Year 2 Report
SFW01-0097 Fisheries Monitoring Plan
WP1: Gillnet Monitoring Plan

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Submitted By: N.David Bethoney, PhD Susan Inglis, PhD, Aubrey Ellertson,

Commercial Fisheries Research Foundation
Tel: 401-515-4662
Fax: 401-515-3537
Email: dbethoney@cfrfoundation.org

Gregory Mataronas
Sakonnet Point Fisheries, LLC
Tel: 401-595-4782
Email: saklob@aol.com

Todd Sutton
Sutton Enterprises, Inc.
Tel: 401-226-3745
Email: fvsweetmisery@aol.com

Name of Lead Institution: Commercial Fisheries Research Foundation

Lead Contact: N. David Bethoney, CFRF Executive Director
Administrative Contact: Teresa Winneg, CFRF Business Manager
Commercial Fisheries Research Foundation
P.O. Box 278, Saunderstown, RI 02874
E-mail: twinneg@cfrfoundation.org
Phone: (401) 515-4890
Fax: (401) 515-3537
Website: www.cfrfoundation.org

Executive Summary

The Commercial Fisheries Research Foundation (CFRF) and fishing partners completed the second year of the South Fork Wind Farm pre-development fisheries monitoring gillnet survey. During the reporting period, spring survey trips were conducted in April-June and the fall seasonal survey was completed between October-December 2022. The gillnet survey gear consists of five gillnet strings per area with six, 300-foot net panels of 12-inch mesh and tie downs. A total of ninety nets were sampled, twice per month on a 24-hour soak during survey periods. The entire catch was measured, and weighed, with length/width measurements taken of individual fish and crustacean species. Stomach samples were collected from select commercially valuable fish species such as winter skate, monkfish and Atlantic cod for prey composition analysis. Oceanographic conditions including temperature, depth, salinity, and weather conditions were recorded for each string. Preliminary results reported in this document cover the second year of surveying. For this second year, the eastern reference area encountered 22 different species and as in the previous year was dominated by skates (winter and little skate), monkfish, and bluefish. The western reference area encountered 30 different species and was dominated by skates (winter skate, little skate) with sea scallops, monkfish, bluefish, summer flounder and chub mackerel as part of the assemblage. Finally, the proposed wind farm area encountered 27 different species and was again dominated by winter skate, monkfish, little skate, and bluefish with an increase in Atlantic mackerel this year. An increase in Atlantic menhaden in all three areas was observed and no blue fin tunas were observed this year. The bottom water temperatures were cooler than in 2021 and the salinity slightly higher in 2022. During the spring months, winter skate dominated the catch with consistent lower levels of summer flounder, monkfish, little skate, spiny dogfish and Atlantic menhaden. This year the expected increase in monkfish and winter skate during their migration in the fall was not observed, but a consistent catch of little skate and bluefish occurred. As in the previous year's stomach analysis, we found a dominance of fish in monkfish diets with winter skate consuming a much more diverse diet.

Introduction

The Commercial Fisheries Research Foundation in partnership with local fishermen conducted pre-construction fisheries monitoring survey of the South Fork Wind Farm (SFWF) near Cox Ledge. Due to the bathymetry and substrate in the construction area, four different gear types with different selectivity were employed: beam trawl survey, gillnet survey, ventless trap survey, and fish pot survey. One of the primary methods for assessing anthropogenic impacts on natural habitats is the Before-After-Control-Impact (BACI) design. The ideal design for this experiment requires baseline information before impact in multiple control areas from several points in time. This asymmetrical design is needed not only to evaluate the variation in animals and habitat within impact areas before and after development, but also to ensure changes in variation can be attributed to the anthropogenic impact. The gillnet survey used a BACI design, with a focus on monkfish and winter skate, to assess whether detectable shifts occur in the presence, relative abundance, and demographics of these species before and after construction (Figure 1). The survey also collected data on the oceanic conditions associated with fish catch to interpret results in the context of a changing environment and provide general information about animal ecology in the area.

