SFW01-0097 South Fork Fisheries Monitoring Plan
WP3: Ventless Trap Survey
Year 3 Report

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Summary

The Commercial Fisheries Research Foundation (CFRF), the University of Rhode Island, and local fishermen have completed both years of the South Fork Wind Farm (SFWF) pre-development fisheries monitoring ventless trap survey and one year of the construction fisheries monitoring ventless trap survey. The survey was designed to collect data on the abundance, distribution, and movement of American lobster and Jonah crab within the SFWF area and two nearby reference control areas. The South Fork Wind Farm development and two nearby reference control areas were sampled twice a month from May-November 2021, 2022 and 2023. Each area had ten stations consisting of ten traps with a target soak time of 5 days between samples. The traps at each station consisted of 6 ventless (V) traps and 4 standard (S) traps in the configuration: V-S-V-S-V-V-S-V-S-V. The entire catch was speciated and counted at the trap level at each station, then sampled for size and sex. Additional data on water temperature and habitat were also collected. Across all years, the eastern control area had the highest abundance of lobster, Jonah crab, and rock crab, with decreased and more comparable abundance for all three species in the western control and South Fork areas. The abundance of lobsters decreased somewhat each year in the two reference areas but remained consistent in the South Fork area. Jonah crab abundance has been relatively consistent in the western reference area but was lower in 2023 for both the South Fork and the eastern areas. Rock crab abundance decreased slightly in South Fork in 2023 but was higher than in 2022 for both reference areas. Across all years, the abundance of rock crabs peaked in the early months (May-June), lobster abundance peaked in the summer (July-September), and Jonah crab abundance peaked in the later months (August-November).

Introduction

The Commercial Fisheries Research Foundation, in partnership with local fishermen and the University of Rhode Island, conducted fisheries monitoring surveys of the South Fork Wind Offshore Wind Farm for two years during the pre-construction phase (2021-2022) and one year during construction (2023). This monitoring aimed to provide data for one of the primary methods for assessing anthropogenic impacts on natural habitats: the Before-After-Control-Impact 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. Due to the differences in selectivity of different gear types, five different surveys, each using a different gear type, are currently being conducted to collect this information: beam trawl survey, ventless trap survey, fish pot survey, mechanical jigging survey, and an acoustic telemetry monitoring survey. A gillnet survey was conducted in 2021 and 2022; however, it was terminated after two years of baseline data collection during the pre-construction phase of the SFWF. The ventless trap survey was designed to collect data on the abundance, distribution and movement of American lobster and Jonah crab in the South Fork Wind Farm development and two nearby reference control areas (Figure 1). This report details the survey methods and summarizes the results from the first three years of the ventless trap survey conducted between May and November 2021, 2022, and 2023.

