Establishing standard methods to assess the biological condition of sea scallops before and after offshore wind farm development

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Executive Summary

Project Title: Establishing standard methods to assess the biological condition of sea scallops before and after offshore wind farm development

Year Awarded: 2022

RSA Priorities Addressed by this Research: 2022-2023 Scallop RSA Priority #2 "Scallop Biology Research on scallop biology, including studies aimed at understanding recruitment processes, spatial population dynamics of the scallop resource, and examination of environmental stressors on reproduction and growth.

Industry Partners: F/V Mister G, Point Judith, RI., Captain Mike Marchetti

Project Narrative: The movement towards renewable energy production in the United States has led to a surge in the development of offshore wind farms, many of which are planned to be close to productive scallop fishing grounds. The current permitting regulations and goals for wind farm development impact surveys focus on monitoring changes in multi-species abundance indices, with little to no consideration for potential sublethal effects on individual species. In this study, we leveraged the Commercial Fisheries Research Foundation's South Fork Wind Farm beam trawl survey to test and establish standardized methods to assess sea scallop biological condition in relation to wind farm development. The final protocol can be easily incorporated into new and existing wind farm surveys. The project was successful at urging Ørsted to support sea scallop biological condition monitoring for the remainder of the beam trawl survey, and these protocols have also already been implemented in the Revolution and Sunrise Wind Otter Trawl Survey. With the biological data collected through these methods, we were able to track sea scallop overall condition, reproductive condition, and meat quality over time and between beam trawl survey areas. This continued sampling has allowed greater insight into the potential impacts of offshore wind farm development on one of the country's most valuable fishery species.

Results and Discussion

This project leveraged and expanded upon the existing CFRF's beam trawl wind farm fisheries monitoring survey to establish a standardized protocol to directly monitor biological conditions in the sea scallop. The overall project goals were 1) to establish baseline biological data in the South Fork Wind Farm (SFWF) development area and 2) to set a precedent to urge the wind farm companies to include this sampling as an essential piece of their monitoring surveys.

Starting in April 2022, with support from this project, one additional tow per trip was conducted outside the survey sampling area, but close to the SFWF development area, to increase scallop catch. During the first two months of this additional sampling, scallop catch in this added tow was more than three times higher than in the original stations. In June 2022, the year-one analysis for the beam trawl survey was completed, and a decision was made, partially guided by the initial data collected from this project, to remove the eastern control area and expand the survey domain in both the SFWF development area and the western control area. The new survey plan was to still sample 3 of the 6 original stations each month and to add sampling four new stations in the expanded area for each sampling area. This increased the overall effort of the survey from 9 to 10 tows, with the 10th tow initially supported by this project through September 2022.

After testing multiple methods for collecting biological data on individual scallops, we determined the most practical method that will not interfere with existing protocols and will help monitor scallop biological conditions over time and assess sublethal impacts of offshore wind farm development. For the final protocol, up to 30 scallops with shell height greater than 60 mm from each survey area are randomly selected for sampling. Scallops are measured to the nearest mm of shell height using digital calipers at sea. The left shell is removed, and scallops are graded for meat quality, sex, and reproductive stage. All tissues are then emptied into a single zip-top bag and stored on ice until survey completion. No tissues were individually bagged because bagging had high error rates, and the results were not consistent. Upon survey completion, scallops are transferred and frozen until processing. Scallops are thawed, the meat and gonad are separated from the remaining viscera, and all three tissues are individually weighed to the nearest 0.1 g using a standard scale. This protocol has been implemented in the monthly SFWF beam trawl surveys since November 2022, with support from Ørsted. It has enabled the collection of standardized biological condition data on Atlantic sea scallops during and after the construction of the South Fork Wind Farm. In addition, this same protocol has been implemented in the CFRF and the University of Massachusetts Dartmouth's School for Marine Science and Technology's collaborative Revolution and Sunrise Windfarm Otter Trawl Survey.

Special Comments

The specific objectives for this project were:

1. Develop and initiate a biological sampling protocol of sea scallops aboard the SFWF beam trawl survey by testing and comparing multiple methods of data collection

2. Conduct analyses of the percent error of scallop tissue weights between methods to determine the most appropriate sampling protocol and determine if modifications are necessary

3. Adapt any modifications to the sea scallop biological sampling protocol and implement the final sampling protocol into the beam trawl survey supported by Ørsted

4. Develop a final written standardized protocol that will be suggested to be used in other windfarm impact surveys to monitor the biological condition of scallops before, during, and after offshore windfarm construction.

5. Explore and analyze biological sea scallop condition data and evaluate whether the established protocols are effective for monitoring the condition of scallops.

These objectives are explored in much greater detail, with supporting analysis and figures, in the final report, which we have given to the New England Fisheries Management Council to share.