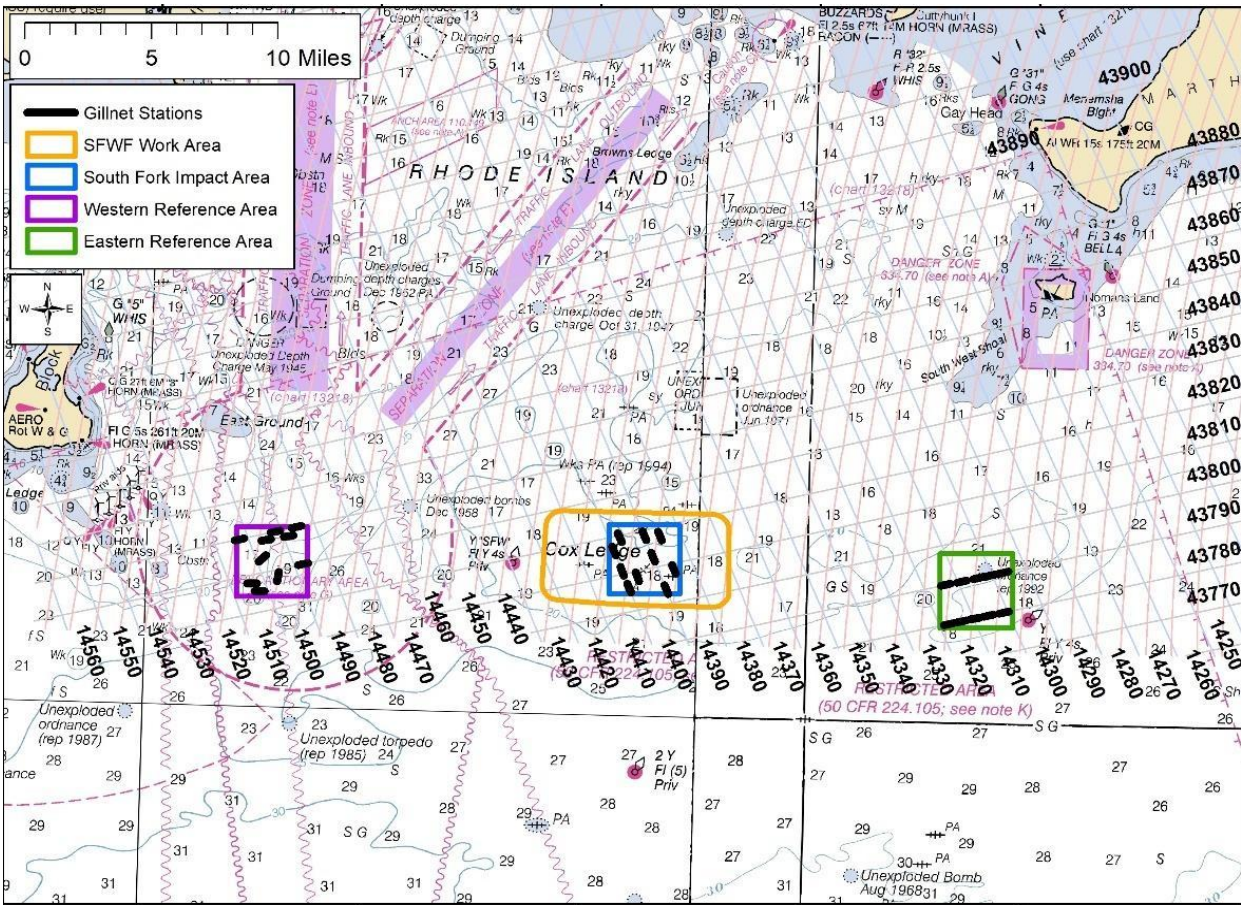


Figure 1. The South Fork Wind Farm (SFWF) gillnet survey area including the impact area and western and eastern reference areas.

The survey began in May 2021 with sampling occurring twice per month from May-June 2021, and then October-December 2021. This report details the methods of the survey and summarizes the result from the second year of sampling that took place in April-June 2022 and October-December 2022. This document follows the same format of Year 1 to facilitate observations of annual variation.

Methods

Twice per month, 5 stations in the impact area and two reference areas were surveyed (Figure 1). Each area had 10 fixed stations and five were randomly selected from each area per survey day resulting in 15 gillnet strings (stations) sampled per survey day. The fixed station locations were identified based on input from CFRF staff, Orsted, Inspire Environmental, and fishing partners. In the western reference area, the 10 selected stations also incorporated feedback from local scallopers and gillnetters external to the survey to reduce impact with other gear type users, and still catch the migration of skates and monkfish. In the SFWF area, it was recommended to set north to south and selected 10 random stations that demonstrated a mix of shallow and deep-water depths. In the eastern area gear was set along Loran Lines commonly utilized by gillnetters. Five equally distanced stations along each of these lines were chosen (Figure 1). Each gillnet station consisted of six, 300-ft net panels of 12-inch mesh with a hanging ratio of ½ (50%) and 42-inch net tie-downs. This is the typical setup of the commercial fishery in Rhode Island and Massachusetts. Sampling followed the South Fork Wind Fisheries Research and Monitoring Plan (South Fork Wind, LLC and INSPIRE Environmental 2020). The target soak time was 24 to reduce interactions with protected species and comply with the Biological Opinion. There were two instances where only 14 strings were sampled during a sample period. The first occurred on October 13th when the survey had to be halted due to vessel mechanical problems and poor weather, and then again in November with a missing net. In the case of the halted survey, nets were reset and hauled on October 16th.