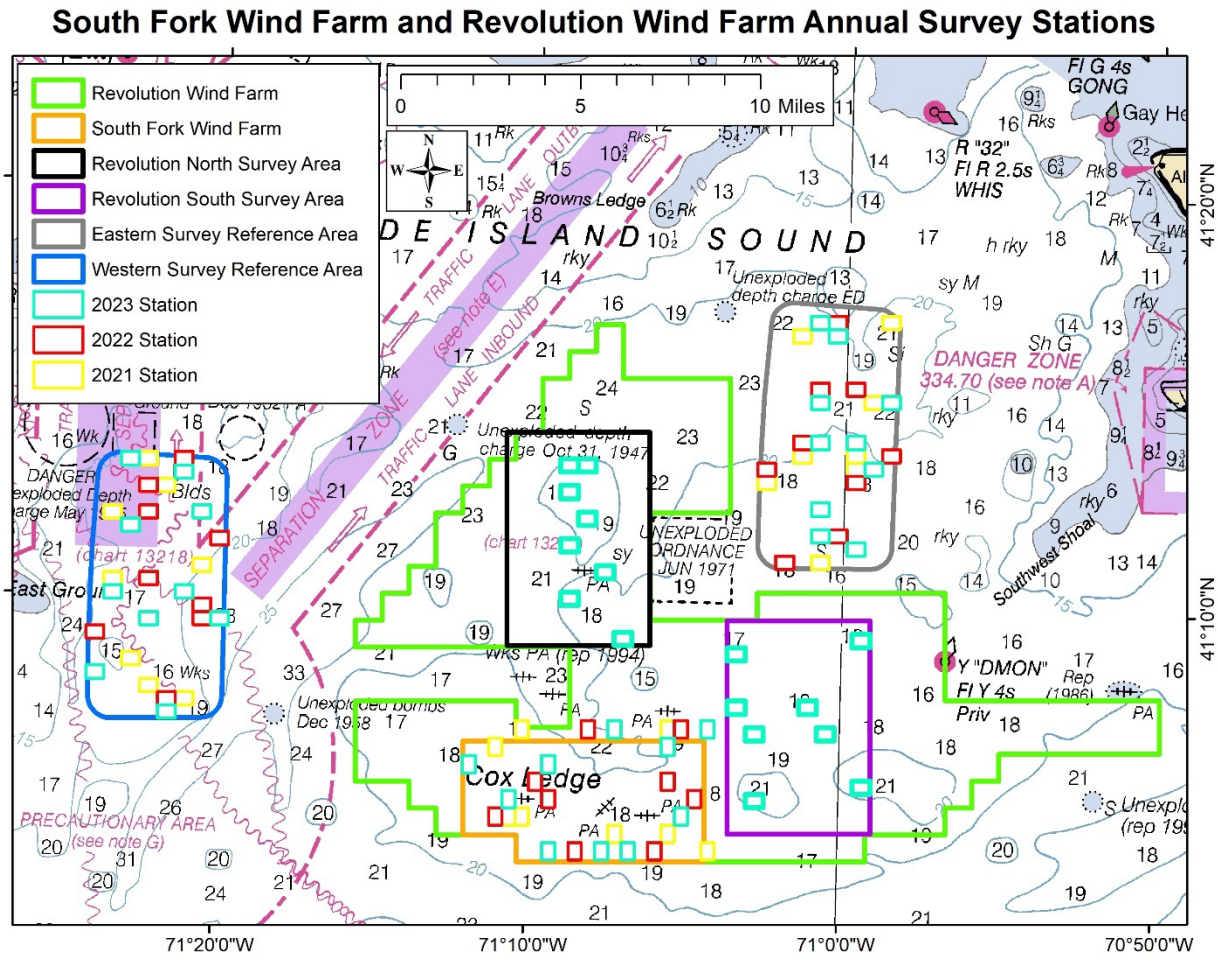

Figure 1. The ventless trap survey monitored the South Fork Wind Farm (SFWF) development area and two reference control areas. In 2023, survey efforts also began in the Revolution Wind Farm area; those data are not discussed in this report.

Methods

The survey followed the protocols of the Southern New England Cooperative Ventless Trap Survey with considerations for consistency with state water surveys. Survey stations were determined using a spatially balanced design. The SFWF impact area was divided into ten equally sized grid cells, and each cell was then further divided into 16 equally sized aliquots. At the beginning of the sampling season, an aliquot was randomly selected for sampling through the entire season in each of the ten larger grid cells. An alternative aliquot was also selected within each grid cell. The alternative aliquot was only sampled if needed based on local conditions (e.g., to avoid gear conflicts). The same process was repeated for two control areas, and new stations were selected for each survey year (Figure 1). The control areas were identified through consultation with local industry members. They reflect locations of known

lobster fishing grounds with similar habitat to the development area and the desire to minimize gear conflicts amongst fishermen.

Three partnering commercial fishing vessels were used as research platforms to sample ten stations in each area twice per month from May through November each year. The three vessels that participated in the survey were the F/V Amelia Anne, F/V Ashley Ann II, and F/V Erica Knight, all from Point Judith, RI. At the start of each monthly sampling event, the vessel crews retrieved and baited the traps. Traps were baited with locally available skate. After a target five-day soak period, the traps were hauled, the catch was processed for sampling, and the traps were rebaited for another target five-night soak. The traps at each station consisted of 6 ventless (V) traps and 4 standard (S) traps in the configuration V-S-V-S-V-V-S-V-S-V, with 100' separation between traps. Traps were single parlor, 16 inches high, 40 inches long, 21 inches wide, and constructed with 1-inch square rubber-coated 12-gauge wire and 5-inch entrance hoops. A temperature logger was attached to one trap in each trawl to record water temperature continuously throughout the monitoring period.

