regularly. Since April, the Research Fleet has sampled over 2,000 black sea bass from nearly 200 different locations throughout southern New England. This brings the total number of black sea bass sampled since the inception of the Research Fleet to over **10,000**! This is a truly impressive sampling effort and data set and none of it would be possible without the commitment of our fishermen collaborators. Thank you Aaron, John, Kenny, Mike, Phil, Rick, Tim, Todd, and Trip!

In other news, this past June the CFRF submitted another round of Research Fleet data to the black sea bass biosamples database at ACCSP. Ultimately, the data will be used to create a discard characterization for the southern New England fishery by investigating the lengths and sex of fish discarded and how those two variables are affected by gear type. In August, the CFRF organized a black sea bass research symposium at the American Fisheries Society annual meeting in Atlantic City, New Jersey and presented the findings and methods of the Research Fleet. The symposium provided a great venue to discuss advances in black sea bass research and its current limitations directly with managers and scientists.

ATTENTION FISHERMEN: CFRF will be adding an additional F/V to the Black Sea Bass Research Fleet this fall and will be seeking applications from interested fishermen. F/Vs that interact with black sea bass during the winter months are especially encouraged to apply. Application materials will be coming soon to www.cfrfoundation.org/black-sea-bass-fleet!

Learn more about CFRF at www.cfrfoundation.org Follow us on Facebook!

Project Update: Elevating Sustainable Seafood in the Ocean State

The new Rhode Island Seafood website is now live! New components include RI seafood species profiles and seasonality (www.dem.ri.gov/riseafood/learn.php) and an interactive map and catalogue of markets and wholesalers that carry local seafood (www.dem.ri.gov/riseafood/buy.php). The CFRF will continue to work with the RI Seafood Marketing Collaborative to add content to this website, including recipes and new seafood access points.

This spring, the CFRF worked with four students at Brown University to develop a suite of educational and promotional materials for Rhode Island seafood. The students created two short videos about Rhode Island seafood and the fishing industry, an infographic about Rhode Island's seafood production, and a directory of wholesale seafood suppliers in the state. Please visit www.cfrfoundation.org/ri-seafood to view the materials!

While "fresh off the boat" sales shorten supply chains and allow fishermen to capture a greater percentage of the value of their catch, these sales are subject to robust regulatory restrictions in order to safeguard public health and ensure compliance with harvest restrictions. Over the summer, the CFRF worked with a Roger Williams University Legal Fellow to identify the permits and processes that fishermen are required to follow to sell finfish directly to consumers. The ultimate goal is to create a guide to help fishermen navigate the permitting process. Summer may be winding down, but RI seafood is always fresh and abundant, so get out there and pick up some local seafood for dinner!

Project Update: Lobster and Jonah Crab Research Fleet

The Lobster and Jonah Crab Research Fleet has been very busy these past few months, having sampled over 6,000 lobsters and over 7,200 Jonah crabs since April! Overall, the Research Fleet has collected biological data from more than 114,500 lobsters and 55,200 Jonah crabs - an impressive feat!

Did you know that Jonah crab was the 7th most valuable fishery in Rhode Island and the 5th most valuable fishery in Massachusetts in 2017? This June, CFRF released a short film highlighting Jonah crab, a species of emerging importance and value to southern New England fishermen. We would like to convey our appreciation to the Research Fleet participants and partners at the MA Division of Marine Fisheries for their contributions to this video. View the video titled "*Jonah Crab: Embracing Ecosystem Change and Ensuring Sustainability"* at www.cfrfoundation.org/jonah-crab-lobster-research-fleet/.

This summer, CFRF staff have been very busy sharing the approach, success, and data of our Lobster and Jonah Crab Research Fleet. CFRF staff co-hosted and presented at two symposiums at the American Fisheries Society Annual Meeting in Atlantic City, NJ highlighting CFRF's Lobster and Jonah Crab Research Fleet and CFRF's other industry-led projects. And in August, the CFRF hosted a Lobster and Jonah Crab Research Session where CFRF staff shared the story of the Research Fleet and dug into the scientific findings that have been produced. Research Session participants also enjoyed several terrific presentations from the MA Division of Marine Fisheries, the Northeast Fisheries Science Center, and University of Rhode Island highlighting fishermen's knowledge and the value of the Research Fleet data in the lobster stock assessment and Jonah crab management plan. Thank you to the dozens of attendees who provided great questions and discussion!

ATTENTION FISHERMEN: The CFRF is adding two additional F/Vs that fish in NMFS statistical areas 522, 561, 526, or 616 to the Lobster and Jonah Crab Research Fleet! This expansion will help fill data gaps listed as high priority in Addendum XXVI. If you fish in these areas or know someone who may be interested in participating, please contact Aubrey at aellertson@cfrfoundation.org or (401) 515-4892.

Project Update: Shelf Research Fleet

This summer, our Shelf Research Fleet collected 50 new water column profiles south of Rhode Island. To date, the Shelf Research Fleet has collected over 485 water column profiles using wireless Conductivity, Temperature, and Depth instruments. These data have shown that the southern New England continental shelf was much colder than previous years at the start of the summer, but transitioned to being unusually warm in August and September, likely due to the movement of Gulf Stream water across the shelf. Did your catch change drastically in August? This might be why!

This May, CFRF staff and Glen Gawarkiewicz from the Woods Hole Oceanographic Institution had an exhibit in the One Ocean Exploration Zone at the Volvo Ocean Race in Newport, RI. The purpose of the exhibit was to broaden awareness of the marine environment, and educate visitors on conservation, sustainability, and research efforts. The exhibit was visited by thousands of spectators and school children.

In June, a peer-reviewed manuscript was pre-published in the Annual Review of Marine Sciences titled "*Partnering with Fishing Fleets to Monitor Ocean Conditions.*" This manuscript covers the benefits of collaborative research and citizen science, and highlights case studies from around the world including the Shelf Research Fleet. To read the article and to learn more about the Shelf Research Fleet, please visit www.cfrfoundation.org/shelf-research-fleet/.

Project Update: The Economic Impact of RI's Fishing Industry

Dr. Tom Sproul from URI has been busy gathering data, running numbers, and developing models to estimate the economic impact of the fishing industry in Rhode Island. From fishing gear suppliers to seafood processors to marine insurance providers, the breadth and value of the fishing industry is far greater than the dollars generated by seafood landings. We hope that this project will highlight how the fishing industry contributes to all facets of the local economy and job market. Project results will be released this fall.

Project Update: Quahog Research Fleet

Despite a rough winter and early spring, the Quahog Research Fleet has sampled just shy of 10,000 quahogs from over 200 locations throughout Narragansett Bay since April. The warmer summer weather marked the commencement of the RI DEM dredge survey and the completion of calibrations by our partners at RI DEM and Roger Williams University. This summer, dredge calibrations have focused on deeper water and softer bottom types, where catch efficiencies were expected to be the lowest. Dredge calibrations are a major component of this project as they will allow Research Fleet data to be compared directly to traditional survey data. Calibrations will also be used to develop a correction factor for dredge-calculated quahog densities by adjusting catch efficiency relative to the depth and substrate type. Calibrations with all of the Research Fleet members alongside the RI DEM dredge should be completed this fall. Once the calibrations are complete, the CFRF will work with RI DEM and RWU to analyze and incorporate the multi-year dataset into quahog management. To follow along with project updates and milestones, check out the project webpage at www.cfrfoundation.org/quahog-research-fleet.

Project Update: SNE Cooperative Ventless Trap Survey

The Southern New England Cooperative Ventless Trap Survey (SNECVTS) is currently in the heart of its sampling season. After a slow spring around Cox's Ledge, things have really picked up this summer. Our teams sampled around 300 lobsters in May and June combined, then July sampling saw the lobster catch increase to over 1,800 lobsters! Jonah crab catches have been more consistent through the first three months of sampling, with a total of 5,642 sampled through July. As for the lobster tagging aspects of SNECVTS, nearly 1,500 t-bar tags have been deployed to date around Cox's Ledge and in Rhode Island Sound. Sampling teams have recaptured 42 tags, and commercial lobstermen have reported an additional 11 tags. We were surprised to see that a few of these lobsters were recaptured far north of Cox's Ledge after they were released in the spring and early summer. An additional 1,500 t-bar tags will be deployed through the end of SNECVTS sampling in November, as well 100 acoustic tags which will be deployed in September. These acoustic tags will allow the SNECVTS team to continuously track the movements of tagged lobsters after they are released, as opposed to t-bar tags, which only provide a release and recapture location. The only catch is, we will need to recapture the acoustic tagged lobsters to collect the data their tags are recording! **Be sure to report any tagged lobsters you catch to CFRF so we can continue to gather information on where these lobsters are heading after they are released, and you could wind up with some extra cash in your pocket!** Habitat camera surveys have also been completed at 16 of the 24 SNECVTS sampling stations to date, revealing exactly what type of bottom our trawls are setting on over the course of this year. Sampling will continue through November, at which point the SNECVTS project efforts will transition from field work to data crunching! If you'd like to find out more about SNECVTS, visit the website at www.cfrfoundation.org/snecvts/.

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New Project: Operationalizing Real-time Telemetry Onboard Commercial Fishing Vessels

The CFRF is working with the Gulf of Maine Lobster Foundation and the NEFSC to install real-time telemetry systems on F/Vs throughout the Northeast. The real-time telemetry of bottom temperature data from commercial fishing boats helps ocean circulation modelers to better understand ocean processes. In May, CFRF staff helped install new telemetry equipment on the F/V Excalibur, a lobster boat in Newport, RI. To view real-time bottom temperatures please visit: www.studentdrifters.org/huanxin/telemetry.html .

New Project: Understanding the Ecological & Economic Implications of Black Sea Bass Range Expansion

Over the next two years, the CFRF will be working with Dr. Jonathon Grabowski and Dr. Melissa McMahan from Northeastern University on a project that seeks to elucidate the ecological and socioeconomic consequences of the northern range expansion of black sea bass. The CFRF Black Sea Bass Research Fleet will collect samples to help scientists understand differences in the life history traits and diet of black sea bass in its native and newly expanded range. Otoliths will be used to assess age and growth rates, gonads will be analyzed to assess sex and reproductive stage, stomach content and stable isotope analysis will be used to determine diet and trophic position, and tissue samples will be used for genetic analysis to understand the population structure of black sea bass in its newly expanded range.

