Augmenting an offshore wind farm fisheries monitoring survey to incorporate biological condition monitoring

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Background

US Offshore Wind Farm Development
- Offshore wind farm development is surging off the US east coast
- Current regulations for wind farm impact surveys are focused on monitoring changes in multi-species abundance indices
- There has been little consideration for monitoring potential sublethal impacts of wind farm development on single species

The Atlantic Sea Scallop Fishery and Wind Farms
- The Atlantic sea scallop fishery is the second most valuable fishery in the US, worth over $670 million in landings in 2021
- Many planned offshore wind farms are in close proximity to productive scallop fishing grounds (Fig. 1)
- If wind farm development has negative impacts on the biological condition of sea scallops, this could have profound impacts on the fishery

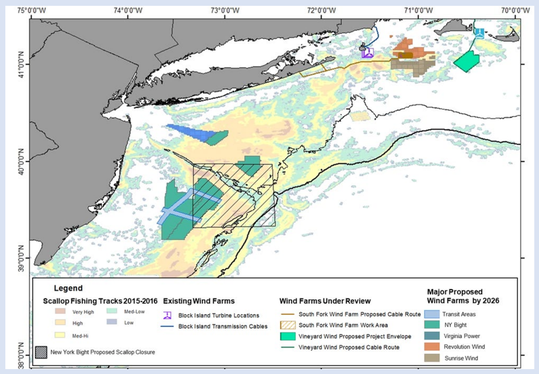


Figure 1. Density of scallop fishing activity from 2015-2016 from southern New England to the mid-Atlantic ranging from low effort (green) to high effort (red), overlaid with the proposed New York Bight scallop closure (Diagonal Lines) and the major wind farm lease areas with planned construction in the next five years. (Data source: NROC (Northeast Regional Ocean Council). 2009. Northeast Ocean Data Portal, www.northeastoceandata.org. Date accessed: 10/20/2021)

Approach

Survey
- Leverage the CFRF's existing monthly pre-construction South Fork Wind Farm (SFWF) beam trawl survey
- Expand the sampling area within the development area to ensure adequate numbers of scallops are sampled

Sample individual scallops for biological condition parameters in the wind farm development area and one control area
- Record data on individual scallop shell height, sex and reproductive stage, and meat quality at-sea
- Test different methods and scales to record data on individual scallop meat, gonad, and tissue weights at-sea versus on land

Evaluate the feasibility of incorporating this type of sampling into established wind farm surveys
- Present standardized protocol to wind farm company and urge them to incorporate this sampling into the construction and post-construction surveys

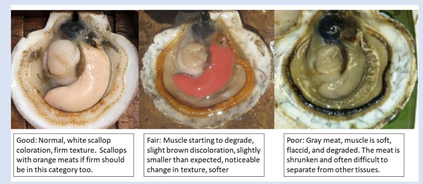


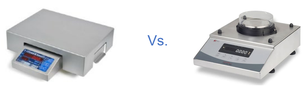
Figure 2. Scale of individual scallop meat quality used to assess biological condition

Outcomes

Objective 1. Determine most suitable methods to monitor the biological condition of sea scallops during wind farm monitoring surveys

We tested 2 motion-compensated scales to take meat, gonad, and remaining tissue weights of individual scallops at sea + tested the effects of bagging all tissues together versus separated to take tissue weights on land

Scallop tissues were either weighed with a Marel M1100 PL2262 Marine Platform scale or WPL Industries R10 M3 Marinescale at sea



Scallop tissues were then either stored combined in a single bag or the gonad or meat was stored separately in a different bag and frozen before being weighed on land

Table 1. Average percent error for each month sampling the weights of scallop tissues at sea with a motion-compensated scale compared with weights on land after the same scallops had been bagged and frozen. Bold values indicate a significant difference in treatment between bagging all the tissues combined in the same bag or separated by tissue type for storage

Month	Bagging Treatment	Scale	Sample Size	Average Percent Error		
				Meat	Other Tissue	Gonads
June	Separated	Marel	16	10.9%	32.1%	
	Combined	Marel	16	39.7%	56.0%	
July	Separated	WPL	15	0.9%	10.4%	
	Combined	WPL	20	1.5%	3.2%	
Aug	Separated	WPL	21	9.8%	12.3%	
	Combined	WPL	37	7.0%	18.3%	
Sep	Separated	WPL	22			**-8.5%**
	Combined	WPL	24			**44.8%**
Oct	Separated	WPL	12			**38.4%**
	Combined	WPL	17			**111.5%**

We determined taking size, sex, and meat quality data at sea + bagging the scallop tissues in a single bag, freezing them, and individually weighing them on land is the most feasible method to collect condition data for individual scallops that won't interfere with existing survey protocols and will help monitor biological condition over time

Objective 2. Incorporate these methods into the SFWF beam trawl survey and collect baseline data so changes in sea scallop biological condition during and after construction of the wind farm can be monitored

We collected biological data that can be used to monitor parameters such as the timing of reproduction, meat quality, shell height to meat weight relationships, and more, over time.

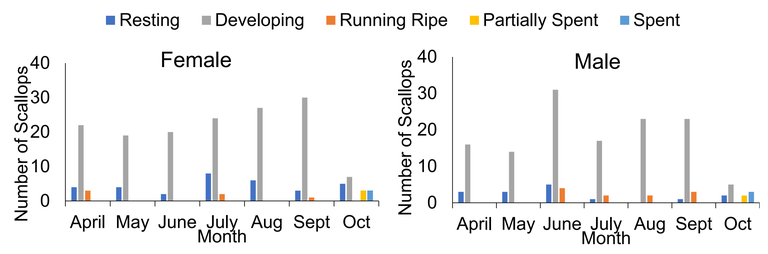


Figure 3 (right). Baseline data on sea scallop sex and reproductive stage by month

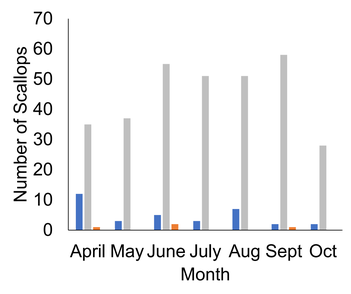


Figure 4 (right). Baseline data on sea scallop meat quality by month

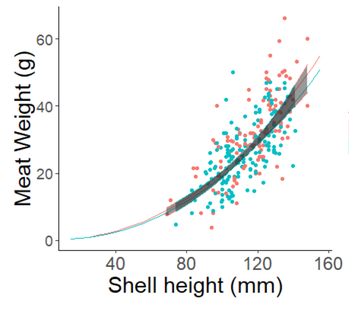


Figure 5 (left). Baseline sea scallop shell height to meat weight relationship separated by survey area for scallops with good quality meat. There was no significant difference between areas

The preliminary results of this project were successful in urging the wind company to incorporate the sea scallop biological sampling protocol established by this project into the South Fork Wind Farm fisheries monitoring plan for the ongoing construction and post-construction phases of the beam trawl survey.

Acknowledgments

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