Quantification of the Risk of Secondary Entanglement due to Derelict Fishing Gear for Floating Offshore Wind Turbines

Research Consortium Kickoff Meeting
10/15/2025

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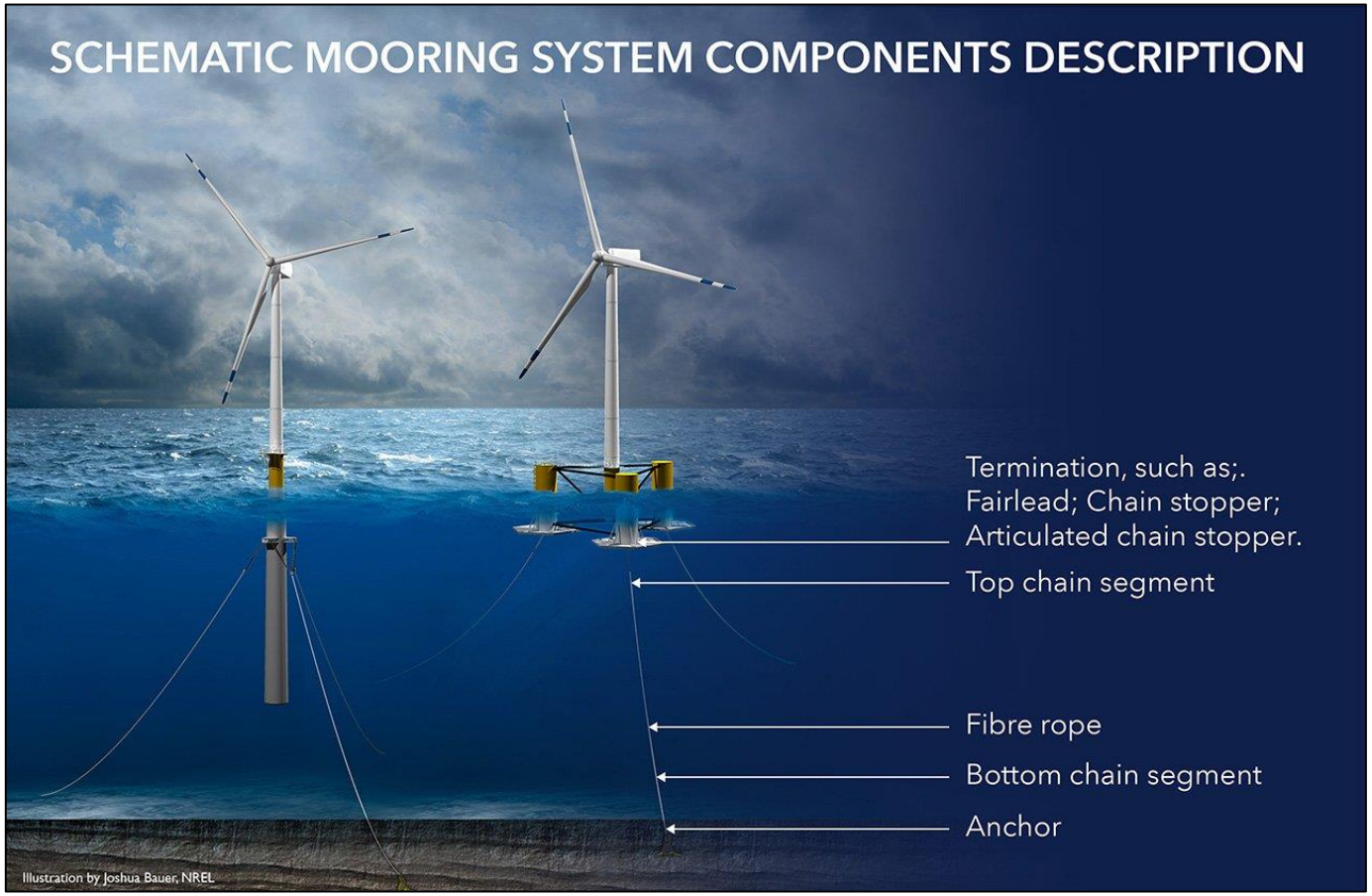
Motivation