Recent Releases and Publications

- **Video**: "*Jonah Crab: Embracing Ecosystem Change and Ensuring Sustainability* (www.cfrfoundation.org/jonah-crab-lobster-research-fleet/)
- **Video**: "*Buy Local! A Guide to Rhode Island Seafood*" (www.cfrfoundation.org/ri-seafood/)
- **Video**: "*RI Seafood: From The Ocean State to Your Plate*" (www.cfrfoundation.org/ri-seafood/)
- **Peer Reviewed Manuscript:** "*Fishers Fill Data Gaps for American Lobster and Jonah crab in the Northeast USA"* Bulletin of Marine Science. Volume 94 (3): 1121-1135.
- **Peer Reviewed Manuscript**: "*Partnering with Fishing Fleets to Monitor Ocean Conditions"* Annual Review of Marine Science. Volume 11.
- **RI Infographic and Seafood Directory:** A Guide to Local Seafood in Rhode Island and A Directory of Rhode Island's Wholesale Seafood Suppliers. (www.cfrfoundation.org/ri-seafood/)

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COMMERCIAL FISHERIES RESEARCH FOUNDATION

CFRF NEWSLETTER

MARCH 2019 ISSUE 10

COMMERCIAL FISHERIES RESEARCH FOUNDATION

The Commercial Fisheries Research Foundation is a non-profit, private research foundation founded and directed by members of the commercial fishing industry. The CFRF's primary mission is to conduct collaborative research and education projects that assist in the achievement of sustainable fisheries and vibrant fishing communities.

MESSAGE CORNER:

After three exciting and productive years at the helm of CFRF, it is with both sadness and hope that I hand over the wheel to the new CFRF Director, Dr. Chris Glass. My work at CFRF has taught me that there are always solutions to the challenges facing fisheries and seafood if you bring the right group of people together. It has also highlighted the importance of standing up for the value of the fishermen-collected data and it has revealed the dedication that industry members have to sustaining ocean ecosystems, adapting to changing markets and species availability, and seeing their industry not just survive, but thrive. I have deep respect and gratitude for the CFRF Board of Directors and staff, and our team of collaborators and I hope to continue to grow these relationships for long into the future. I trust that Dr. Glass will carry the CFRF forward with enthusiasm and I will certainly be following along from my new position as the Chief of the Cooperative Research Branch at the NEFSC.

Sincerely, Anna Mercer

Thanks to the tireless work of Anna, the CFRF has become a leader in fisheries research. Under her leadership, the CFRF diversified its approach for engaging fishermen in research, developed new partnerships within the scientific community, and produced a suite of practical results that have supported fishing communities across the region. She is well respected throughout the fishing industry, academic community, and government organizations. The CFRF is grateful to have had her as Executive Director and we applaud her performance. CFRF Board of Directors

PROJECT RESULTS: ELEVATING SUSTAINABLE SEAFOOD IN THE OCEAN STATE

Over the course of this project, the CFRF completed a wide variety of education and research activities, including: 1) Hosted the "Taste the Ocean State: Celebrate RI Seafood" event at the Boston Public Market that engaged shoppers in discussions with fishermen, seafood cooking demonstrations and tastings, 2) Renovated the www.seafoodri.com website to include ecological and fisheries information about local seafood species and a map of seafood access points in RI, 3) Developed infographics to describe the characteristics of the RI seafood system and tips for supporting local seafood, 4) Produced two educational videos to improve appreciation of the RI seafood system, 5) Developed and co-hosted a workshop at Nick's on Broadway that brought together over 50 RI food professionals, seafood businesses, and fishermen to share information and develop sourcing relationships, 6) Developed a guide for navigating the regulations surrounding the direct sale of fish in RI, 7) Developed a RI seafood species availability calendar, based upon historical landings during each month of the year, 8) Developed a RI Seafood Suppliers Directory for wholesale businesses, 9) Assisted with the production of a RI Monthly Article about seafood in RI, including species summaries and graphics, and tips for procuring local seafood, and 10) Provided dozens of port and seafood production tours to develop an appreciation for RI's seafood system. Thank you to all of our collaborators for helping to make this project a success! Visit www.cfrfoundation.org/ri-seafood for photos, reports, and more!

PROJECT RESULTS: THE ECONOMIC IMPACT OF RI'S FISHING INDUSTRY

This study, conducted in collaboration with Dr. Tom Sproul at the University of Rhode Island, is the first to measure the economic impact of the RI Fisheries and Seafood Sector using an approach in which businesses are hand-counted to estimate jobs, gross sales, and economic impacts across the state. The Rhode Island Fisheries and Seafood Sector spans commercial fishing and shellfishing, fishing charters, processing, professional service firms, retail and wholesale seafood dealers, service and supply firms, and tackle shops. These 428 firms generated 3,147 jobs and $538.33 million of gross sales in 2016. Including spillover effects across all sectors of the Rhode Island economy, the total economic impact was 4,381 jobs and output of $419.83 million (+/- 11.6%). This study finds that Commercial Fishing is the largest subsector by jobs and number of firms, while Wholesalers is the largest by annual gross sales. To facilitate policy discussion, this study also estimated economic impact multipliers for X-Vessel landings values. The X-vessel landings jobs multiplier is 32.43 jobs per $million. The X-vessel landings economic impact multiplier is 3.06. These multipliers are "total effects" in the Rhode Island economy, inclusive of effects on commercial fishing. Details of the data collection, subsector definitions, estimation procedure and confidence intervals can be found in the Full Report and Technical Appendix available at: www.cfrfoundation.org/economic-impact-of-fisheries-in-rhode-island/ .

Learn more about CFRF at www.cfrfoundation.org Follow us on Facebook!

Project Update: Black Sea Bass Research Fleet

The Black Sea Bass Research Fleet has been hard at work and, since September, has sampled 2,720 black sea bass from just shy of 200 individual locations across southern New England. This sampling effort brings the total number of black sea bass sampled since the beginning of the project to 13,250! In addition to at-sea sampling, Research Fleet participants have collected hundreds of black sea bass from inshore waters for diet, growth, and maturity analysis. In December, the Black Sea Bass Research Fleet welcomed its newest participant; the F/V Debbie Sue, a trawler homeported in Point Judith, RI, captained by Troy Sawyer. The F/V Debbie Sue will expand the sampling coverage of the Research Fleet in two important ways; geographically, further south into the mid-Atlantic, and temporally, through the winter months. Welcome to the team, Troy and crew!

The CFRF is pleased to announce that additional funding has been secured to expand the collection and laboratory analysis of black sea bass as well as to support the addition of two new vessels to the Research Fleet! Starting this spring, Research Fleet participants will collect black sea bass from data-poor areas offshore and CFRF and RI DEM staff will analyze the diet, growth, and maturity of the fish in the lab. This work builds upon the Research Fleet's collection and analysis of black sea bass from inshore waters, which has started to show some interesting results, including a prey portfolio of over 100 species that includes Jonah and rock crabs, fish (namely sand lance), squid, shrimp, amphipods, and lobster. The CFRF is soliciting applications from Fishermen for two additional F/V slots in the Research Fleet through Friday, March 29, 2019. Upcoming announcements and application materials can be found at www.cfrfoundation.org/black-sea-bass-fleet!

Project Update: Quahog Research Fleet

At the end of January, the Quahog Research Fleet participants conducted their last sampling sessions and returned their sampling equipment to CFRF. Over the course of this project, Research Fleet participants sampled an astonishing 53,866 quahogs from over 1,000 locations within Narragansett Bay. The quantity and quality of the data provided by the Quahog Research Fleet is truly exceptional and shows how dedicated all participants are to the betterment of their fishery. The calibration component of this project, a collaboration with RWU and RI DEM, further highlights the efficacy of the shellfishermen, who exhibited catch efficiencies up to 99.6%. All shellfishermen were able to maintain their high catch efficiencies through various bottom types, depths, and quahog densities. In comparison, the RI DEM dredge catch efficiency varied widely depending on depth, bottom type, and quahog density, and was overall less efficient than the shellfishermen. This exemplifies the importance of incorporating industry knowledge and data into the stock assessment process.

Not only has the Quahog Research Fleet provided an extensive quahog density and catch composition database that will improve the quahog stock assessment, it has also produced a suite of valuable lessons regarding technology, process, and partnership. Stay tuned in the coming months when CFRF releases the final project report, which will summarize all of the work accomplished through the Quahog Research Fleet. Finally, we would like to thank all of the shellfishermen (Bo Christensen, David Ghigliotty, Ernest Wilcox, Gerry Schey, and Jarrod Goulart) and project partners (Conor McManus, RI DEM and Dale Leavitt, RWU) who contributed to this project. The CFRF deeply values the dedication and skills of our collaborators and looks forward to refining and continuing this work in the future . If you would like to obtain a copy of the final project report, keep an eye on the project webpage at www.cfrfoundation.org/quahog-research-fleet!

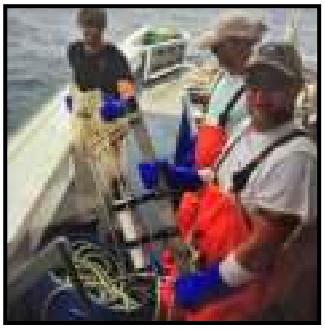
Project Update: Lobster and Jonah Crab Research Fleet

The Lobster and Jonah Crab Research Fleet continues to expand and evolve to address the data needs of these valuable resource species. In the fall, we welcomed three new fishing vessels to our Research Fleet: F/V Terri-Ann (Sandwich, MA), F/V Carol Coles (Newington, NH), and F/V Dana Conant (Newington, NH). These fishing vessels will help fill offshore data gaps listed as high priority areas for lobster by the Atlantic States Marine Fisheries Commission. Despite rough weather and storms this fall, the Research Fleet sampled over 11,000 lobsters and 9,700 Jonah crabs since September. This brings the total number of lobsters and Jonah crabs sampled since 2014 to over 125,516 and 64,920, respectively. This is incredibly impressive and we would like to thank all of the fishermen involved for their time and effort!

The Research Fleet's data continues to be widely used by lobster and Jonah crab stock assessment scientists, managers, and academics. Most recently, NH Fish and Game scientists used the Research Fleet's data to explore offshore lobster recruitment, the ASMFC Lobster Technical Committee used the Research Fleet's data to characterize catch and understand reproductive dynamics for the lobster stock assessment, and oceanographers from SMAST and WHOI used the Research Fleet's bottom water temperature data to inform hydrodynamic models. The CFRF is proud that the value of the Lobster and Jonah Crab Research Fleet continues to grow.