On gear set days, the captain recorded the local time the gear was set and secured a HOBO TidbiT UTBI-001 logger randomly to one of the 5 strings per area to record data at 10-minute intervals during the soak time. During haul sampling days, the following station and environmental data were recorded: station number, location (latitude and longitude), haul begin and end time, soak time and date, water depth (ft) at start and end of string haul, wind speed and direction, Beaufort Sea state and presence of seaweed. A handheld Global Positioning System was used to collect station information. A conductivity, temperature, and depth (CTD) cast was done at the end of each string to record the vertical temperature, depth, and salinity profile of the station. The gear condition (torn meshes, or if any nets were obstructed by a large object, torn, or balled up) was also recorded for fishing effort.

Once fish were brought onboard, the first 30 fish of each species are measured to the nearest cm and weighed to the nearest 0.01 kg. The sex of all skate species was also recorded. Once 30 individuals of each species were measured and weighed per string, the additional fish were weighed in baskets (recording count of individuals per basket and weight (kg) of each basket) until 10 baskets had been weighed. Scientists utilized tally count for the remaining count of a

particular species. If a species was decomposed, or missing portions of its body/skeleton, scientists dashed weight and recorded length only with a subsequent comment as to the reason. Up to 10 individuals per string were sacrificed for stomach sampling from each station. Typically, this meant 5 monkfish and 5 winter skate per string to have an even distribution. However, any Atlantic cod, were also retained for stomach analysis. The individuals were measured and weighed and then the stomachs excised and stored on ice for further analysis at the lab. The reproductive stage and sex were recorded for all codfish, skate and monkfish during the stomach sampling.

The stomachs selected for further analysis were frozen upon returning to land then processed within two weeks of collection. The entire stomach was weighed prior to dissection, then each prey item identified to the lowest possible taxonomic unit with the aid of a 5x magnifier or a 25x stereo microscope. Intact prey items were measured for total length (carapace width for crabs) and the individual weight recorded to the nearest 0.01 g. Prey items that could not be measured were aggregated by species for the weight and if possible, the number of individuals recorded. If prey items could not be identified to the species level, they were grouped to the lowest possible level and weighed. After the stomach was fully examined an empty stomach weight was recorded.

All invertebrates were processed according to species. Sea scallops were measured and weighed and categorized as either scallop (whole with meat) or clapper. All rock crabs, Jonah crabs and lobsters were measured for carapace width/length to the nearest 0.1 mm, weighed and then evaluated for shell condition, number of claws, disease status, sex, egg status, and the presence of v-notches for lobster. The remaining invertebrates were identified to species level and then counted and weighed by species.

The project moved into the construction phase during the fall survey with boulder removal commencing, therefore extra protocols were put in place for incidental takes of species of concerns. All CFRF staff scientists were trained and certified as protected species observers. Night vision goggles and marine mammal watches were conducted during the set and haul days. Any incidental takes were immediately processed according to the Biological Opinion RPM 2 and gently returned overboard and observed for post capture condition if possible. Depending on the protected species interaction, a detailed written report was provided to Orsted within 24 hours of the incident, who then emailed the report to the appropriate agencies; protectedspecies@bsee.gov; nmfs.gar.incidental-take@noaa.gov; renewable_reporting@boem.gov.These reports included gear set information, haul information, water depth, temperature and where in the gillnet panel the interaction occurred (Appendix 1). For marine mammals, the reporting protocols changed from ASM, which directly directly reports under the Marine Mammal Authorization Program using google doc form within 48 hours, to reporting to the NMFS Greater Atlantic Regional Fisheries Office, Protected Resources Division and Orsted with 24 hours of the interaction. Orsted subsequently submitted the report to NMFS. All incidental take reports are in Appendix 1.

All data were imported into an Access survey database and linked to each station sampled. Upon completion of data entry, all data was reviewed for accuracy by at least one of the scientists who sampled the data prior to submission to INSPIRE Environmental for data analysis.