Sampling effort and trap-level information on all species encountered were collected for each trawl using voice recorders. Sampling effort data parameters included:

- Station number
- Start and end latitude and longitude
- Start and end time and date
- Start and end water depth
- Beaufort sea state
- Wind direction

All lobsters, Jonah crabs, and rock crabs were counted before collecting data on individuals. All lobsters were then sampled for individual data parameters, including:

- Carapace Length (Nearest 0.1 mm)
- Sex (Male, Female, Unknown)
- Shell Hardness (New, Paper, Hard, Splitter)
- Cull (Missing Claws, Buds, Regenerating Claws)
- Shell Disease (None, Minor, Moderate, Severe)
- Eggs (Absent, New, Eyed, Tan, Hatching, Spent)
- V-Notch (Present, Absent)
- Mortality (Alive, Dead)

Data collected for all Jonah crabs in one ventless trap per trawl and up ten Jonah crabs in all remaining nine traps included:

- Carapace Width (Nearest 0.1 mm)
- Sex (Male, Female, Unknown)
- Shell Hardness (New, Paper, Hard, Splitter)
- Cull (Missing Claws, Buds, Regenerating Claws)
- Shell Disease (None, Minor, Moderate, Severe)
- Eggs (Absent, Orange, Brown, Black, Hatching, Spent)
- Mortality (Alive/Dead)

Data collected for all rock crabs in one ventless trap per trawl and up ten rock crabs in all remaining nine traps included:

- Width (Nearest 0.1 mm)
- Sex (Male, Female, Unknown)
- Mortality (Alive/Dead)

For all bycatch species data collected included:

- Species (Common Name)
- Length/Width (Nearest 0.5 cm for finfish, nearest mm for invertebrates)
- Sex (Male, Female, Unknown)
- Mortality (Alive/Dead)

In addition to the biological data collected for all lobsters caught in the survey, 1,500 lobsters (500 per area) were targeted to be tagged with uniquely numbered t-bar tags to monitor their movement behaviors. Tagged lobsters were recaptured in the survey sampling, and any tagged lobsters caught by commercial fishermen were also encouraged to be reported to CFRF via the phone number printed on each tag.

All GPS data, temperature logger data, and animal data were imported into an Access survey database and linked to each station sampled. Prior to data submission to INSPIRE Environmental, one of the scientists who collected the data reviewed and quality-checked them for accuracy. Any gear loss or protected species interactions were reported to required federal agencies (Appendix 1).

For each aliquot sampled in the control areas, a video habitat camera sled system was used to collect imagery of the seafloor. The camera sled system consisted of an Applied Microvideo 310 camera, which provided video imaging and live video streams during deployment. Video imaging was conducted for a five-minute drift along the ten-trap trawl at each station. The camera sled was deployed one meter off the seafloor, and two lights illuminated the seafloor.

Preliminary Results

The data in this reporting period covers the third year of the ventless trap survey, which took place from May to November 2023. Each trip was conducted as close to the beginning of the month as possible (Table 1). All data for these trips were entered into the project database, and quality-control procedures were conducted by CFRF staff and subsequently reviewed by INSPIRE Environmental. Table 2 summarizes the environmental conditions, and Table 3 and Figures 2-4 summarize the dominant species composition for the two years of the pre-construction survey (2021-2022) and the construction phase (2023). Overall, the eastern control area had the highest abundance of lobster, Jonah crab, and rock crab, with lower and comparable abundance for those species in the western control area and the South Fork area. The abundance of lobsters decreased somewhat each year in the two reference areas but remained the same in South Fork. Jonah crab abundance has been relatively consistent in the western reference area but was lower in 2023 for both South Fork and the eastern area. Rock crab abundance decreased slightly in South Fork in 2023 but was higher than in 2022 for both reference areas. Across all years, the abundance of rock crabs peaked in the early months (May-June), lobster abundance peaked in the summer (July-September), and Jonah crab abundance peaked in the later months (August-November).