Over the past few months, CFRF staff have shared results from the Lobster and Jonah Crab Research Fleet at a SMAST seminar, the winter meeting of the Southern New England Chapter of the American Fisheries Society, and the ASMFC Lobster Benchmark Stock Assessment Workshop. These events provide valuable opportunities to discuss the Research Fleet data directly with other scientists and identify novel applications, including characterization of length frequencies and sex ratios in areas not sampled by inshore state ventless trap surveys and exploration of recruitment trends of lobsters by depth and stock area. For more information about this project, please visit www.cfrfoundation.org/jonah-crab-lobster-research-fleet!

Project Update: Shelf Research Fleet



The Shelf Research Fleet project, conducted collaboratively with the Woods Hole Oceanographic Institution (WHOI), has gathered oceanographic data from across the continental shelf south of Rhode Island since 2014. To date, the fishermen participating in the Shelf Research Fleet have collected over 530 water column profiles using Conductivity, Temperature and Depth instruments. These data have provided scientists with insights into the dynamic nature of the ocean ecosystem in southern New England and its connection to fishery productivity. The Shelf Research Fleet data have been particularly valuable in explaining sub-seasonal trends that are not observed by other surveys. Thank you to the fishermen involved in the Shelf Research Fleet for your time and effort!

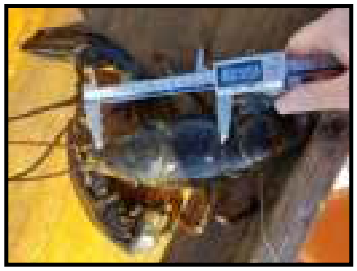
In January 2019, a manuscript authored by CFRF's Director, Anna Mercer, and Glen Gawarkiewicz (WHOI) titled "*Partnering with Fishing Fleets to Monitor Ocean Conditions"* was published in the Annual Review of Marine Science. The manuscript outlines the components of effective collaborative research, highlights four case studies from across the world, and discusses future opportunities and challenges.

In February, members of the Shelf Research Fleet met with WHOI scientists to discuss recent oceanographic conditions and to share at-sea observations. Discussions focused on the high frequency of salinity maximum intrusions during the first half of 2018 and their relationship to cross-shelf transport of nutrients, productivity, and resource species. To access the ARMS manuscript, view data summaries, or download raw data, please visit www.cfrfoundation.org/shelf-research-fleet/.

Project Update: SNE Cooperative Ventless Trap Survey

The Southern New England Cooperative Ventless Trap Survey (SNECVTS) wrapped up a successful field season in November and CFRF/URI staff have since focused their efforts on data exploration, analysis, and writing. Catch rates, disease dynamics, and reproductive cycles from 2018 are being compared to those from 2014/15 to assess interannual and long-term trends. In total, 6,619 lobsters and 43,312 Jonah crab were sampled by the SNECVTS survey in 2018. The data suggests a decline in lobster abundance and highly variable Jonah crab abundance from 2014-2018. The data will ultimately be used to develop a baseline assessment of lobster and Jonah crab populations in the Cox's Ledge Wind Energy Area.

Over the course of the 2018 field season, 2,736 lobsters were tagged. So far, 199 have been caught and reported, including 38 lobsters which made an 80 mile run out to the continental shelf break from Cox Ledge. One lobster even walked all the way to the Hudson River Valley, a journey of nearly 150 miles in just over two months!



The full SNECVTS team of lobstermen and scientists got together in early January to reflect on the project and discuss the results in detail. CFRF staff also presented results of the project at the American Fisheries Society Southern New England Chapter winter meeting and the Massachusetts Lobstermen's Association Annual Weekend in January. CFRF and URI staff will be finishing the final project report this spring, so keep a look out for its release later this year! To learn more, please visit www.cfrfoundation.org/snecvts/.

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Project Update: Development of a Marketable Seafood Product from Scup

This winter, the first scup fillet trials were completed at the Pier Fish Company processing facility in New Bedford, MA. Batches of scup were run through scaling and filleting machines with changes made to blade angles, cutting depths, and guide locations. After improving the filleting process with these adjustments, yields were around 40% as a marketable product. The next steps will include trials of freeze and refresh methods with both whole and filleted scup through plate freezing, blast freezing, and individual quick freezing, followed by nutritional and shelf-life testing of the final scup product.

Coincidentally, the CFRF has been working with our partners at Johnson and Wales University to get scup into the mouths of chefs, students, and visitors. In February, CFRF participated in a seafood sustainability workshop for culinary educators which focused on scup. After a presentation on the benefits of utilizing local sustainable seafood from CFRF staff, JWU chefs, students, and culinary educators participated in a side by side cooking demonstration with scup and tilapia. Everyone at the event agreed that scup looks, smells, and tastes far better! Moving ahead this spring, this project will dig deeper into the most efficient techniques processors can use to generate a high quality scup product, which will be evaluated by culinary professionals at JWU. Pairing that along with a scup Fishery Improvement Project, consumers will hopefully be seeing scup fillets on the market in the near future! If you'd like to follow along with our scup processing and marketing efforts, visit www.cfrfoundation.org/scup-fillet.

Recent Releases, Publications, and Awards

(documents available at www.cfrfoundation.org/news-releases)

- **Award**: "Rhode Island Foundation 2018 Best Practices Collaboration Award", December 2018
- **Report**: "The Economic Impact of Rhode Island's Fisheries and Seafood Sector", December 2018
- **Report** : "Selling Fish to Restaurants and the Public: A Fisher's Guide", December 2018
- **Report**: "Comparative Analysis of State Regulation of Direct-to-Market Sales of Finfish", February 2019
- **Press**: "Confronting Climate Change, Fishermen Collect Data on Changing Oceans", WCAI NPR, November 2018
- **Press**: "CFRF Awarded for Work in Communities", Narragansett Times, December 2018
- **RI Senate Resolution**: "Expressing Appreciation and Support for all Rhode Island Fishers and the Rhode Island Commercial Fishing Industry", February 2019

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COMMERCIAL FISHERIES RESEARCH FOUNDATION

CFRF NEWSLETTER

NOVEMBER 2019 ISSUE 11

COMMERCIAL FISHERIES RESEARCH FOUNDATION

The Commercial Fisheries Research Foundation is a non-profit, private research foundation founded and directed by members of the commercial fishing industry. The CFRF's primary mission is to conduct collaborative research and education projects that assist in the achievement of sustainable fisheries and vibrant fishing communities.

MESSAGE CORNER:

This time of year inspires gratitude and reflection and the CFRF feels fortunate to have a diverse network of collaborators that helps us achieve our mission of supporting sustainable fisheries in New England. Since 2003, the CFRF has worked with over 150 fishermen from Maine to New Jersey, as well as hundreds of fisheries scientists, managers, and culinary professionals that have helped make the CFRF's work truly impactful. These efforts have resulted in new tools to reduce bycatch, better data for stock assessments, and a growing sense of trust and cooperation among fisheries stakeholders. Conducting research and education that benefits the fishing industry is at the heart of CFRF's mission, and we are very proud of our accomplishments to date. We hope you enjoy a cornucopia of local seafood this Holiday season!

Fred Mattera, CFRF President

PROJECT RESULTS: SNE COOPERATIVE VENTLESS TRAP SURVEY

The Southern New England Cooperative Ventless Trap Survey (SNECVTS), in collaboration with the University of Rhode Island Graduate School of Oceanography, successfully completed its latest year of monitoring and data analysis for the Rhode Island/ Massachusetts Wind Energy Area. With three years of baseline data collected in 2014, 2015, and 2018, the lease site at Cox Ledge now has a multi-year record of pre-construction conditions at one of the first offshore wind energy lease sites in the United States. All data from the 2018 monitoring season and a final report were submitted to the Bureau of Ocean Energy Management (BOEM) for review and approval in July of 2019, and the final report will be released upon BOEM's approval. Although at-sea sampling and the final report have been completed for SNECVTS, there are still over 2,500 lobsters tagged with SNECVTS t-bar tags in Southern New England. If you catch any of these tagged lobsters, please report them to CFRF by calling 401-515-4892 or emailing Michael Long at mlong@cfrfoundation.org with the date and location of capture. Recapture data from years following initial tagging will provide valuable multi-year movement data for lobsters in the region, particularly for lobsters which have been recaptured multiple times. CFRF and URI staff would like to thank all the fishing vessel captains, crews, and sea samplers who contributed to SNECVTS throughout its three years of data collection. If you'd like to find out more about SNECVTS, visit the CFRF website: www.cfrfoundation.org/snecvts/.

PROJECT RESULTS: ASMFC LOBSTER MATURITY ASSESSMENT PROJECT

Temperature is perhaps the most prominent environmental force on American lobster life history and in defining its habitat. In Southern New England, waters have experienced dramatic and widespread warming. This increase in bottom water temperature has been known to influence the species molting and growth, maturity, and egg extrusion and development. As a result, the CFRF in partnership with the MA Division of Marine Fisheries, the Atlantic States Marine Fisheries Commission and the Maine Department of Marine Resources, conducted an American lobster maturity study this summer to provide updated maturity information to be used in the upcoming lobster stock assessment.

Three fishing vessels from CFRF's Lobster and Jonah Crab Research Fleet, collected 208 non egg-bearing female lobsters this summer from NMFS statistical areas 537 and 562. For each lobster a suite of biological data was collected and recorded. A. Ellertson and CFRF summer intern, F. Hart, dissected lobsters at the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) in New Bedford, MA. All data was shared with Maine Department of Marine Resources for further analyses and final maturity determinations. Stay tuned for the final report that will be published on our webpage (www.cfrfoundation.org/asmfc-lobster-maturity) in early 2020!

Learn more about CFRF at www.cfrfoundation.org

Follow us on Facebook!