Preliminary Results:

The data in this report covers the 12 sampling trips during the second year of the gillnet survey. Each trip was conducted as close to every other week in the month as possible (Table 1). All data for these trips has been entered into the project database, reviewed for accuracy, and shared with INSPIRE Environmental. Unfortunately, the CTD assigned to one of the gillnet vessels experienced some malfunctioning that is reflected in our results. The average temperature (°C) and salinity (PSU) were consistent between survey areas (Table 1). However, we did observe cooler temperatures in 2022 compared to 2021 with the bottom water temperature ranging from 7.0 to 19.0 °C in 2021 compared to 6.7 to 16.0°C in 2022. It was in 2021 that we encountered blue fin tuna in the survey area. The bottom salinity ranged from 32.4-33.0 in 2021 compared to 32.0-33.8 in 2022 practical salinity units (psu). We observed more consistent readings near 33.0 in 2022 suggesting there may have been a salinity maximum intrusion in the area during sampling.

Summary information of the species composition and size distribution of monkfish/winter skate for Year 2 is displayed in Table 2 and Figures 2-4. The eastern reference area encountered 22 different species and was dominated by skates (winter and little skate), monkfish, and bluefish. The western reference area encountered 30 different species and was dominated by skates (winter skate, little skate), sea scallops, monkfish, bluefish and summer flounder with chub mackerel as part of the assemblage this year. The proposed wind farm area encountered 27 different species and was again dominated by winter skate, monkfish, little skate, and bluefish with an increase in Atlantic mackerel this year. We observed an increase in Atlantic menhaden in all three areas and did not observe any blue fin tuna or weakfish this year. In addition, the SFWF development area also saw bluefish, spiny dogfish and summer flounder. Generally, the catch metrics were similar to 2022 and between areas, except in incidental catch rate of species of concern, with the majority of seal bycatch caught in the eastern area and Atlantic sturgeon in the windfarm area. In total, 2,473 winter skates, 771 monkfish, 927 little skate, 186 bluefish, and 192 Atlantic menhaden were measured and represented the top species caught during year 2. This is in comparison with a total of 12,264 winter skates, 1,138 monkfish, 1,183 little skate, 645 bluefish, and 125 summer flounder measured as top species caught during year 1. We saw a significant decline in the numbers of these dominant species in 2022. A total of 175 monkfish and 240 winter skate were processed for stomach content analysis (Figure 5).

During the spring months, winter skate dominated the catch with consistent lower levels of summer flounder, monkfish, and little skate catch. In the fall, an increase in monkfish catch, little skate and bluefish was observed. (Figure 2). To understand the seasonal catch composition of winter skate, winter skate size distribution was compared between Spring and Fall sampling periods (Figure 3). During the spring, winter skates ranged from 42 to 108 centimeters (cm) with an average length of 81.4 cm. In the fall, winter skates ranged from 46 to

94 cm with an average length of 74.9 cm. In both seasons, more males were caught than females. For monkfish in the spring sampling period the range was from 45 to 96 cm with an average length of 71.64 cm. In the fall monkfish ranged from 35-87cm with an average of 72.4 cm (Figure 3).

The gillnet survey gear interacted with species of concern during this survey period and these incidental takes were reported following the BioOp RPM2 protocols (Appendix 1). The species impacted and the number and locations of these interactions are found in Table 2.

Table 1. Trip dates and average bottom temperature and salinity for each survey in the South Fork Wind Farm development (SFWF) area and two nearby reference areas (east and west). N/A refers to instances when there were operational problems with CTD.

	Average Temperature (°C)			Average Salinity (PSU)		
Survey Date	East	SFWF	West	East	SFWF	West
4/13/2022	n/a	n/a	6.7	32.7	32.7	33.0
4/27/2022	7.9	7.9	7.1	32.7	32.8	32.6
5/17/2022	9.3	9.3	9.5	32.8	32.9	32.8
5/26/2022	9.1	9.5	9.3	32.6	n/a	32.7
6/07/2022	n/a	n/a	9.7	32.6	32.6	32.7
6/24/2022	10.4	10.5	10.4	32.8	32.8	32.4
10/13/2022	16.0	15.9	15.8	32.6	32.7	32.6
10/27/2022	16.0	16.0	15.9	n/a	n/a	32.7
11/10/2022	15.6	15.6	15.4	32.5	32.4	32.9
11/23/2022	13.0	13.4	12.7	32.5	32.8	33.2
12/05/2022	11.9	12.4	12.4	32.7	32.9	32.9
12/20/2022	9.3	10.4	10.5	n/a	n/a	32.8

Table 2. Total number of species caught for the South Fork Wind Farm development (SFWF) area and two nearby reference areas (east and west) sampled during the second year of the gillnet survey (April-June 2022, October-December 2022).