- The presence of floating offshore wind technology (FOWT) in the Gulf of Maine introduces the risk of secondary entanglement of sensitive marine mammal populations
- Risk is highly dependent on the movement of Abandoned, Lost, or Discarded Fishing Gear (ALDFG) that is in the resource
- This research looks to quantify such risk, by focusing on the process in which ALDFG **ensnares** on FOWT infrastructure



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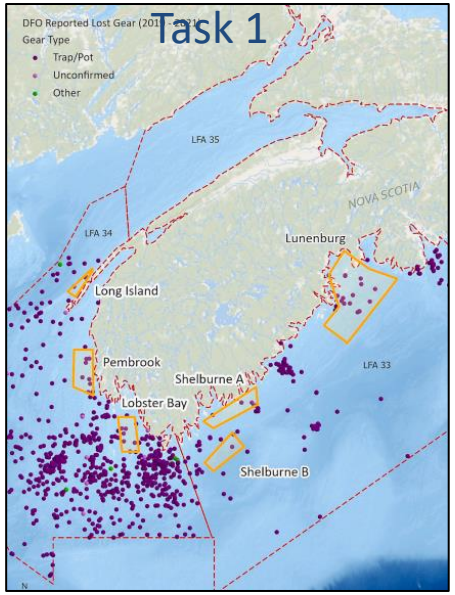
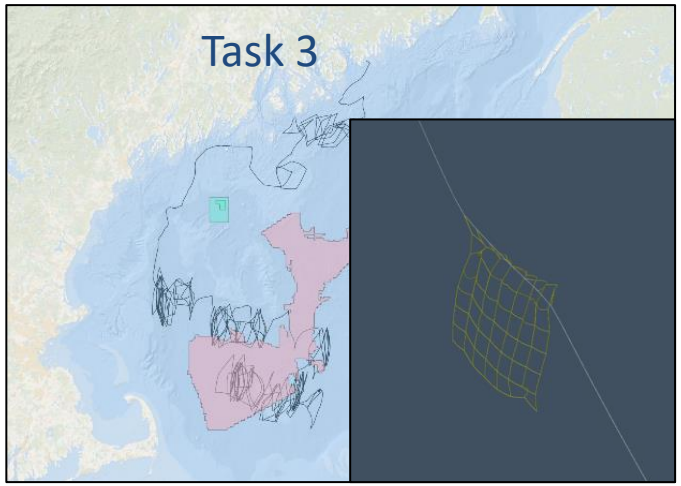
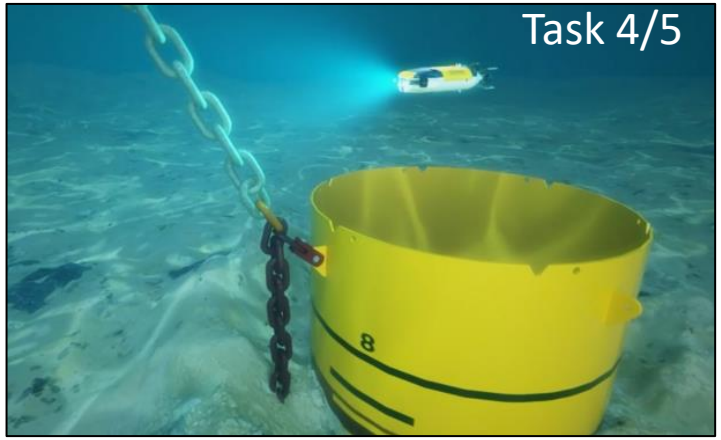
Scope

1. Literature Review, Data Collection, and Data Gaps
2. Stakeholder Engagement
3. Desktop Risk Assessment
4. Monitoring Approaches and Technology
5. Retrieval Approaches and Technology







[1]Gilman, E. (2015). Status of international monitoring and management of abandoned, lost and discarded fishing gear and ghost fishing. *Marine Policy*, *60*, 225-239.