Project Update: Black Sea Bass Research Fleet

The Black Sea Bass Research Fleet has been busy sampling this summer and fall. We saw an abundance of younger, just legal-sized, black sea bass this season compared to the last few years. After 3 full years of data collection, the Research Fleet has now sampled over 20,000 black sea bass from over 1,500 locations throughout southern New England and the Mid-Atlantic! The Research Fleet also collected just shy of 2,000 black sea bass from inshore, RI state, waters for laboratory analysis by RI DEM. In December, the CFRF and RI DEM will be expanding our collection program and begin investigating stomach contents and aging of black sea bass from the offshore federal waters of southern New England throughout the winter. This work will be providing invaluable biological data on the ecological role black sea bass play as they overwinter offshore of southern New England. Further, this will serve as a comparison of the diet composition of black sea bass from offshore waters to the collected black sea bass from inshore, which was largely dominated by crabs. In other news, the CFRF welcomed a few new members into the Research Fleet this past season: Gary Mataronas Sr., F/V X-Terminator, Joe Baker, F/V Harvest Moon, and John Walker, F/V Blue Label. We are incredibly thankful for the new members jumping right into sampling with the Fleet and look forward to continuing the work next season when the black sea bass come back inshore!

The CFRF has been busy highlighting and promoting the Research Fleet design and collaborative research as a whole: in May, at the Wakefield Fisheries Symposium in Anchorage, AK, about collaborative research and in November, at the Gulf of Maine 2050 Symposium. For more information about the project, please visit our project webpage at: www.cfrfoundation.org/black-sea-bass-fleet.

Project Update: Development of a Marketable Seafood Product from Scup

Throughout the summer and fall, CFRF, the Pier Fish Company, and Johnson and Wales University (JWU) have been working diligently through scup processing trials and culinary evaluations. The team was first put on hold for over a month in the late spring and early summer due to the spring spawn of scup, after which fish were coming in with poor body condition, which caused softer fillets along with decreased yield during processing. Despite this delay, and multiple other roadblocks encountered along the way, progress has been made to develop a marketable refreshed scup fillet. Fresh fillets have received great feedback from all culinary professionals and public consumers who have worked with or tasted them; however, the biggest hurdle with the project to date has been a strong and undesirable taste associated with refreshed fillets. Pier Fish is currently in the process of trying several freezing techniques, fillet cuts, and treatments to combat the undesirable taste in the refreshed fillets, and with JWU will continue to evaluate all the different products that Pier Fish develops.

The Sustainability Incubator also completed a Fishery Improvement Project (FIP) pre-assessment of the scup fishery, which revealed that the scup fishery already meets the Marine Stewardship Council (MSC) Fisheries Standard. There are still several steps which need to be taken before scup can receive full MSC sustainability certification, but the scup fishery is now in an excellent position to move forward! If you'd like to follow along with our scup processing and marketing efforts, visit the CFRF website: www.cfrfoundation.org/scup-fillet.

Project Update: Lobster and Jonah Crab Research Fleet

The Lobster and Jonah Crab Research Fleet has steadily increased sampling throughout the summer and fall months. To date the Research Fleet has sampled biological data from over 141,600 lobsters and 65,000 Jonah crabs. This June, marked six years of data collection! We are grateful for the continued support from industry, scientists and fishery managers who continually use and request CFRF's data. From Maine to New Jersey, the Research Fleet has begun to address the data needs surrounding lobster and Jonah crab and has contributed to the sustainable management of these valuable resources. This spring, the CFRF was pleased to welcome the F/V Bug Catcha from Port Clyde, ME, captained by Gerry Cushman. Welcome to the team Gerry! The CFRF will continue to evolve and grow to address the data needs and priorities of stock assessment scientists and managers, and promote the value of fishermen as research partners. This past summer and fall, CFRF staff shared project results at the Wakefield Fisheries Symposium in Anchorage, AK, as well as the Gulf of Maine 2050 International Symposium in Portland, ME.

ATTENTION FISHERMEN: Are you interested in being involved in CFRF's Lobster and Jonah Crab Research Fleet? Please contact Aubrey at: aellertson@cfrfoundation.org or 401-515-4892. For more information about the project, please visit our project webpage at: www.cfrfoundation.org/jonah-crab-lobster-research-fleet.

New Project: Piloting a N-Viro Dredge in SNE Scallop Fishery

The N-Viro scallop dredge pilot project is CFRF's first experience with NOAA's research set aside (RSA) program. All funds for the research project are generated through the sale of scallops harvested under a research specific quota the foundation has received from NOAA. This project seeks to pilot a novel gear type that has been proven effective at reducing bycatch in the king and queen scallop fisheries. Two N-Viro dredges have been delivered to the port of Galilee and have been rigged to fish. Unfortunately, the project missed the 2019 scalloping season. Our captains look forward to putting the experimental dredges in the water when they get back to scalloping in the spring. Three Limited Access General Category (LAGC) scallop fishing vessels will be fishing the smaller (9ft) N-Viro dredge including F/V Mister G, F/V Harvest Moon and F/V Brooke C. The larger dredge (15ft) will be fished on the F/V Karen Elizabeth, a Limited Access scallop vessel. The N-Viro dredges will be tested for bycatch reduction, improved fuel efficiency and comparable scallop catch rates against a traditional New Bedford style dredge. For more information about this project, please visit www.cfrfoundation.org/piloting-novel-dredge-type !

New Project: Salinity Maximum Intrusions

CFRF recently received an award from the National Science Foundation for a project partnering with Woods Hole Oceanographic Institute (WHOI), the School for Marine Science and Technology (SMAST) and National Marine Fisheries Service (NMFS). Scientists led by Glen Gawarkiewicz will be attempting to map mid-depth salinity maximum intrusions on the Southern New England Continental Shelf. The project will consist of two research cruises: a 7 day pilot cruise in May 2020 and a 14 day main cruise in May of 2021. Researchers will use autonomous underwater vehicles to measure the physical properties of the salinity maximum intrusions, which are associated with warm core rings. The combination of the CTD/VMP data and the daily surveys from the two REMUS vehicles will be combined to obtain daily three-dimensional maps of temperature, salinity, and microstructure in the salty intrusions. The CFRF will lead the outreach efforts included in the project, which seek to share project information and discuss implications with the commercial fishing industry. Look forward to more information regarding this project in the coming months as it develops at www.cfrfoundation.org/salinity-max !

Project Update: Operationalizing Real-Time Telemetry Systems

The CFRF staff continues to work with the Gulf of Maine Lobster Foundation and the Northeast Fisheries Science Center to install real-time telemetry systems on fishing vessels throughout the Northeast. The system includes a wireless temperature, depth, and orientation probe that attaches to fixed or mobile gear. The goal of this project is to expand the availability of real-time oceanographic data on the New England continental shelf and allows ocean circulation modelers to better understand changing ocean conditions. This summer and fall, the CFRF staff helped install telemetry equipment on F/V Virginia Marie and F/V Terri-Ann, both lobster/crab boats out of Sandwich, MA. To view real time bottom temperatures from fishing vessels involved please visit: https://studentdrifters.org/huanxin/telemetry.html .

Office Location:

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PROJECT UPDATE: SHELF RESEARCH FLEET

Climate change is most often described as a global phenomenon, but it has begun to affect people and their environments at a regional scale. The ocean waters surrounding Southern New England are some of the most productive in the world. But as these waters warm, concerns have been raised about how this will impact fisheries resources and the people who depend upon them. There is an urgent need to better understand the environmental changes taking place, and how these changes are affecting the ecosystem. To address these needs, the CFRF has worked with the Woods Hole Oceanographic Institution (WHOI) to engage fishermen in the collection of oceanographic data from across the continental shelf south of Rhode Island. Fleet participants continue to use wireless Conductivity, Temperature and Depth instruments and iPads to collect water column profiles, view their data, and communicate that data to CFRF and WHOI partners. As of November 2019, the fleet has collected over 599 profiles. Fishermen involved are learning more about the ocean conditions they are working in, and the data has been used by both individual research fleet participants to refine fishing practices, as well as physical oceanographers studying the propagation of warm core rings on the southern New England continental shelf.

ATTENTION FISHERMEN: The CFRF is currently seeking fishing vessels that fish between 40 and 70 fathoms south of Rhode Island to participate in the Shelf Research Fleet. If you are interested please contact Aubrey at: aellertson@cfrfoundation.org or 401-515-4892. For more information please visit our project webpage: www.cfrfoundation.org/shelf-research-fleet .

RECENT RELEASES, PUBLICATIONS, AWARDS AND UPCOMING EVENTS

(DOCUMENTS AVAILABLE AT WWW.CFRFOUNDATION.ORG/NEWS-RELEASES)

- **Press**: **"**How eating sea bass and crab can help Maine lobstermen**"** - Press Herald, April 2019
- **Event**: AFS SNEC Chapter Winter Meeting – Hyatt Regency, Cambridge, MA - January 13-14, 2020
- **Event**: Maine Fishermen's Forum—Rockland, ME – March 5-8, 2020
- **Event**: Seafood Expo North America—Boston, MA – March 15-17, 2020
- **Event**: MA Lobstermen's Association Annual Meeting— Hyannis, MA – April 16-19, 2020

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CFRF NEWSLETTER

May 2020 **ISSUE 12**

COMMERCIAL FISHERIES RESEARCH FOUNDATION

The Commercial Fisheries Research Foundation is a non-profit, private research foundation founded and directed by members of the commercial fishing industry. The CFRF's primary mission is to conduct collaborative research and education projects that assist in the achievement of sustainable fisheries and vibrant fishing communities.

MESSAGE CORNER:

I am excited and grateful to be writing to you as the new Executive Director of the CFRF. Before this, I spent nearly 12 years at the University of Massachusetts Dartmouth School for Marine Science and Technology conducting fisheries research guided by the principles of practical application and collaboration. This fundamental alignment with the Foundation's mission will help me to be an effective leader that will sustain CFRF's excellence while guiding it to new opportunities and through new challenges. These days, one cannot mention challenges without recognizing COVID-19. For our small part we tried to help the fishing community through these times by paying Research Fleet members their stipends if they couldn't sample because of COVID-19 related reasons. We value and recognize that without the support of the fishing community none of the projects described below would be possible.

N. David Bethoney, CFRF Executive Director

PROJECT UPDATE: BLACK SEA BASS RESEARCH FLEET

The Black Sea Bass Research Fleet produces year-round estimates of black sea bass catch, bycatch, and biological data for seven different gear types in the Southern New England and Mid-Atlantic regions. Since our last update in November, the Research Fleet has sampled over 2,000 black sea bass with the total sampled by the Research Fleet just shy of **23,000**! This winter members of our Black Sea Bass Research Fleet began recording black sea bass offshore in December, with a substantial increase in catch in January when the winter season opened. Multiple Research Fleet Members fishing through the winter noticed a substantial increase in juvenile (less then 10 centimeters) black sea bass in the offshore fishery. This is good news as young of the year black sea bass that are able to reach warmer, offshore, waters and survive their first winter in southern New England are believed to play a large role in overall recruitment. Further, the inshore fishing vessels in the Research Fleet active over the winter noticed a high number of adult black sea bass within Narragansett Bay.