Species	East	SFWF	West
American lobster	2	5	3
Atlantic cod	0	10	21
Atlantic mackerel	4	39	8
Atlantic menhaden	35	88	86
Atlantic sturgeon	0	3	0
Atlantic white shark	4	1	1
Barndoor skate	9	15	4
Black sea bass	2	1	1
Blue shark	0	0	1
Bluefish	55	45	109
Chub mackerel	0	1	35
Clearnose skate	9	4	10
Common thresher	1	1	0
Cownose ray	1	0	0
Dusky shark	1	0	0
Fourspot flounder	0	1	0
Frigate mackerel	0	0	5
Gray seal	9	3	1
Horseshoe crab	2	0	1
Jonah crab	10	93	42
Little skate	352	299	307
Monkfish	251	171	358
Northern searobin	1	1	1
Ocean quahog	0	3	7
Ribbed messel	0	3	7
Rock crab	30	2	1
Sandbar shark	9	4	2
Sea scallop	8	1	240
Sea star	0	4	4
Silver hake	0	0	1
Smooth dogfish	0	1	4
Spiny dogfish	51	40	75
Summer flounder	15	20	75
Tautog	0	0	1
Weakfish	0	0	4
Windowpane	0	0	0
Winter skate	1475	1789	2712

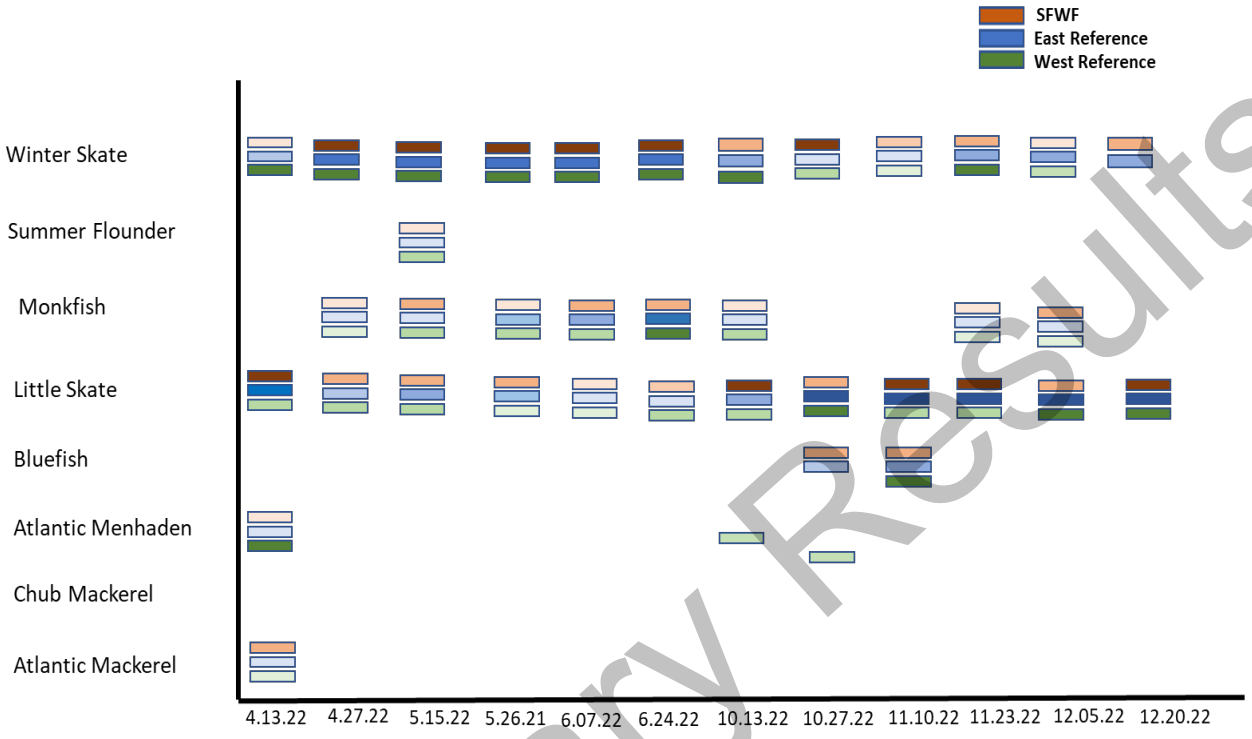


Figure 2. The predominant finfish species in catch per survey date for the South Fork Wind Farm development (SFWF) area and two nearby reference areas (east and west). The intensity of the bar color represents the dominance of the species in the catch.