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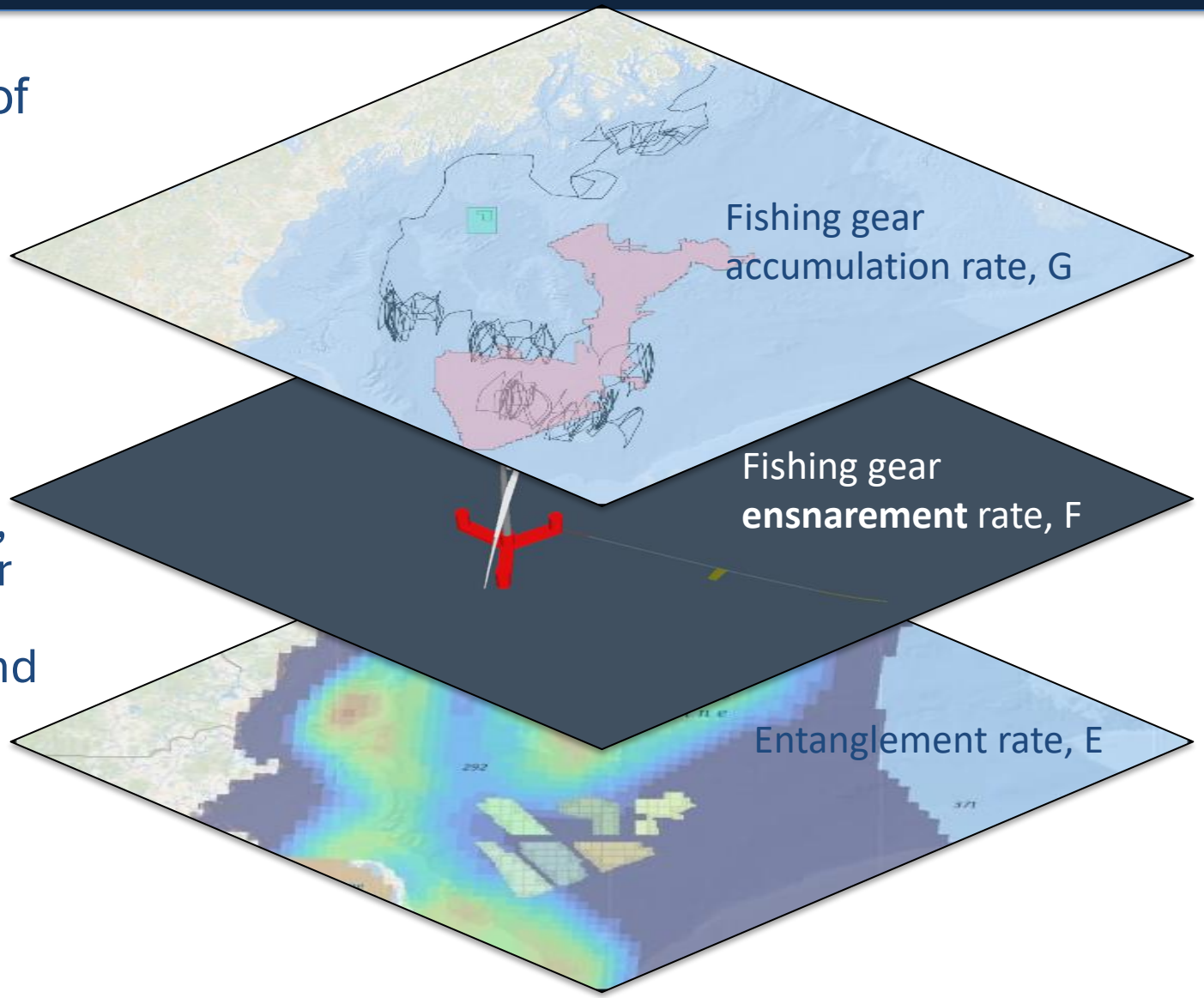
Risk Methodology