A total of 1,384 lobsters were tagged with t-bar tags in 2021; 430 lobsters were tagged in the South Fork area, 476 lobsters were tagged in the eastern control area, and 478 were lobsters tagged in the western control area. A total of 1,214 lobsters were tagged with t-bar tags in 2022; 496 lobsters were tagged in the South Fork area, 276 lobsters were tagged in the eastern control area, and 442 were lobsters tagged in the western control area. A total of 761 lobsters were tagged in 2023; 211 lobsters were tagged in the South Fork area, 276 lobsters were tagged in the eastern control area, and 274 lobsters were tagged in the western control area. From the 3,359 total lobsters tagged across all three years, there were 557 recaptured tags; 178 were recaptured in 2021, 233 were recaptured in 2022, and 146 were recaptured in 2023. Commercial fishermen reported 123 recaptures, and 434 were from the ventless trap survey efforts.

Outreach

The CFRF maintains a project website at https://www.cfrfoundation.org/sfwf-ventless-trap-survey, which provides a general description of the survey. This survey has also been highlighted four times in the CFRF quarterly newsletter (July 2021, November 2021, January 2023, and November 2023).

Table 1. Monthly sampling summary for all survey areas. A full month of sampling includes 200 traps sampled per area; months with less than 200 traps sampled per area were due to gear loss. The vessel monitoring the South Fork area had a delayed trip on 8/13/2021 due to Covid-19 protocols, and the vessel monitoring the east control area had a delayed trip on 7/11/2023 due to mechanical issues

Month	Trip Dates			Traps Sampled		
	Trap Bait and Set	Trap Sampling and Reset	Trap Sampling and Deactivation	West	South Fork	East
May 2021	5/3/2021	5/8/2021	5/13/2021	200	200	200
June 2021	6/1/2021	6/6/2021	6/11/2021	200	200	200
July 2021	7/1/2021	7/7/2021	7/12/2021	200	200	200
August 2021	8/1/2021	8/6/2021	8/10/2021 & 8/13/2021	199	196	199
September 2021	9/3/2021	9/8/2021	9/14/2021	200	200	180
October 2021	10/1/2021	10/6/2021	10/13/2021	200	200	198
November 2021	11/6/2021	11/11/2021	11/17/2021	200	200	200
May 2022	5/6/2022	5/13/2022	5/19/2022	200	200	200
June 2022	6/2/2022	6/7/2022	6/12/2022	200	200	200
July 2022	7/1/2022	7/7/2022	7/11/2022	200	200	188
August 2022	8/4/2022	8/11/2022	8/15/2022	200	200	200
September 2022	9/2/2022	9/9/2022	9/16/2022	200	200	200
October 2022	10/6/2022	10/11/2022	10/16/2022	200	200	200
November 2022	11/3/2022	11/9/2022	11/15/2022	200	200	200
May 2023	5/3/2023	5/8/2023	5/13/2023	200	200	200
June 2023	6/1/2023	6/6/2023	6/11/2023	200	200	200
July 2023	7/5/2023	7/10/2023 & 7/11/2023	7/17/2023	200	200	200
August 2023	8/1/2023	8/6/2023	8/12/2023	198	200	200
September 2023	9/5/2023	9/11/2023	9/18/2023	200	200	200
October 2023	10/3/2023	10/11/2023	10/17/2023	200	200	200
November 2023	11/2/2023	11/6/2023	11/13/2023	200	200	200

Table 2. Monthly environmental conditions during survey periods for all areas.