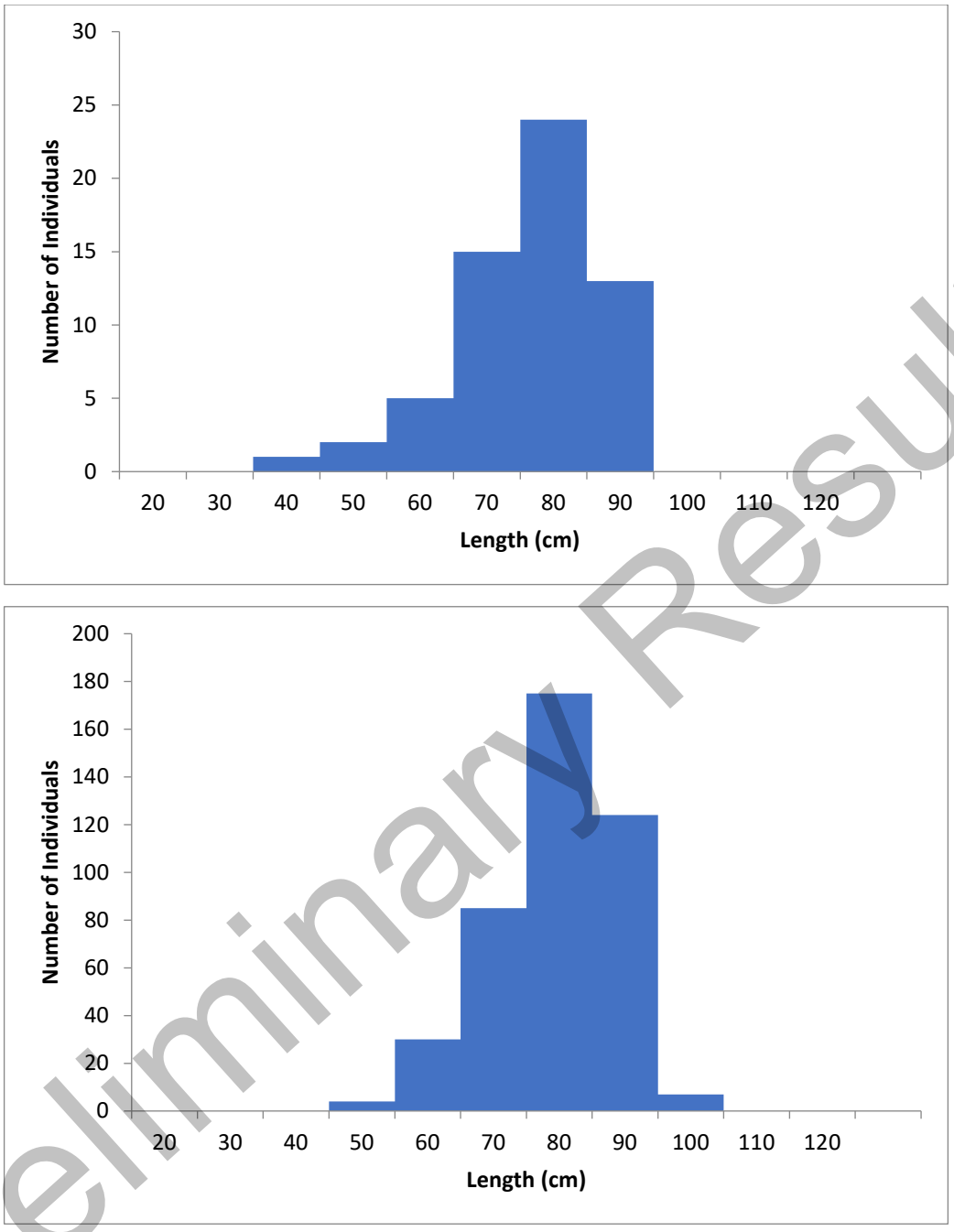
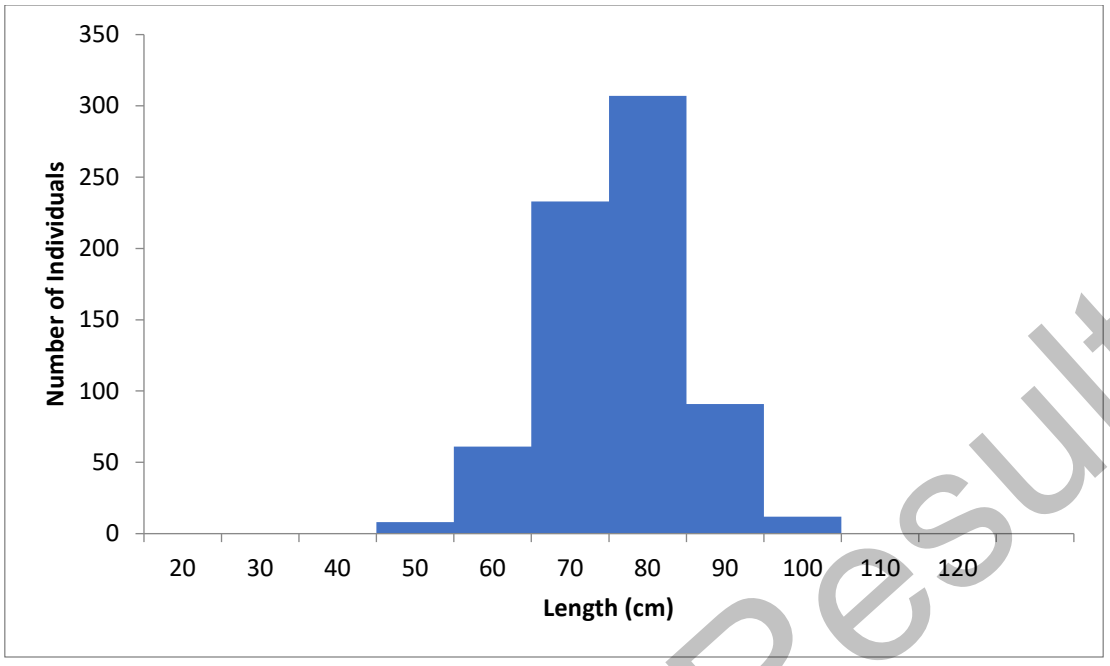