- The probability of entanglement follows:

$$P_E = \int EFG$$

- Decouples hazard, demand, and fragility (gear movement, ensnarement, and entanglement)
- Borrowed from seismic and hurricane risk



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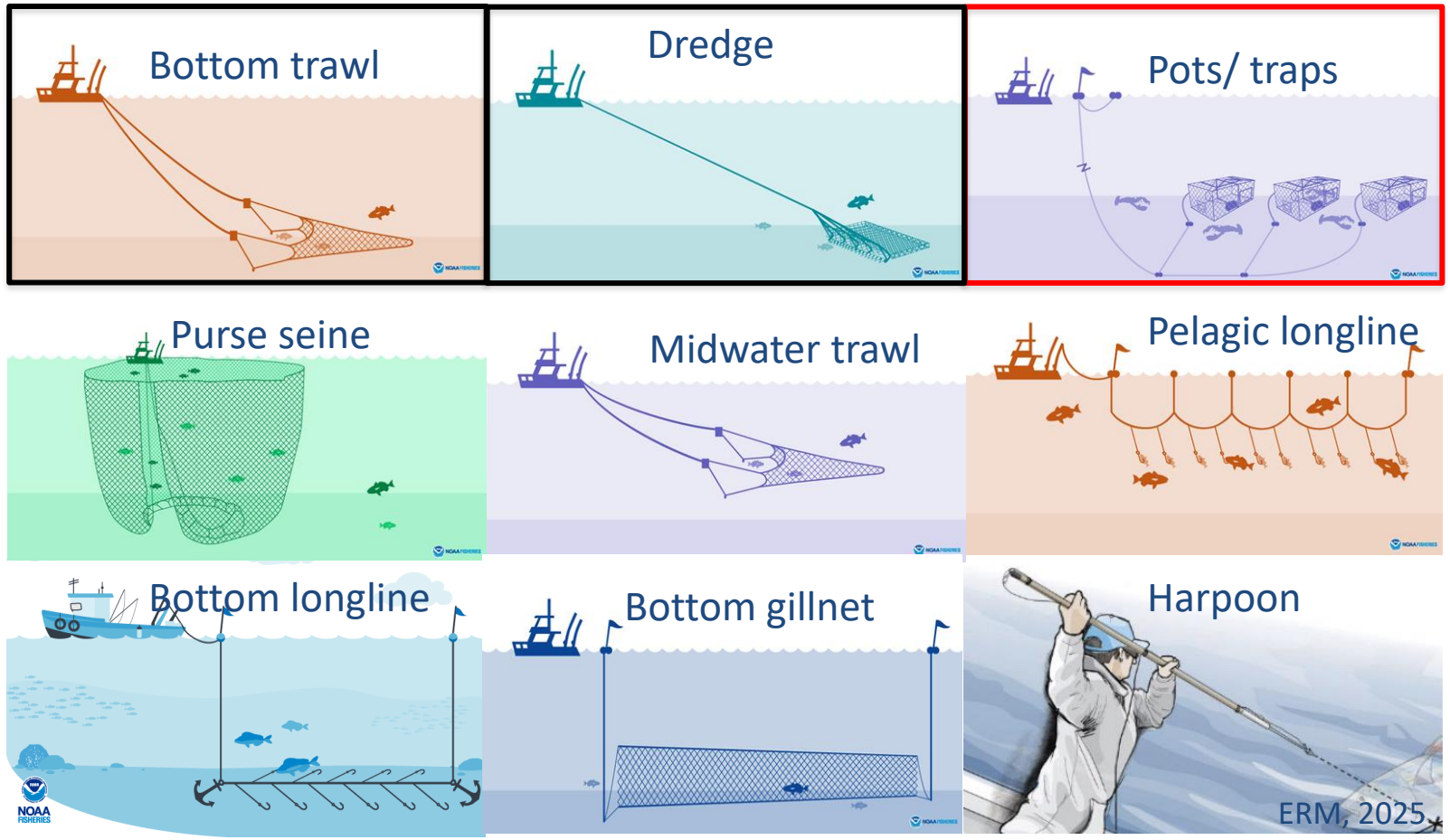
Gulf of Maine Fishing Gear