Month	Average Temperature (°C)			Average Beaufort Sea State		
	West	South Fork	East	West	South Fork	East
May 2021	7.0	6.8	7.3	2.5	2.3	2.2
June 2021	9.0	9.9	9.9	4.0	4.9	4.6
July 2021	11.0	11.7	12.6	3.0	2.9	3.2
August 2021	12.9	12.7	13.9	2.3	3.7	3.1
September 2021	16.1	17.6	16.7	3.1	2.3	2.6
October 2021	18.9	17.2	18.0	1.7	1.6	2.0
November 2021	15.5	15.2	16.9	2.8	3.2	2.2
May 2022	8.8	8.8	9.2	3	2.6	2.9
June 2022	9.7	9.6	10.0	2	2	2.2
July 2022	10.6	10.6	11.9	2	3	2.5
August 2022	12.7	13.9	14.7	2.4	2	1.2
September 2022	15.4	15.0	15.5	3.5	1.5	4.2
October 2022	16.5	16.1	16.5	2	2	2
November 2022	15.7	15.7	15.5	2.9	1.8	4.4
May 2023	9.2	9.3	9.6	3.1	3.3	2.3
June 2023	10.6	11.1	11.9	2.0	2.0	1.7
July 2023	12.5	11.8	12.9	4.5	4.0	2.6
August 2023	12.3	12.8	13.7	2.5	2.0	1.7
September 2023	14.5	13.8	15.0	2.1	3.0	2.0
October 2023	15.4	15.6	15.8	2.8	2.5	2.3
November 2023	14.8	14.7	14.6	3.5	3.5	3.5

Table 3. Total number of each species caught by area for the 2021-2023 ventless trap survey, with 2023 numbers broken up by area. Abundance for each species by area in previous years are available in previous annual reports.

Species	2021	2022	2023			
	Total	Total	Total	East	South Fork	West
JONAH CRAB	32613	39648	21149	9291	5021	6837
ROCK CRAB	22227	11468	15028	8675	1245	5108
AMERICAN LOBSTER	11959	8205	7246	3093	1867	2286
BLACK SEA BASS	2389	2910	6121	3553	1047	1521
RED HAKE	1248	1803	2528	927	836	765
CUNNER	1361	1494	1275	335	326	614
SCUP	655	977	617	290	125	202
OCEAN POUT	519	428	245	161	35	49
CONGER EEL	284	322	202	31	50	121
SEA RAVEN	81	71	60	28	17	15
LONGHORN SCULPIN	40	19	36	21	6	9
GRAY TRIGGERFISH	6	2	29	9	0	20
SPOTTED HAKE	7	2	22	9	8	5
ATLANTIC COD	23	33	18	1	10	7
PLANEHEAD FILEFISH	0	0	13	3	6	4
SPIDER CRAB UNCL	3	8	11	11	0	0
WINTER FLOUNDER	5	1	9	3	2	4
FRINGED FILEFISH	0	0	7	0	7	0
SPINY DOGFISH	1	6	6	2	2	2
LITTLE SKATE	1	8	4	0	0	4
ASTERIAS SPP	0	0	3	0	3	0
NORTHERN KINGFISH	0	0	2	2	0	0
SMOOTH DOGFISH	1	2	2	0	1	1
BUTTERFISH	0	50	1	1	0	0
ARMORED SEAROBIN	0	0	1	0	1	0
NORTHERN SEAROBIN	1	6	1	0	0	1
SEA SCALLOP	6	0	1	0	0	1
STRIPED SEAROBIN	0	1	1	0	0	1

SURF CLAM (LIVE)	2	0	1	0	0	1
ATLANTIC MENHADEN	2	1	0	0	0	0
BARRELFISH	6	10	0	0	0	0
BLUE CRAB	5	2	0	0	0	0
HERMIT CRAB	20	2	0	0	0	0
MOON SNAIL	11	0	0	0	0	0
QUEEN TRIGGERFISH	1	0	0	0	0	0
SNOWY GROUPER	2	0	0	0	0	0
SUMMER FLOUNDER	1	2	0	0	0	0
SWIMMING CRAB UNCL.	2	0	0	0	0	0
WAVED WHELK	79	7	0	0	0	0
WHITE HAKE	7	9	0	0	0	0
OCEAN QUAHOG (LIVE)	0	1	0	0	0	0
TAUTOG	0	5	0	0	0	0
WINTER SKATE	0	1	0	0	0	0