Figure 3. Winter skate size and sex distributions from the spring (top) and fall (bottom) for the South Fork Wind Farm development area and two nearby reference areas combined.



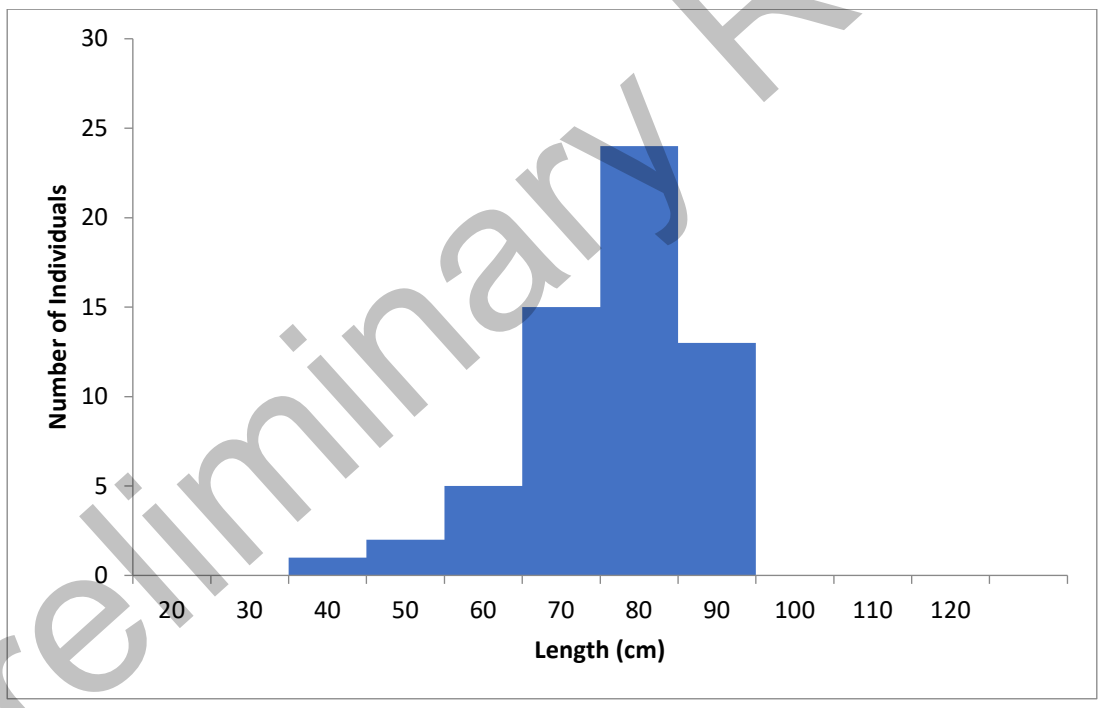


Figure 4. Monkfish size distribution from the spring (top) and fall (bottom) for the South Fork Wind Farm development area and two nearby reference areas combined.