- Relevant fishing gear types for the Gulf of Maine were identified via Communities-at-sea data (2011-2015), NEFSC fishing footprints (2016-2020) and the ERM-GMRI Fisheries Coexistence Report (2025)
- Images from NOAA Fisheries, and used in marine mammal entanglement identification guides



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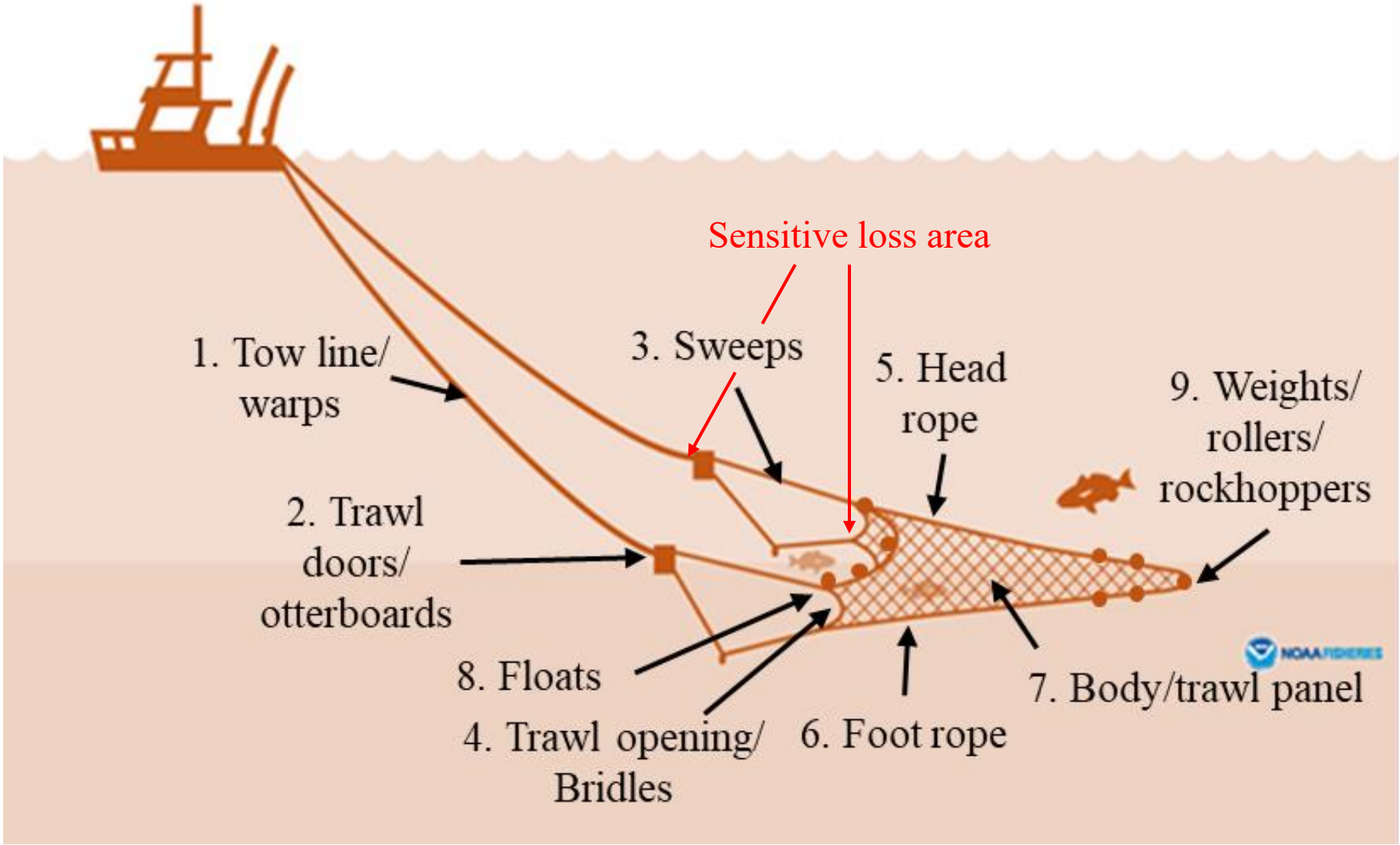
Research, Education, and Economic Development