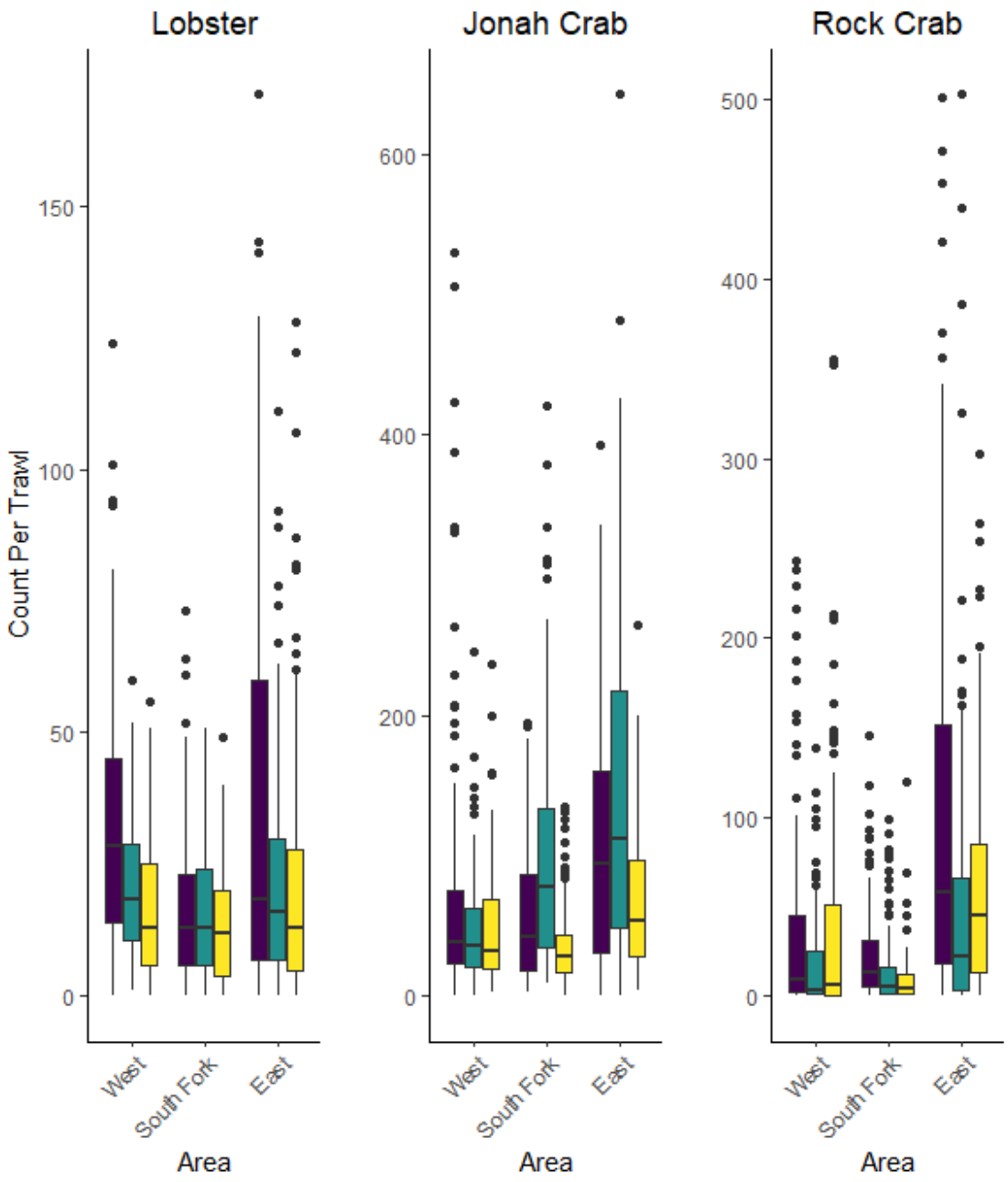

Figure 2. Box plots for counts of the three target species of lobster, Jonah crab, and rock crab per trawl by area for the 2021 (purple), 2022 (green), and 2023 (yellow) ventless trap surveys.