The effort from the Research Fleet has also been used to support two supplemental projects to help better manage black sea bass. One project, in collaboration with Northeastern University, collects tissue samples from black sea bass for stable isotope and genomics work. This will allow scientists to trace where the black sea bass in southern New England came from and for direct comparison of black sea bass further north in their range, through Massachusetts and even Maine, to look at demographic differences between the groups of fish. This project was started last summer and will continue this summer. The second project, funded by the Sarah K. De Coizart Charitable Foundation, expands the lab sampling program of the Black Sea Bass Research Fleet to offshore, federal, waters to investigate sexual maturity, diet composition, and aging as black sea bass overwinter off southern New England. Historically, there has been very little data collection on black sea bass during this period of the year due to the relative difficulty of obtaining samples, particularly here in southern New England at the northern end of the species range. Since January, the CFRF has purchased about 600 black sea bass and is currently finishing up the remaining laboratory work described above. We extend a huge thank you to John Peabody and the crew of the F/V Lady Clare for offering the black sea bass needed to complete this project. Stay tuned in the coming months as the data becomes available and we compare the offshore black sea bass from this past winter to the fish we've been collecting inshore from the past three years!

We are pleased to announce the Research Fleet will continue to operate through 2021 thanks to additional funding from the ACCSP! More information on the Black Sea Bass Research Fleet can be found at: http://www.cfrfoundation.org/black-sea-bass-fleet.

Learn more about CFRF at www.cfrfoundation.org Follow us on Facebook!

Project Update: Development of a Marketable Seafood Product from Scup

This project seeks to develop the techniques needed to produce a frozen, boneless, skinless, scup fillet product that meets the needs of consumers and is endorsed by fishermen, fish processing companies, chefs, and food scientists. CFRF, Pier Fish Company, and Johnson and Wales University (JWU) staff have continued efforts with processing, freezing, and tasting trials. After months of trials, the most recent trials conducted in February finally produced promising results with individual vacuum sealed frozen fillets. Through blind taste tests, the vacuum sealed frozen fillets received positive feedback from JWU chefs and students which were on par with fresh fillets tested in previous tasting trials. The project team is now looking into the feasibility of larger batch vacuum sealing of frozen fillets for expanded marketing opportunities. However, due to COVID-19 impacts and social distancing requirements, further trials with the vacuum sealed frozen fillets have temporarily been put on hold. The project team is eager to continue testing and improving this refreshed scup fillet product in the coming months! If you'd like to follow along with our scup processing and marketing efforts, visit the CFRF website: www.cfrfoundation.org/scup-fillet.

Project Update: Lobster and Jonah Crab Research Fleet

The Lobster and Jonah Crab Research Fleet collects critically needed biological data for two commercially important species, the American lobster and the Jonah crab. From the 18 vessels participating in the Research fleet, 148,600 lobsters and 83,900 Jonah crabs have been sampled since June 2013. The Research Fleet continues to evolve and expand vessel participation to address spatial gaps and data needs of American lobster and Jonah crab. Since our last update in November, the Research Fleet sampled consistently through the winter and spring. In April, CFRF welcomed Jon Grant of the F/V Linda and Laura (pictured right) from Block Island, RI to the Research Fleet, and also received 5 additional vessel applications this spring from fishermen interested in being involved. Due to COVID-19, CFRF staff have recorded 2-3 minute-long videos for training purposes as part of a "virtual training" effort and are working with each fishing vessel operator to secure work agreements, and schedule in-person training when safe to do so. Stay tuned for our upcoming announcement of new vessels added to the fleet!

CFRF is excited to announce that the Lobster and Jonah Crab Research Fleet was selected for funding under the NOAA Fisheries Saltonstall-Kennedy Program and received renewed funding from The Campbell Foundation. More information on the Lobster and Jonah Crab Research Fleet can be found at: www.cfrfoundation.org/jonah-crab-lobster-research-fleet.

Project Update: Operationalizing Real-Time Telemetry Systems

The CFRF staff continues to work with the Gulf of Maine Lobster Foundation and the Northeast Fisheries Science Center to install real-time telemetry systems on fishing vessels throughout the Northeast. The system includes a wireless temperature, depth, and orientation probe that attaches to fixed or mobile gear. The goal of this project is to expand the availability of real-time oceanographic data (pictured right) on the New England continental shelf and to allow ocean circulation modelers to better understand changing ocean conditions. This winter, the CFRF staff helped install telemetry equipment on the F/V Nathaniel Lee a lobster-crab boat out of Newport, RI and the F/V Brooke C, a scalloper out of Point Judith, RI. To view real time bottom temperatures from fishing vessels involved please visit: https://studentdrifters.org/huanxin/telemetry.html.

Project Update: Piloting a N-Viro Dredge in The Southern New England Scallop Fishery

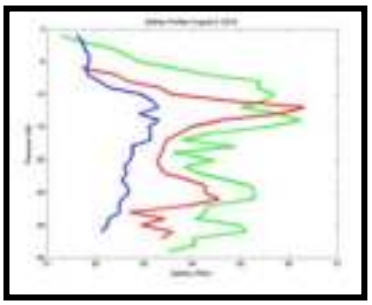
This project seeks to pilot a dredge which could reduce bycatch, minimize habitat impacts, and improve fuel efficiency in the sea scallop fishery. Following some delays to the start of field season, CFRF staff have been busy in 2020 conducting research trips to compare the performance of the N-Viro dredge (pictured right) to New Bedford style dredges on Limited Access General Category (LAGC) vessels. There was a learning curve through the first few research trips with the N-Viro dredge due to new bags that were made for the individual dredges, slower tow speeds, adjustments to the dredge tines and tine bar, and testing of different bottom types and depths. Preliminary results show reduced bycatch rates with the N-Viro dredge, but lower scallop catch rates compared to the participant vessels' New Bedford style dredges. Staff have now completed roughly half of the research trips for the project on LAGC vessels, and there will also be a five-day research trip aboard a Limited Access (LA) vessel to conduct paired tows of the N-Viro dredge with a New Bedford style dredge.

Once all research trips and data analyses have been completed, CFRF staff and participant vessel captains will host a workshop to discuss the project results and applicability of the N-Viro dredge to LAGC and LA vessels in Southern New England. This workshop will take place later this fall or winter – be sure to check back in so you don't miss it! To find out more about the N-Viro dredge project results, visit the CFRF website: http://www.cfrfoundation.org/piloting-novel-dredge-type.

Project Update: Shelf Research Fleet

The Shelf Research Fleet works with scientists at the Woods Holes Oceanographic Institution (WHOI) to measure changes in oceanographic conditions, particularly temperature, to better understand how these changes may impact the distribution and abundance of key fisheries resources. As of April 1, 2020, over 630 salinity, temperature and depth profiles in six areas off the coast of Rhode Island have been collected by the Shelf Research Fleet. This data contributed to a recent scientific manuscript by lead WHOI Shelf Research Fleet scientist Dr. Glen Gawarkiewicz and others that described a marine heat wave that occurred in 2017 over the Mid-Atlantic Bight. In January 2020, members of the Shelf Research Fleet and fishing industry met with WHOI scientists to discuss recent oceanographic conditions and to share at-sea observations. Data showed that in 2019, the first half of the year was generally cool and fresh, while the second half of the year was very warm and salty due to warm core rings. After that meeting, there were several media requests by Yahoo Finance and WBUR NPR Boston. The Yahoo Finance piece on climate change and the impacts to fishing businesses can be found here: https://finance.yahoo.com/news/how-warming-oceans-are-disrupting-the-food-supply-chain-in-america-151557695.html. More information on the Shelf Research Fleet can be found at: http://www.cfrfoundation.org/shelf-research-fleet.

Project Update: Salinity Maximum Intrusions



CFRF has partnered with oceanographers from the Woods Hole Oceanographic Institute, the University of Massachusetts Dartmouth School for Marine Science and Technology and the National Marine Fisheries Service on this project. The oceanographers, led by Dr. Glen Gawarkiewicz, will be attempting to map mid-depth salinity maximum intrusions on the Southern New England Continental Shelf. A salinity maximum intrusion is as an important exchange process that contributes significantly to the salt balance over the continental shelf. One of these intrusions, increasing salinity to 36 PSU, is depicted at 15 meters of depth in the Shelf Research Fleet profile taken off of Martha's Vineyard in 2018 shared here. Researchers will use autonomous underwater vehicles to measure the physical properties of the salinity maximum intrusions, which are associated with warm core rings. The combination of this data and the daily surveys from two REMUS vehicles will be used to create daily three-dimensional maps of temperature, salinity, and microstructure in the salty intrusions. The initial 7-day pilot cruise was delayed until August 2020 due to COVID-19 and the 14-day main cruise is scheduled for May 2021. The CFRF will be leading the outreach efforts included in the project, which seek to share project information and discuss implications with the commercial fishing industry. Look forward to more information in the coming months at http://www.cfrfoundation.org/salinity-max!

New Project: A Pro-Seafood Climate Action Agenda

A group of Rhode Island and Massachusetts fishing organizations recently initiated a process to craft a new narrative on climate solutions - one that places wild seafood production at its core. In February, the Commercial Fisheries Center of Rhode Island, Massachusetts Fishermen's Partnership, and Fishing Partnership Support Services conducted the first in a series of learning circles designed to identify climate solutions that fishermen can get behind. The series was cut short by the COVID-19 pandemic. In March, the Food and Farm Communications Fund awarded a 16-month grant to the CFRF, on behalf of the three fishermen's organizations, to undertake a narrative building project. Through this project, fishermen will complete a scan of available climate solutions that could complement or replace a reliance on offshore wind, build networks with other frontline communities, and participate actively in state- and federal-level energy planning processes. Fishermen are invited to contact Mike Roles (mtroles@gmail.com) and Sarah Schumann (schumannsarah@gmail.com) for more information and to help shape the project. The partners are grateful to the Food and Farm Communications Fund for making this important work possible!