Gear Breakdown: Bottom Trawl



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Research, Education, and Economic Development

Pot/Trap Gear Construction

Component	Name	Material Construction	Buoyancy	Diameters/ Sizes (in)	Lengths (ft)
1	Buoy	Wood/Foam/Plastic	Positive	5”x11” to 8”x15”	N/A
2	Buoy line/Sink line	Synthetic rope (nylon, poly) , sometimes with steel core	Negative	3/8”-1/2”	Varies by water depth 10’s-100’s of ft
3	Float Line	Synthetic rope	Positive	3/8”-1/2”	Varies 10’s100’s of ft
4	Groundline	Synthetic rope, sometimes with steel core	Negative	11/32”-1/2”	10’s-100’s of ft
5	Gangion	Synthetic rope	Varies	11/32”-1/2”	10’s of ft
6	Becket/Bridal	Synthetic rope	Varies	11/32”-1/2”	10’s of ft
7	Trap/Pot	Coated steel	Negative	48”x21”x13”	N/A

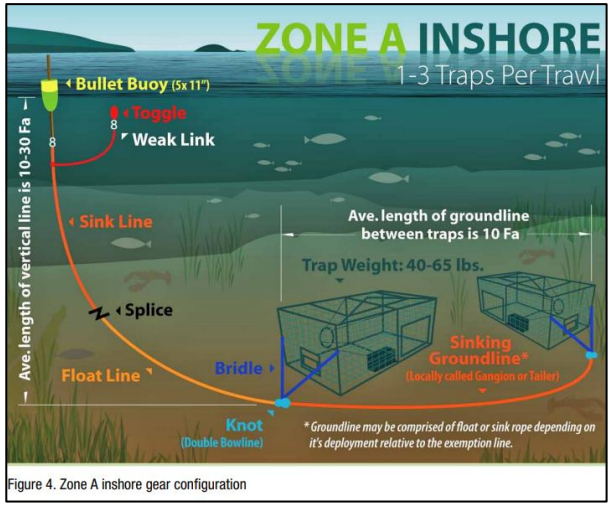

Figure 4. Zone A inshore gear configuration

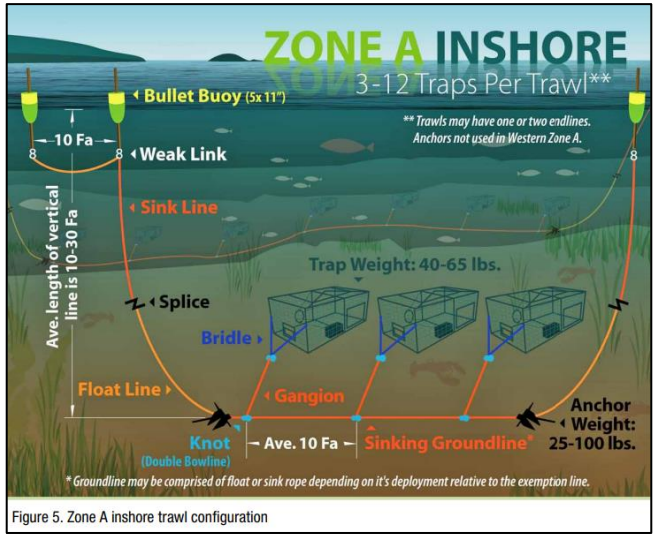

Figure 5. Zone A inshore trawl configuration

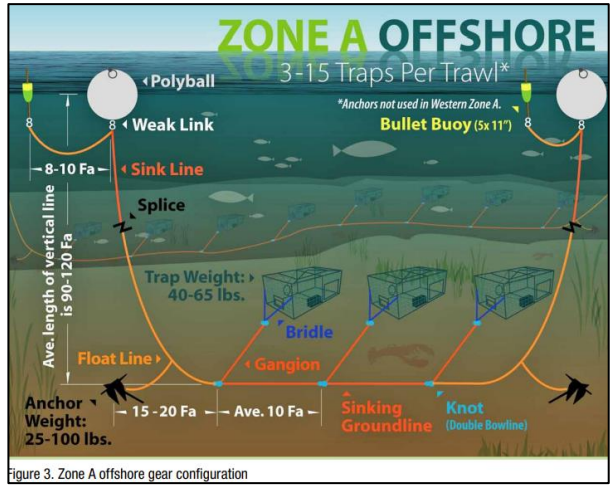

Figure 3. Zone A offshore gear configuration

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Research, Education, and Economic Development

Schedule, and Next Steps

PHASE		DETAILS	Year 1 Period of Performance												
			Q3		Q4			Q1			Q2			Q3	
			M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
			8/25	9/25	10/25	11/25	12/25	1/26	2/26	3/26	4/26	5/26	6/26	7/26	8/26
1	**Task 1: Literature Review, Data Collection, and Data Gaps**	Subtask 1.1: Literature review													
		Subtask 1.2: Data compilation and dissemination													
		Milestone 1: Literature review complete				Nov-26									
		Deliverable 1.1: State of the art report				Nov-26									
		Deliverable 1.2: Creation of online data repository				Nov-26									
2	**Task 2: Stakeholder Engagement Plan**	Subtask 2.1: Stakeholder engagement plan													