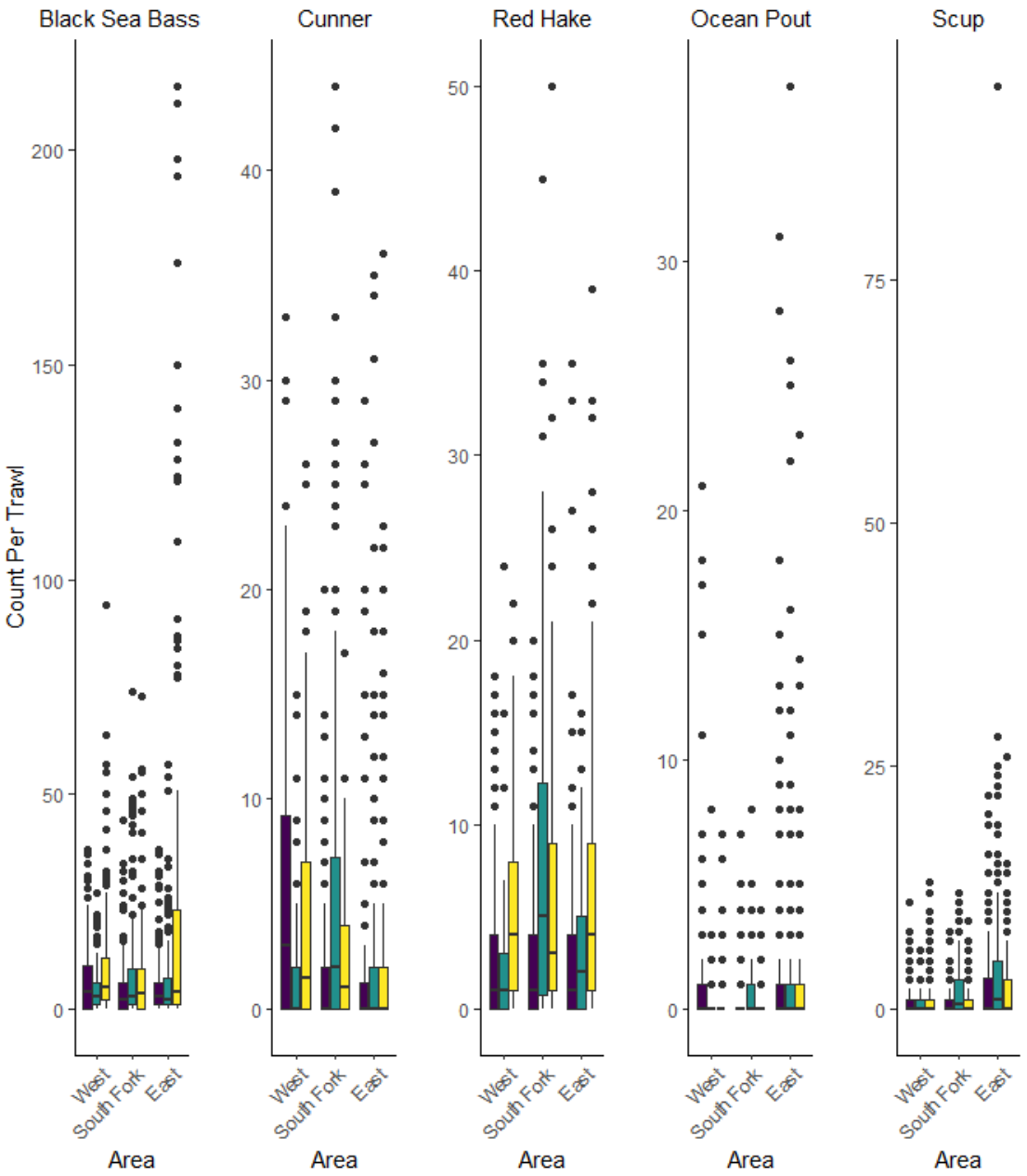

Figure 3. Box plots for counts of the five most abundant finfish species per trawl by area for the 2021 (purple), 2022 (green), and 2023 (yellow) ventless trap surveys.

