Fisheries Monitoring Of An Offshore Windfarm: Non-Extractive Sampling Of Structured Habitat



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Ocean Wind 1

Location: Approximately 15 miles off the coast of southern New Jersey

Timeline: Construction is planned to start in the early 2020's, with the wind farm expected to provide first power in late 2024

Turbine: GE Haliade X 12 MW turbine

Capacity: 1,100 MW

Annual Production: Enough to power more than 500,000 homes

Owner & Developer: 75% Ørsted, 25% PSEG



oceanwindone.com

Ocean Wind 1 Fishery Monitoring Plan

Trawl Survey (Extractive)



eDNA (Non-Extractive)



Clam Dredge Survey (Extractive)



Acoustic Telemetry (Extractive/Non-Extractive)



Stuctured Habitat Survey:

-BRUV(Non-Extractive)-Chevron Traps (Extractive)-Hook-and-Line Fishing (Extractive)



Acoustic Glider-Based Surveys (Non-Extractive)



Towed Camera Surveys (Non-Extractive)



Research Question

• What is the relative abundance, distribution, and demographics of structure-associated species within the Study Area and at nearby control sites before, during, and after construction?

Justification and Approach

- Structure-associated fishes are important in the Study Area
- Limitations of mobile bottom trawls
- Artificial reef effects of offshore wind farms





Sampling Methodology

- -Baited Remote Underwater Video
- -Chevron Traps
- -Hook-and-Line Fishing







Langlois et al. 2018. Marine sampling field manual for benthic stereo BRUVs. In, Field manuals for marine sampling to monitor Australian waters. Eds R Przesławski, S Foster. NESP. pp 82-104.

Langlois et al. 2020. A field and video guide for baited removed underwater stereo-video surveys of demersal fish assemblages. Methods in Ecology and Evolution 11: 1401-1409.





Figure 5. Relationship between horizontal visibility and area sampled in the field of view of underwater video samples (dashed line). Dotted lines indicate error in calculated area assuming a horizontal visibility error of ± 0.1 m based on repeated estimates by multiple observers. Histogram shows the distribution of visibility ranges for the 66 visibility videos with visibility ≥ 0.5 m from East Bay.



(A)

Baker et al. 2022. Underwater video as a tool to quantify fish density in complex coastal habitat. Diversity 14, 50.

Figure 2. (**A**) Underwater video camera mounted on sampling base. (**B**) Closeup of camera mount showing fixed bolt that ensures consistent camera position between camera exchanges. (**C**) Field of view from visibility camera showing secchi pole marked at 10 cm intervals, used to estimate visibility range.







Bouchet et al. 2018. Marine sampling field manual for pelagic BRUVs. In, Field manuals for marine sampling to monitor Australian waters. Eds R Przesławski, S Foster. NESP. pp 105-132.





Structured Habitat Survey: Chevron Traps

MARMAP (Marine Resources, Monitoring, Assessment, and Prediction Program) Chevron Trap Survey



https://www.dnr.sc.gov/marine/mrri/CoastalResearch/ReefFishSurvey/index.html

Structured Habitat Survey: Chevron Traps







Structured Habitat Survey: Rod and Reel Sampling





Structured Habitat Survey





https://www.nj.gov/dep/fgw/artreef.htm





- Three Habitats: 1.) Artificial Reef, 2.) Planned Turbines, 3.) Open Bottom (Phantom Turbines)
- Randomly select six sites for each habitat (eighteen total sites) during each sampling season (January, April, July, October)
- At each sampling location:
 - 1-hour pelagic BRUV deployment and 1-hour benthic BRUV deployment
 - Six chevron traps deployed for 1.5 hours
 - Three 8-minute drifts with five hook-and-line anglers