COMMERCIAL FISHERIES CENTER OF RHODE ISLAND
FISHING PARTNERSHIP SUPPORT SERVICES

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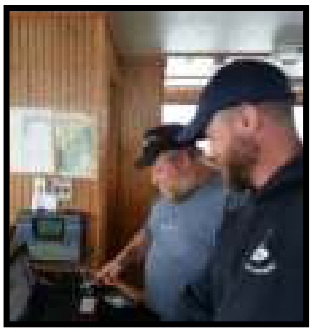
New Project: River Herring Bycatch Avoidance Program



This is an established project that CFRF has become a new partner in with the arrival of Dr. Bethoney. CFRF is now part of a collaboration between the University of Massachusetts Dartmouth School for Marine Science and Technology, the Massachusetts Division of Marine Fisheries and 8 fishing companies representing 13 vessels. The program, started in 2010, provides area specific information to help fishermen stay under river herring bycatch limits while targeting Atlantic herring and Atlantic mackerel. The information includes the location of unsustainable bycatch events, calculation of tons of target species that may be caught at current observed bycatch rates, the impact that observed bycatch will have on the overall bycatch rate in the fishery, and communications that compare individual vessel bycatch rates to the fleet's rates. These consistent communications have positively influenced fishing habits and played a role in the approximately 60% decrease in total bycatch and 20% decrease in the bycatch ratio observed during the program prior to river herring catch limits. More information on the River Herring Bycatch Avoidance Program can be found at: https://www.umassd.edu/smast/bycatch/

Education and Outreach

- Four undergraduate students from Brown University worked with CFRF staff and Board of Directors member Norbert Stamps to produce a video in conjunction with a bill moving through the Rhode Island state legislature. The bill would ban the release of bulk balloons in the state. Photos and videos provided by fishermen who found balloons floating at sea were used along with an interview of Norbert to spread awareness about this issue. Check out CFRF's Facebook page to see the final video, and share with your friends to spread awareness to the issue of mass balloon release!
- This February, Aubrey Ellertson and Michael Long (CFRF staff) teamed with Kate Masury (Eating with the Ecosystem), and joined Dr. Dawn Kotowicz's Sustainable Seafood panel created as part of her Human Use and Management of the Marine Environment class at the University of Rhode Island. The goal of this panel was to present students with an overview of a few issues related to sustainable seafood focusing on Rhode Island fisheries. CFRF staff presented an overview of Rhode Island commercial fisheries, research initiatives underway by CFRF, as well as highlighted two specific projects: CFRF's Lobster and Jonah Crab research Fleet and Scup fillet production and marketing.

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COMMERCIAL FISHERIES RESEARCH FOUNDATION

CFRF NEWSLETTER

NOVEMBER 2021 ISSUE 16

COMMERCIAL FISHERIES RESEARCH FOUNDATION

The Commercial Fisheries Research Foundation is a non-profit, private research foundation founded and directed by members of the commercial fishing industry. The CFRF's primary mission is to conduct collaborative research and education projects that assist in the achievement of sustainable fisheries and vibrant fishing communities.

MESSAGE CORNER:

This is the time of year where gratitude and reflection are paramount. The CFRF is fortunate to have a skillful team of researchers. They have allowed us to increase the amount of research and education we are conducting and therefore our impact on the communities we hope to support. We are grateful for all the members of the fishing community who make this research possible through their contributions on land and sea. Our work is also made possible due to collaborations with fishery scientists, managers, and culinary professionals. Thank you all! As I reflect upon this past year, my thoughts go to Norbert Stamps who passed away a few months ago. Norbert was a champion of collaborative research who played a key role in the founding of our Lobster-Crab and Shelf Research Fleets. As a Board member of CFRF, he was never short on new ways for CFRF to pursue its mission. We'll keep working to make Norbert and all of our supporters proud in this upcoming year. Happy holidays to all and make sure you enjoy some local seafood during your celebrations!

Fred Mattera, CFRF President

PROJECT RESULTS: MAPPING HOTSPOTS AND PILOTING UNDERWATER VIDEO TECHNOLOGY

This project tested and confirmed the use of fishermen's knowledge and underwater video as a method to refine ghost gear (discarded or lost fishing gear) locations for removal. A map of ghost gear locations was generated for Narragansett Bay using nautical charts and interviews with eight commercial fishermen that use lobster traps, fish pots or trawl. The map, pictured left, was then used to navigate to ghost gear hotspots during two surveys, one in June aboard the trawler Christopher Andrew and a second in August aboard the lobster vessel Catherine Anne (pictured). Two live-feed camera systems were deployed and evaluated for utility during these surveys. We were able to find ghost gear on the sea floor and learned a lot about ways to improve this approach. To test reproducibility of finding gear identified by camera, we used a waypoint location from the June survey to relocate a ghost gear rope during the August survey. We were successfully able to renavigate to the location. The less expensive GoPro camera system performed the best during the surveys. The survey results were developed into an interactive ghost gear image map of Narragansett Bay. This map and a video produced by 11th Hour Racing that summarizes the project can be viewed at the project webpage. This project also provided us with an opportunity to network with other organizations working on ghost gear removal both regionally and internationally. We jointly hosted a webinar with the Global Ghost Gear Initiative that brought together local ghost gear removal programs in Maine (Gulf of Maine Lobster Foundation) and Cape Cod (Center for Coastal Studies). Thank you to all the fishermen that helped with this project and the funder, 11th Hour Racing.

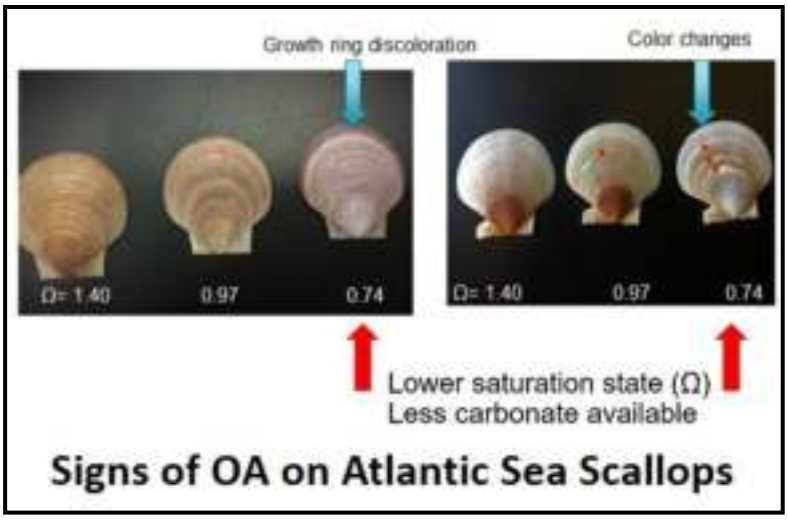
The results from this project were key to our next step in ghost gear work; a sustainable plan for its removal from Rhode Island waters. Next month we will begin developing this plan with a Southeast New England Program Watershed grant!

Learn more about CFRF at www.cfrfoundation.org

Follow us on Facebook!

Project Update: Assessing the Vulnerability of the Atlantic Sea Scallop Social-Ecological System:

This project's objective is to determine the vulnerability of the sea scallop fishery, both the scallops and the communities that rely on them, to ocean acidification (OA) and temperature changes. A focus of the first year was a set of workshops in New Bedford, MA, Point Judith, RI, and Barnegat Light, NJ to establish interest in the project and create positive partnerships with sea scallop fishermen. We wrapped up our last fishing community workshop for year one of the project earlier this month. The workshops generated lively and constructive discussions that continued on site after the end of their designated times. Although each workshop had some regional differences in comments from the participants, the workshops also revealed some common perceptions on the impact of ocean warming and acidification on the scallop fishery that we will address in year two. Other feedback focused on improving the workshops including increasing the length of the workshops to allow more time for question and answers. Initially we assumed that a shorter workshop would provide a more positive experience for the participants. Further, we will modify the presentations for each workshop to include more local and regional results from the project. Lastly, based on feedback from a pilot workshop, we moved the timing of the workshops this year to late summer early fall and we plan to hold the workshops next year in the late fall period. For more information on this project visit the webpage here. We look forward to updating everyone on the progress of the different project components in next year's workshops.



Project Update: Development of a Marketable Seafood Product From Scup

This project seeks to develop a frozen scup fillet product that meets consumer, fisherman, fish processor, and chef needs. Efforts for this project have largely been on hold since the spring of 2020 due to the Covid-19 pandemic. The project team recently partnered with Chef Joshua Berman of J.B. Cuisine to promote the scup fillet product at the Rhode Island Seafood Festival. CFRF managed a vendor booth at the festival, and 500 free samples of "Crispy Narragansett Bay Scup Tacos" prepared by Chef Berman were distributed to festival attendees. At the booth we also discussed and promoted the project and local sustainable seafood. All patrons gave positive feedback on the scup tacos and indicated that they would be open to buying and cooking scup in the future. Extra frozen scup fillets were donated to the Jonnycake Center Food Pantry in South Kingstown, RI. The project team is now preparing to promote the frozen scup fillet product to a global audience at the Seafood Expo North America in Boston this March. If you'd like to follow along with our scup processing and marketing efforts, visit the CFRF project webpage here.

Project Update: Piloting a Low-Bycatch Automatic Squid Jig Fishery in SNE

This project investigates the feasibility of automatic squid jigging machinery, used in other large-scale squid fisheries worldwide, in the southern New England Longfin squid fishery. We faced initial delays when the jig equipment was caught up in customs on its way over from Sweden. Once the equipment arrived, some quick thinking and working with Champlin Welding was required to make the squid jigs fully operational on both vessels piloting the gear. We completed five at-sea trials aboard our in-shore collaborating vessel, the F/V Miss Edi, between May 19 to August 12. Sampling occurred between the hours of 7:00 pm to 5:00 am in waters off Rhode Island with waning success as spring progressed to summer. We also completed a four-day trip aboard the F/V Mattie and Maren south of Nantucket, MA in late June. The automatic squid jigs ran overnight, similar to the inshore trips. Functionally, the squid jigs ran very smoothly aboard both vessels, however, we had limited success in catching squids. We believe that the squid's summer time reproductive behaviors made them less likely to attack and be caught by our jigs. We will see how this theory pans out as we complete the rest of the at-sea trials in the spring. Check out the project webpage here for more information and updates. Thanks to our partners at Town Dock and support from the NOAA Bycatch Reduction Engineering Program and the Mid-Atlantic Fishery Management Council.

