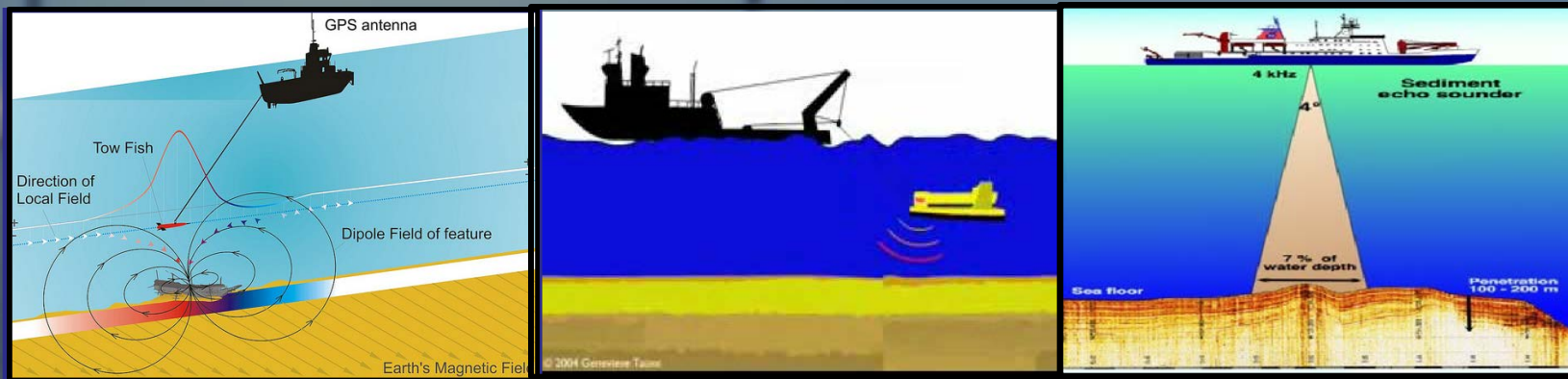
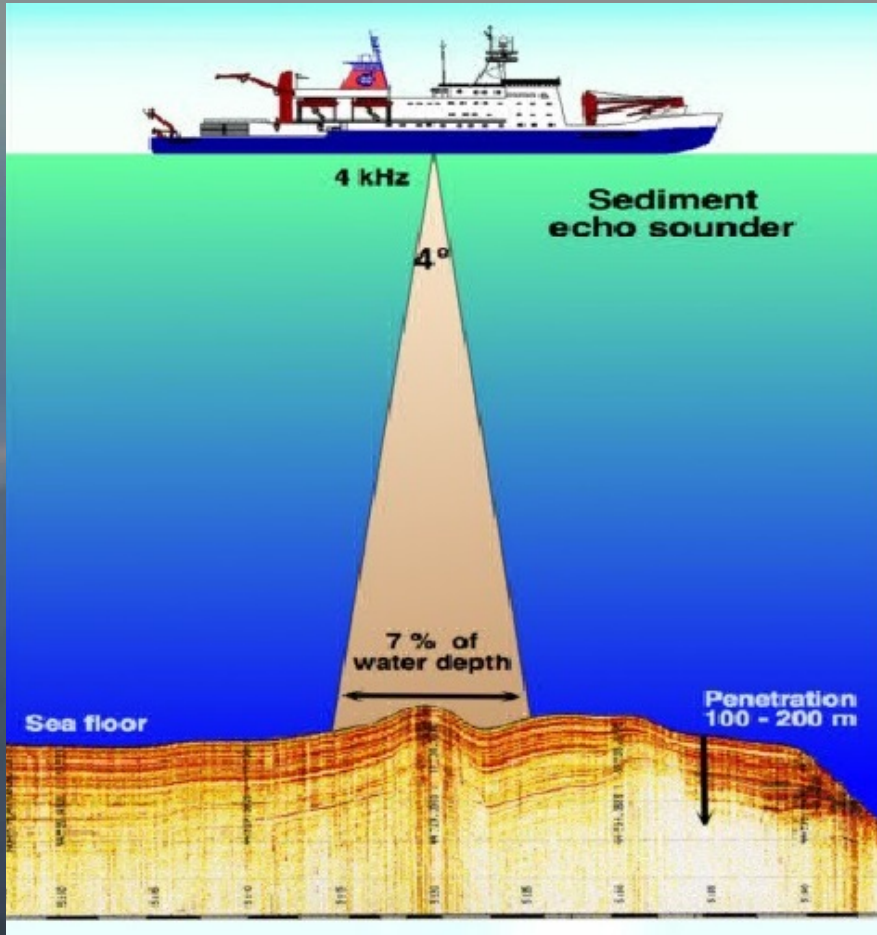


High-Resolution Geophysical Surveys



HRG Surveys



Purpose to collect geophysical info:

- Archaeological
- Geohazards
- Habitat
- Cable routes
- Sediment characteristics
- Unexploded Ordinance



Review of BOEM's Existing HRG Requirements

North Atlantic Right Whale Mitigation Measures for Atlantic Renewable Energy Activities



Protected species observer requirements

No surveys or pile-driving at night
(unless alternative monitoring plan)



General vessel-strike avoidance measures

Vessels $\geq 65'$ restricted to 10 knots *(or less)*
■ Nov 1 to April 30

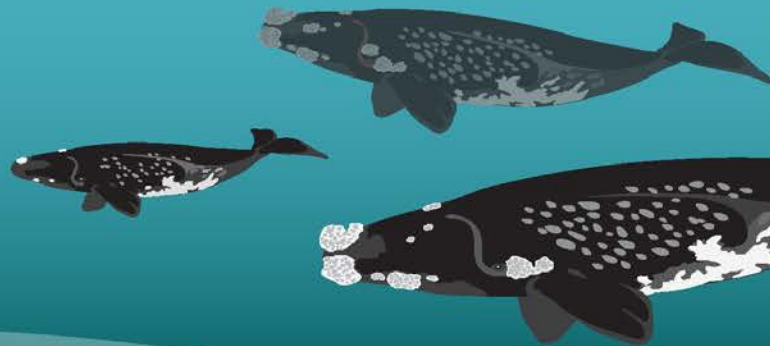


All sub-bottom profiling and pile driving stops within 24 hrs of DMA establishment

Prohibition on pile driving (met tower)
■ Nov 1 to April 30

Exclusion zones for sub-bottom profiling and pile driving

No sub-bottom profiling within right whale critical habitat
■ Nov 15 to April 15



Cumulative Sound Exposure Level Distances for HRG Survey Equipment

HRG SOURCE (Operating below 200 kHz)	PTS INJURY DISTANCE (m)			
	Low Frequency Cetaceans	Mid Frequency Cetaceans	High Frequency Cetaceans	Seals (Phocids)
Boomers	9	0	2	2
Sparkers, Mini-GI Gun, Bubble Gun (impulsive)	26	<1	95	13
Mini-GI airgun (impulsive)	20	0	45	8
Sub-bottom profilers	2	<1	36	<1
Multi-beam echosounder (100 kHz)	0	2	430*	<1

PTS injury distances were calculated with NOAA's sound exposure spreadsheet tool using sound source characteristics for HRG sources in Crocker and Fratantonio (2016)