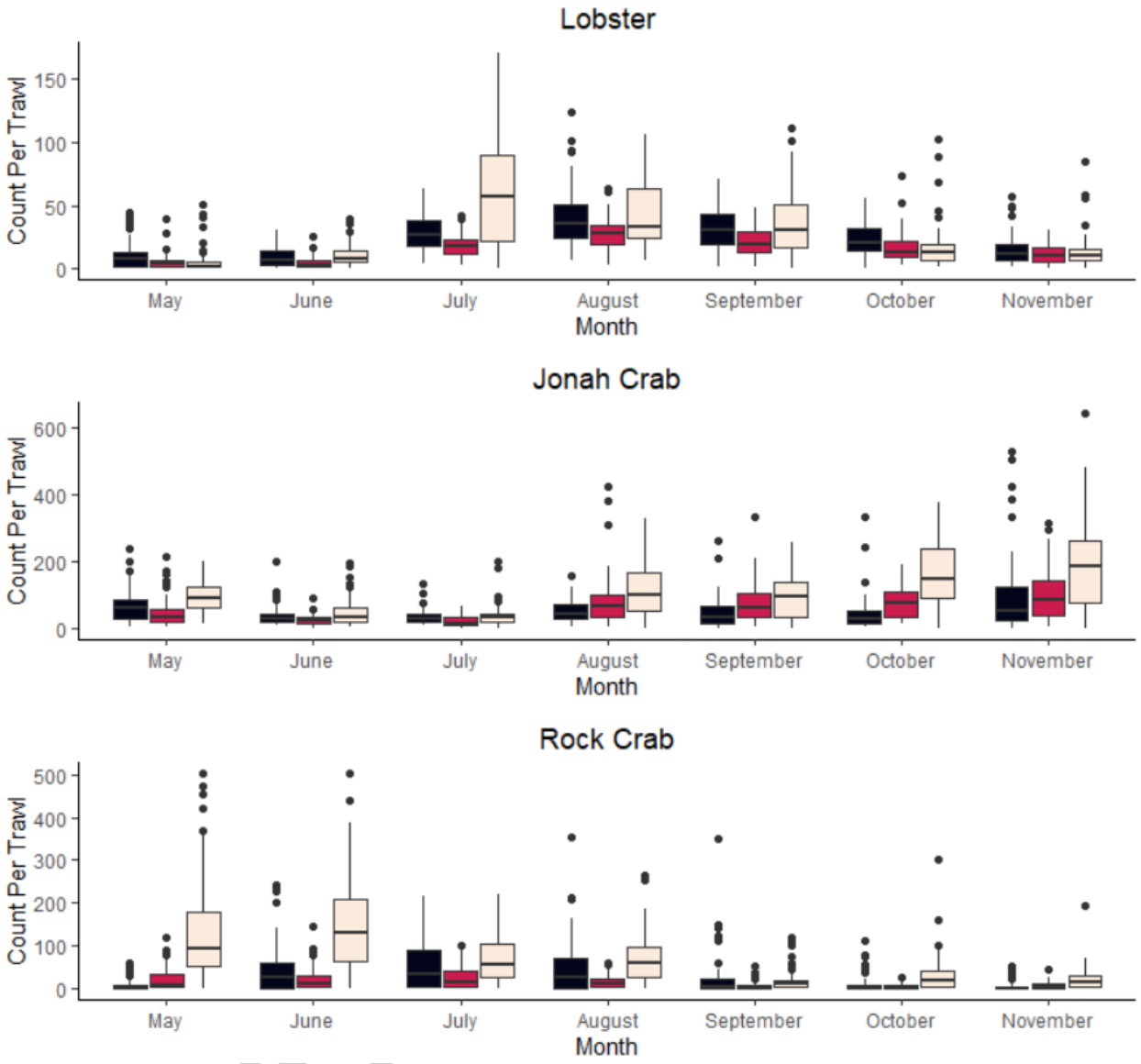

Figure 4. Monthly box plots of lobster, Jonah crab, and rock crab count per trawl by area for the ventless trap survey, 2021-2023 data combined. Navy blue = West, Red = South Fork, Beige = East.