0.5 miles







0.5 miles



0.5 miles













	Ethogram				Eve	nts for "SH2201_S	25_STBD.B_Joey_	_Blind_Counts" obs	servat
Key	Code	Туре	Descript	SH2201_S25_RIGHTB_GX020002_TRIMv2 copy.mov: 00:10:35.199 / 00:12:58.548 total: 00:10:35.199 / 00:58:03.909 (paused)		time	subject	code	/p
	Chase/ Po	oint event	Chasing/.	Pocal subject: Spiny Dogrish	190	00:09:44.397	Spiny Dogfish	Leaves Frame	
	Leaves Frame Po	oint event	Leaves th		191	00:09:44.397	Spiny Dogfish	Outside Count	
	No Reaction Po	oint event	Camera		192	00:09:45.667	Sea Robin	Enters Frame	
	Swimming Po	oint event	Fish is		193	00:09:49.147	Sea Robin	Enters Frame	
	Enters Frame Po	oint event	Enters the		194	00:09:49.147	Sea Robin	Max # in	
	End of Chas Po	pint event	Stops		195	00:09:50.895	Spiny Dogfish	Enters Frame	
	Count Po	pint event	Cumulativ		196	00:09:53.398	Spiny Dogfish	Leaves Frame	
	Max # in Po	oint event	Max # of .		197	00:09:53.647	Spiny Dogfish	Count	
	Glimpse Po	pint event	Individual		198	00:09:53.647	Spiny Dogfish	Outside Count	
	Interaction Po	pint event	Interactio		199	00:09:56.145	Spiny Dogfish	Interaction	
	Outside Count Po	oint event	Count out		200	00:09:56.399	Spiny Dogfish	Enters Frame	
_					201	00:10:00.647	Spiny Dogfish	Enters Frame	
	Subjects				202	00:10:01.395	Spiny Dogfish	Leaves Frame	
	Subjects	December			203	00:10:01.645	Spiny Dogfish	Count	
кеу	No focal	Description	Current		204	00:10:07.395	Spiny Dogfish	Enters Frame	
	Spiny Dogfish N	Δ	- 11		205	00:10:10.167	Spiny Dogfish	Leaves Frame	
	Little Tunny N	Δ			206	00:10:10.417	Spiny Dogfish	Outside Count	
	Mako Shark N	۵			207	00:10:16.164	Spiny Dogfish	Interaction	
	Dolphinfish N	۵	- 11		208	00:10:24.168	Spiny Dogfish	Leaves Frame	
	Yellowfin Tuna N	۵			209	00:10:24.417	Spiny Dogfish	Count	
	Other Shark N	Δ			210	00:10:26.914	Sea Robin	Leaves Frame	
	Blue Runner N	A			211	00:10:27.169	Sea Robin	Outside Count	
	Amberiack N	A			212	00:10:28.168	Spiny Dogfish	Enters Frame	
	Bluefish N	A			213	00:10:29.942	Sea Robin	Leaves Frame	
	Smooth N	Δ			214	00:10:30.195	Sea Robin	Outside Count	
	Black Sea N	Δ.			215	00:10:33.195	Spiny Dogfish	Enters Frame	
	Summer N	Δ.			216	00:10:34.444	Sea Robin	Enters Frame	
	Sea Pobin	A			217	00:10:36.951	Spiny Dogfish	Leaves Frame	-
	Sea Robin N	~			218	00:10:36.951	Spiny Dogfish	Outside Count	

BORIS https://www.boris.unito.it/

Structured Habitat Survey – July Preliminary Summary

	BRUV	Hook-And-Line	Chevron Trap
			·
Northern Sea Robin	Х	101	13
Black Sea Bass	Х	40	4
Striped Sea Robin	Х	4	
Tautog	Х	1	
Cunner	Х	1	
Red Hake	Х		
Summer Flounder	Х		
Scup	Х		
Rock/Jonah Crab	Х		94
Common Spider Crab	Х		1
Effort	-	36 hours	162 hours



Towed Camera Surveys

- Cameras in towed housing act as their own trolling lures
- Analogous to BRUVs for pelagic predators (tunas, billfish, sharks, jacks, others)
- Individual sightings are mapped and contoured as probability density functions