		Subtask 2.2: Stakeholder engagement meetings for concept overview													
		Subtask 2.3: Stakeholder engagement meetings for gear loss estimation													
		Subtask 2.4: Stakeholder engagement meetings for risk results, monitoring, and gear retrieval													
		Deliverable 2.1: Stakeholder engagement plan				Nov-26									
		Deliverable 2.2: Stakeholder engagement summary report												Jul-31	
3	**Task 3: Desktop Risk Assessment**	Subtask 3.1: Global-scale model of current flow and gear movement													
		Subtask 3.2:Turbine-scale model of gear impacting FOWT moorings													
		Subtask 3.3: Seasonal likelihood of whale species entering WEAs													
		Milestone 3: Desktop risk assessment complete													
		Deliverable 2.1: Secondary entanglement risk quantification report											Jun-26		
		Deliverable 2.2: Secondary risk entanglement toolbox added to Online data repository												Jul-31	
		Deliverable 3.3: Secondary entanglement risk quantification publication.												Jul-31	
4	**Task 4: Monitoring Approaches and Technologies**	Subtask 4.1: Literature review and industry survey for monitoring and detecting derelict gear													
5	**Task 5: Retrieval Approaches and Technologies**	Subtask 5.1: Literature review and industry survey for retrieving derelict gear													
		Deliverable 4.1/5.1: Summary report for monitoring and retrieval approaches and technology.													
		Milestone 4: Monitoring and retrieval approaches complete										May-29			

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Questions and Acknowledgements

- Maine Department of Energy Resources
- Maine Offshore Wind Research Consortium
- California Energy Commission and Lawrence Berkeley Labs

- Questions?

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