Project Update: South Fork Wind Farm Fisheries Monitoring— Beam Trawl Survey

Year one of the beam trawl survey was completed this October! The goal of the survey is to help determine potential impacts of wind farm development on bottom dwelling animals. The South Fork Wind Farm development area and two reference areas to the east and west are monitored. The main takeaway from the year one data is that our eastern control area is very different from the impact area and the western control area. The eastern area has a muddy bottom that is dominated by rock crab and little skate, while the other two areas have more hard structure and higher biodiversity. We have also observed some minor seasonal changes particularly with the higher catch of fish during the spring in all areas, more details on the seasonal changes can be viewed on the survey webpage here. A big thank you to the F/V Mister G and all those who participated in year one of the survey. Stay tuned for what the next year will bring!

Project Update: South Fork Wind Farm Fisheries Monitoring — Ventless Trap Survey

From May through November of 2021, we worked with University of Rhode Island Graduate School of Oceanography students, the F/V Amelia Anne, F/V Ashley Ann II, and F/V Erica Knight out of Point Judith, RI to complete the first year of this survey. The goal of the survey is to assess the seasonal abundance, distribution, movement, and habitat use of lobster and Jonah crab in the South Fork Wind Farm development area and two reference areas to the east and west. Through the first few months of the survey, the wind farm area and western control had relatively low catch rates of lobster, Jonah crab, and rock crab, while the eastern control area was dominated by rock crabs, regularly getting over 100 crabs in each ventless trap. As the survey moved into late summer and fall, the catch rates of all three areas became more comparable with higher catch rates and a mix of lobster, Jonah crab, and rock crab dominating the catch in all three areas. In addition to the survey, in each of the three survey areas 500 lobsters were tagged to monitor their movement and occupancy behaviors. These green t-bar tags are designed to stay in the lobsters through at least one molt, so all Southern New England lobstermen should keep their eyes out for tagged lobsters while hauling gear! We would like to thank all the fishing vessel captains, crews, and research staff who contributed to the first year of data collection for survey. If you'd like to find out more about the survey, visit the CFRF survey webpage here.

New Project: Whelk Research Fleet

We are pleased to announce the latest expansion of the Research Fleet model; the Whelk Research Fleet. Whelk (conch) are notoriously difficult to manage due to their slow maturation and growth rate coupled with localized larval and adult distributions. Despite the relatively high value of the fishery in both Rhode Island and Massachusetts there is substantial uncertainty around whelk populations and management due to a lack of biological data. The Whelk Research Fleet will seek to fill data gaps in the combined Knobbed and Channeled Whelk fishery across southern New England through fishermen collected data. The same principles and at-sea protocols established by our other Research Fleets will be applied. We officially began work on this Atlantic Coastal Cooperative Statistics Program funded project in September and are looking forward to commencement of sampling in the spring fishery. The Whelk Research Fleet will be cooperatively run with the Rhode Island Department of Environmental Management and the Martha's Vineyard Fishermen's Preservation Trust. If you are interested in learning more about the project or are interested in applying, please visit the project webpage here.

More On-Going Projects:

- **A Pro-Seafood Climate Action Agenda:** A group of RI and MA fishing organizations initiated a process to craft a narrative on climate solutions that places wild seafood production at its core. Contact Sarah Schumann (schumannsarah@gmail.com) for more information.
- **Black Sea Bass Research Fleet:** In partnership with RI DEM, the Black Sea Bass Research Fleet produces year-round estimates of black sea bass catch, bycatch, and biological data for seven different gear types in the Southern New England and Mid-Atlantic regions. More information can be found on the project webpage here .
- **Catalyzing the Restoration of the Bay Scallop:** This project seeks to help develop a restoration plan for bay scallops in Rhode Island. Information on this project can be found here.
- **Lobster and Jonah Crab Research Fleet:** This Research Fleet provides year-round biological data and environmental data from lobster and Jonah crab traps. Please visit our project webpage here to find more information about this project and the Lobster and Jonah Crab Research Fleet.
- **Phase II Piloting a N-Viro Dredge in the Scallop Fishery:** This project builds on previous work to utilize this dredge to reduce bycatch, including small scallops, in the sea scallop fishery. To follow along with the N-Viro dredge project and read the Phase I project report, visit the CFRF project webpage here.
- **Salinity Maximum Intrusions:** This project will map intrusions of warm, salty water that may influence fish distributions in Southern New England. Check out the blog and our project webpage here for more information and stay tuned for the meeting announcement.
- **Scallop Research Fleet:** The main goal of this pilot Research Fleet is to develop and test methods of collecting individual weights and spawning condition of scallop during normal fishing operations. For updates visit the project webpage here.
- **Shelf Research Fleet:** In partnership with Woods Hole Oceanographic Institution the Shelf Research Fleet collects oceanographic data along the continental shelf. More information can be found on the shelf research fleet the project webpage here.
- **South Fork Wind Farm Fisheries Monitoring—Fish Pot Survey:** This survey is designed to determine the spatial scale of potential impacts on the abundance and distribution of structure associated finfish in the immediate area around the wind farm installation. More information on this project can be found at the survey webpage here.
- **South Fork Wind Farm Fisheries Monitoring—Gillnet Survey:** This survey is designed to assess the seasonal abundance and distribution of monkfish and winter skate in the South Fork Wind area and two reference control areas to the east and west. More information on this project can be found at the survey webpage here .

Education and Outreach:

- In September, David Bethoney presented "The Commercial Fisheries Research Foundation: Who we are and what we do" at the University of Massachusetts Dartmouth School for Marine Science graduate student seminar
- In October, Michael Long presented to thirteen Indonesian government officials attending the Science for Sustainable Fisheries Policy in Indonesia course at the University of Rhode Island.
- In October, David Bethoney gave "An overview of annual Atlantic sea scallop management and the science behind it" to Roger Williams University students as part of their Marine Resource Management course.
- In November, we made presentations on the Research Fleets (David Bethoney), characterizing Black sea bass discards (Hannah Verkamp), and the wind farm surveys (Carl Huntsburger) at the American Fisheries Society Annual Meeting. Noelle Olsen moderated the collaborative research symposium and coordinated student volunteers at the meeting.

Recent Releases, Publications, Awards and Upcoming Events:

- Video Release: Check out the new CFRF introductory video here .
- Video Release: In the summer of 2021, Charlie Enright of the 11th Hour Racing Team took an excursion out on his local waters of Narragansett Bay with the Commercial Fisheries Research Foundation onboard the fishing vessel Christopher Andrew to learn about the problems ghost gear causes for local habitats and commercial fishermen. The video of that June 28,2021 ghost gear survey can be viewed here.
- Upcoming Event: Seafood Expo North America, Boston, MA, March 13-15, 2022.
- Upcoming Event: Massachusetts Lobstermen's Association Meeting, Hyannis, MA, March 24-27, 2022.

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COMMERCIAL FISHERIES RESEARCH FOUNDATION

CFRF NEWSLETTER

MARCH 2022 **ISSUE 17**

COMMERCIAL FISHERIES RESEARCH FOUNDATION

The Commercial Fisheries Research Foundation is a non-profit, private research foundation founded and directed by members of the commercial fishing industry. The CFRF's primary mission is to conduct collaborative research and education projects that assist in the achievement of sustainable fisheries and vibrant fishing communities.

MESSAGE CORNER:

For decades we've tried to sort out a means to improve the value of scup to fishermen. A goal has been to diminish the reliance of the consignment market in the cities (New York City, Jessup/Baltimore and Philadelphia) to allow supply and demand to dictate the pricing. CFRF took on the incredible challenge to seek such a solution by enhancing marketing of scup. Fortunately, scup stocks are sustainable for the long term, but the challenges were many: fillet machines for volume, fresh vs. frozen, fish size, fillet size, vacuum packs, fresh/frozen finish fillets and marketing outlets. We agreed to collaborate with Pier Fish Company to process and market, Johnson & Wales University and local chefs to provide exquisite recipes, tastings and nutritional value, and RI fish dealers for quality product. For over four years this partnership was all led at CFRF by research biologist Mike Long. Mike toiled with the team, experimenting and confronting trials until a viable fillet was available. Earlier this month, the entire team displayed their fillets at the Seafood Expo North America with chefs producing delicious "scup tacos" to a receptive audience of fish buyers. Pier Fish salesmen cultivated interest of potential buyers from supermarket chains and institutional markets. The future is brighter due to the tenacious effort of Mike and the collaborators.

Fred Mattera, CFRF President

PROJECT RESULTS: DEVELOPMENT OF A MARKETABLE SEAFOOD PRODUCT FROM SCUP

Our scup processing and marketing project finally came to its culmination this month. The goal of the project was to develop a frozen scup fillet product that met consumer demand, improved prices, and justified expanded harvest of this underutilized species. In achievement of that goal, we debuted vacuum sealed, boneless and skinless frozen scup fillets in an exhibitor booth and the New Product Showcase at the Seafood Expo North America in Boston. This is the biggest seafood show in the country, bringing together more than 1,300 suppliers from 49 countries to provide North America's seafood buyers access to their products. At the booth, CFRF and Commercial Fisheries Center of Rhode Island staff relayed the sustainability of the scup fishery, fishermen perspectives and the market challenges scup faces. Pier Fish Company staff met with potential retail and food service buyers. Chef Josh Berman of JB Cuisine and Johnson and Wales University students served nearly 1,000 free fried scup tacos to potential buyers and Expo attendees. Dodge Associates produced great outreach materials for the booth, while the Sustainability Incubator set the stage with a press release prior to the event. A true example of teamwork! Feedback throughout the Expo was extremely positive, and Pier Fish staff received many promising sales inquiries that will likely lead to expanding the market for scup in its new frozen fillet form. This project originally started in 2018, but due to Covid-19 delays, the project was extended several times to ensure that the final frozen fillet product could be presented at the Seafood Expo. We are thankful to the NOAA Saltonstall-Kennedy program for funding this project and working with us to extend it.

We are now preparing the final project report, which will be available on the project website when completed. If you'd like to read the final report once released and find out more about the project, visit the project webpage here.

Learn more about CFRF at www.cfrfoundation.org Follow us on Facebook!