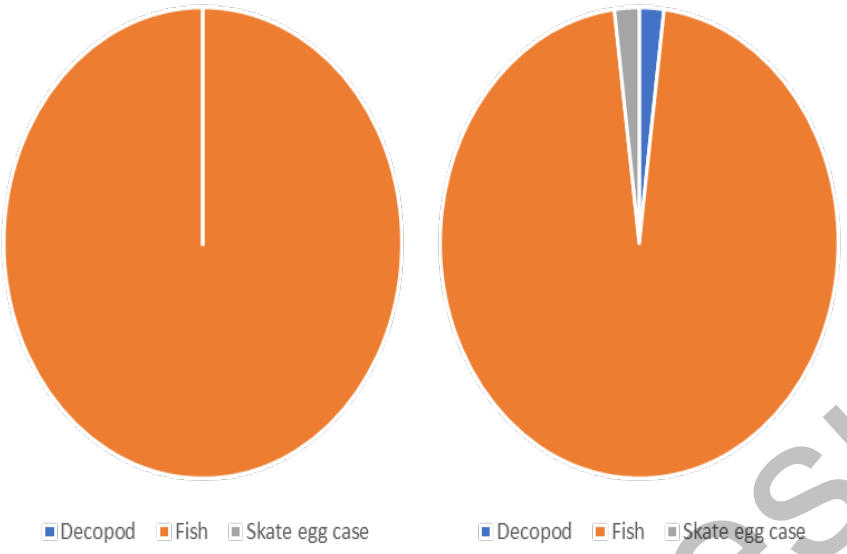


Figure 5. Composition of stomach contents of monkfish (n = 145 combined) for Spring (left) and Fall (right) and the South Fork Wind Farm development area and two nearby reference areas combined.

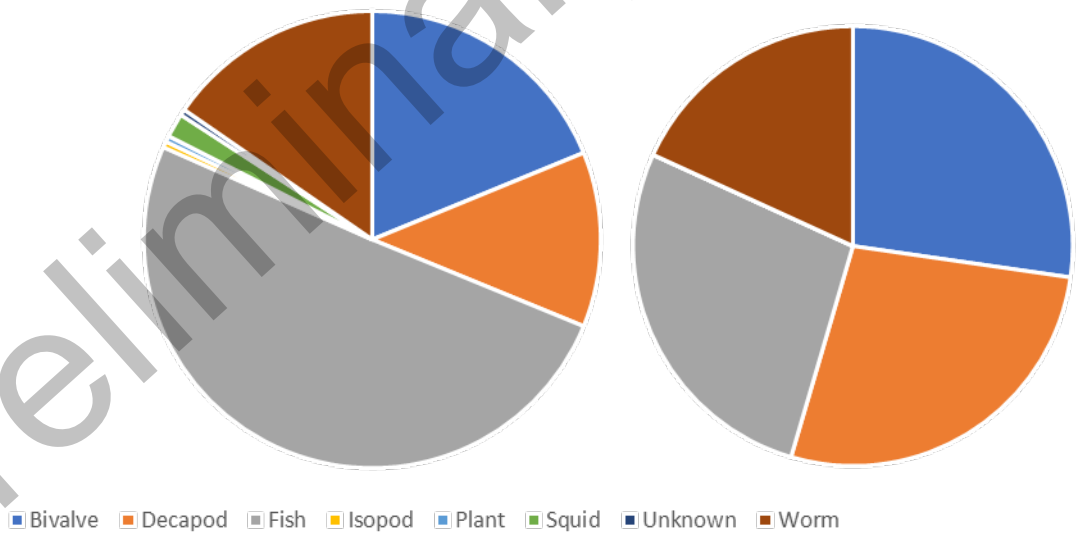


Figure 6. Composition of stomach contents of winter skate (n=240) combined) for Spring (left) and Fall (right) and the South Fork Wind Farm development area and two nearby reference areas combined.

Outreach:

The CFRF maintains a project website at http://www.cfrfoundation.org/sfwf-gillnet-survey where data summaries are uploaded as the survey progresses. This survey has also been highlighted in the CFRF quarterly newsletter (March 2022 and January 2023).