Project Update: Lobster and Jonah Crab Research Fleet

Even in the face of rough weather and storms this fall, the Lobster and Jonah Crab Research Fleet was hard at work sampling over 5,000 lobsters and 2,900 Jonah crab since November. This brings the total number of lobster and Jonah crabs sampled since 2013 to over 181,500 and 107,400, respectively. This is impressive and we would like to thank all the fishermen involved for their time and effort! The data collected by the Research Fleet are incorporated into the lobster and Jonah crab biosamples databases at the Atlantic Coastal Cooperative Statistics Program and used extensively in the lobster stock assessment and upcoming Jonah crab stock assessment. The effort from the Research Fleet has also been used to support several supplemental projects to help better understand the lobster and Jonah crab resource. One includes working with Jim Manning at the Northeast Fisheries Science Center to incorporate CFRF's bottom water temperature data into his larger data set. Another, in collaboration with Jesica Waller (ME DMR) and Dr. Tracy Pugh (MA DMF), led to a publication in *Fisheries Research* about lobster size at maturity in offshore areas (see the publications section at the end of the newsletter).

The Research Fleet will continue data collection, with support by the Campbell Foundation, the Atlantic States Marine Fisheries Commission, and NOAA's Saltonstall-Kennedy Program. We are looking to bring on additional offshore vessels. Please visit the project webpage here to find more information about this project and an application form to join the fleet.

Project Update: South Fork Wind Farm Fisheries Monitoring—Fish Pot Survey

Year-1 of the South Fork Wind Farm Fish Pot survey came to a close with the final survey trip occurring on December 29th. The survey is designed to determine the spatial scale of potential impacts of wind farm turbine construction on the abundance and distribution of structured associated finfish species. A huge thanks go out to Joe Baker and Evan Adams of F/V Harvest Moon for their attention and dedication throughout the first year of the survey! Catch throughout the sampling season fluctuated but was dominated by Jonah crabs and black sea bass. Crab catch peaked in August and December. Black sea bass catch increased through the initial survey months and peaked in October and remained high through December. Scup catches were consistent throughout the survey, but were only a fraction of the amount of black sea bass. Other species of fish such as cunner and conger eels were common in some months but never in the abundances of black sea bass or even scup.

More information on this project can be found here. Funding for this monitoring is provided by South Fork Wind LLC.

Project Update: South Fork Wind Farm Fisheries Monitoring—Gillnet Survey

This December marked the completion of the first year of the gillnet survey. The survey is conducted in partnership with the F/V Cailyn and Maren and F/V More Misery, and is designed to assess the seasonal abundance, distribution, movement and habitat use of winter skate and monkfish in the South Fork Wind Farm area and two reference areas to the east and west of Cox Ledge. The eastern reference area encountered 20 different species and was dominated by skates (both winter and little skates), monkfish, bluefish, summer flounder and spiny dogfish. The proposed wind farm area encountered 23 different species and was dominated by skates, monkfish, bluefish, Jonah crab and spiny dogfish. Finally, the western area had the most species encountered (27!) and was dominated by winter skate, sea scallops, monkfish, bluefish, little skate and Atlantic menhaden. The second year of the survey will kick off next month.

More information on this project can be found here. Funding for this monitoring is provided by South Fork Wind LLC.

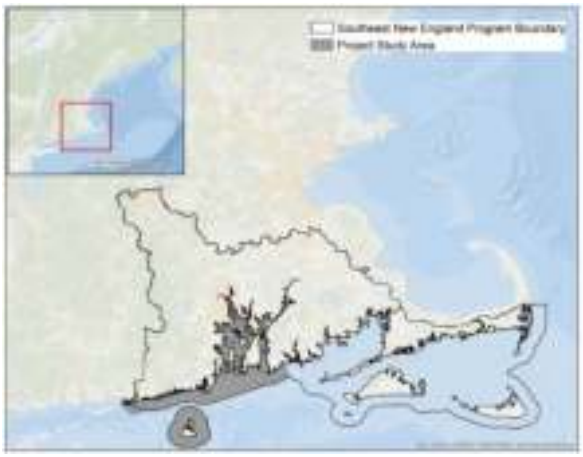
New Project: Electronic Gear Location Marking

We are in the planning stages of a new project supported by the National Fish and Wildlife Foundation to test an electronic gear location marking application (app). To reduce gear entanglement by North Atlantic Right Whales, there has been a movement towards buoyless fishing systems. Less attention than needed has been given to the fact that without an adequate marking tool conflicts with mobile gear threaten the viability of several fisheries in shared fishing grounds. There is a crucial need for reliable technology that allows fishermen to identify the location of gear that does not have buoys. In collaboration with NOAA, this project will leverage our South Fork Wind Farm fisheries monitoring surveys and recruit additional fishermen to test the accuracy and utility of the Track Tracker app that was developed to fill this need, but has not been sufficiently tested. Our goals are to identify how accurately this app reflects the true location of marked gear, as well as to determine the usefulness of this app to fishermen. Stay tuned for project updates here!

Sample Track Tracker App Chart

New Project: Rhode Island Ghost Gear Removal Plan

Ghost gear, or derelict fishing gear, impacts coastal Rhode Island waters. This new project builds on the results of a recently completed project which mapped ghost gear locations in Narragansett Bay. Now, with the support of commercial fishers and other regional stakeholders we will develop a cohesive, sustainable ghost gear management and removal plan to remove this gear and more from Rhode Island waters. As part of this project, we are organizing regional partnerships to help develop and implement the plan, and will host a workshop in late summer that will bring together local stakeholders and international experts to discuss and evaluate the planning document. The project will conclude with outreach to the public on this plan and the issue of ghost gear. See our project webpage here for workshop, public meeting announcements and outreach materials. This project is funded by the Southeast New England Program watershed grants.



New Board Member: Katie Almeida, The Town Dock:

We are excited to publicly welcome our newest board member, Katie Almeida. Katie is the Senior Representative of Government Relations and Sustainability for the Town Dock located in Point Judith, Rhode Island. The Town Dock is the largest supplier of calamari in the United States. They own six otter trawl vessels that fish for longfin squid, illex squid, whiting, butterfish, fluke, scup, black sea bass, herring, and a mix of groundfish. Katie is responsible for following all state and federal regulations that pertain to the species on which the Town Dock relies. She sits on the Squid/Mackerel/Butterfish, Fluke/Scup/Black Sea Bass, River Herring/Shad, and Small Mesh Multispecies Advisory Panels. She also is a part of the New Bedford working group for Wind Industry Issues and the Rhode Island Industry Advisory Committee. Further, she is a board member of the Responsible Offshore Development Alliance and Responsible Offshore Science Alliance. She brings a lot of valuable experience and connections to help guide CFRF.

More On-Going Projects:

- **A Pro-Seafood Climate Action Agenda:** A group of RI and MA fishing organizations initiated a process to craft a narrative on climate solutions that places wild seafood production at its core. Contact Sarah Schumann (schumannsarah@gmail.com) for more information.
- **Assessing the Vulnerability of the Atlantic Sea Scallop Social-Ecological System:** This project looks at how vulnerable sea scallop fishing communities are to ocean acidification and warming water temperatures and develops recommendations on how to build resiliency to these changes. For more information on this project visit here.
- **Black Sea Bass Research Fleet:** In partnership with RI DEM, the Black Sea Bass Research Fleet produces year-round estimates of black sea bass catch, bycatch, and biological data for seven different gear types in the Southern New England and Mid-Atlantic regions. More information can be found here .
- **Catalyzing the Restoration of the Bay Scallop:** This project seeks to help develop a restoration plan for bay scallops in Rhode Island. Information on this project can be found here.
- **Phase II Piloting a N-Viro Dredge in the Scallop Fishery:** This project builds on previous work to utilize this dredge to reduce bycatch, including small scallops, in the sea scallop fishery. To follow along with the N-Viro dredge project and read the Phase I project report, visit the CFRF project webpage here.
- **Piloting a Low-Bycatch Automatic Squid Jig Fishery:** This project investigates the feasibility of automatic squid jigging machinery, used in other large-scale squid fisheries worldwide, in the southern New England Longfin squid fishery. Check out the project here for more information and updates.
- **Salinity Maximum Intrusions:** This project will map intrusions of warm, salty water that may influence fish distributions in Southern New England. Check out the blog at https://sirates.sites.umassd.edu/ and our project webpage here for more information.
- **Sea Scallop Research Fleet:** This project seeks to develop and test methods of collecting individual weights and spawning condition of scallops during normal fishing operations. For project updates visit here.
- **Shelf Research Fleet:** In partnership with Woods Hole Oceanographic Institution the Shelf Research Fleet collects oceanographic data along the continental shelf. More information can be found here.
- **South Fork Wind Farm Fisheries Monitoring— Beam Trawl Survey:** This survey is designed to help determine potential impacts of wind farm development on bottom dwelling animals. More information can be found here.
- **South Fork Wind Farm Fisheries Monitoring—Ventless Trap Survey:** The goal of the survey is to assess the seasonal abundance, distribution, movement, and habitat use of lobster and Jonah crab in the South Fork Wind Farm area and two reference areas to the east and west. More information can be found at here.
- **Whelk Research Fleet:** In partnership with RI DEM, this project seeks to fill data gaps in the combined Knobbed and Channeled Whelk fishery across southern New England through fishermen collected data. Please visit the webpage for more information here.

Education and Outreach:

- In January, David Bethoney presented results from our ghost gear work at the Land to Sea Speaker Series.
- In February, Aubrey Ellertson joined fellow members of the Sea Grant American Lobster Initiative for a network-wide meeting to discuss ways to foster collaboration and a sense of community across the expanding research program.
- In March, Aubrey Ellertson attended the virtual Ocean Science Meeting and presented "*Fishermen on the Front Lines of a Warming Ocean: The Shelf Research Fleet*".

Recent Releases, Publications, Awards and Upcoming Events:

- **Event**: Research Workshop on Jonah Crab Management, April 6th, 3-7pm. For information and to RSVP, visit here.
- **Article**: "Scientists, Shellfishermen Seek Strategies to Sustain Ocean State's Dwindling Bay Scallop Populations" - ecoRI News, January 2022
- **Recent Publication**: "*Differences in the size at maturity of female American lobsters (Homarus americanus) from offshore Southern New England and eastern Georges Bank*." (Ellertson et al. 2022), Fisheries Research, Volume 250
- **Press Release**: "SENA Launch Sustainable Wild Atlantic Scup for Food Service", March 2022

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