Cetaceans of the Scotian Shelf and DFO Maritimes Region's Long-Term Passive Acoustic Monitoring Program

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Cetaceans of the Scotian Shelf

More than 15 species of whales, dolphins, and porpoises occur off eastern Canada

Photos by H. Moors-Murphy

Seasonal migrants and year-round resident species

Photos by H. Moors-Murphy

Several species listed as endangered, threatened, or special concern under the Species at Risk Act (SARA)

Species assessed as endangered, threatened, or special concern by the Committee on the Status Wildlife in Canada (COSEWIC)

Identified Important Habitats

North Atlantic right whale

Photo by H. Moors-Murphy

Critical Habitat formally designated under the SARA

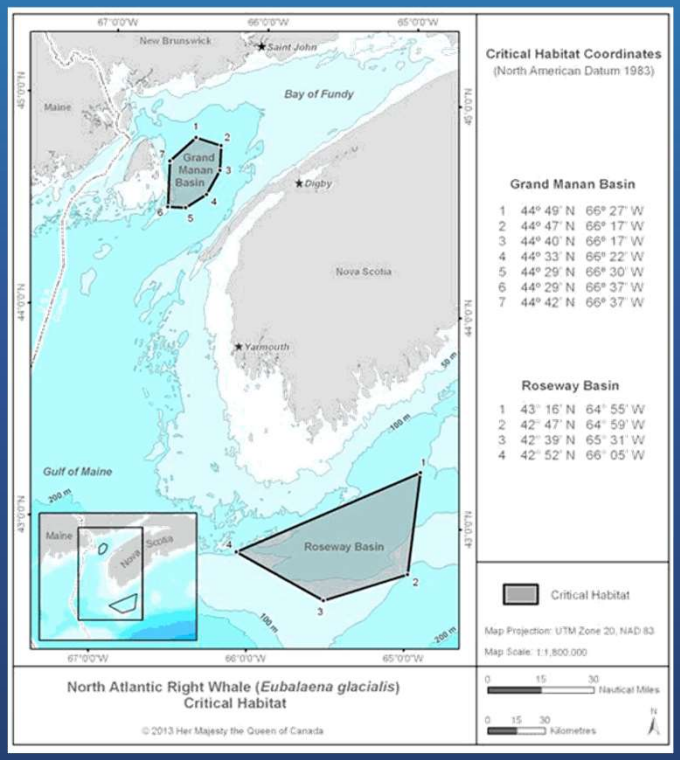


Figure from: DFO. 2014. Recovery Strategy for the North Atlantic Right Whale (*Eubalaena glacialis*) in Atlantic Canadian Waters [Final]. Species at Risk Act Recovery Strategy Series. Fisheries and Oceans Canada, Ottawa. vii + 68 pp.

Identified Important Habitats

Atlantic blue whale

Identified important foraging habitat (green) and transit corridors (blue)

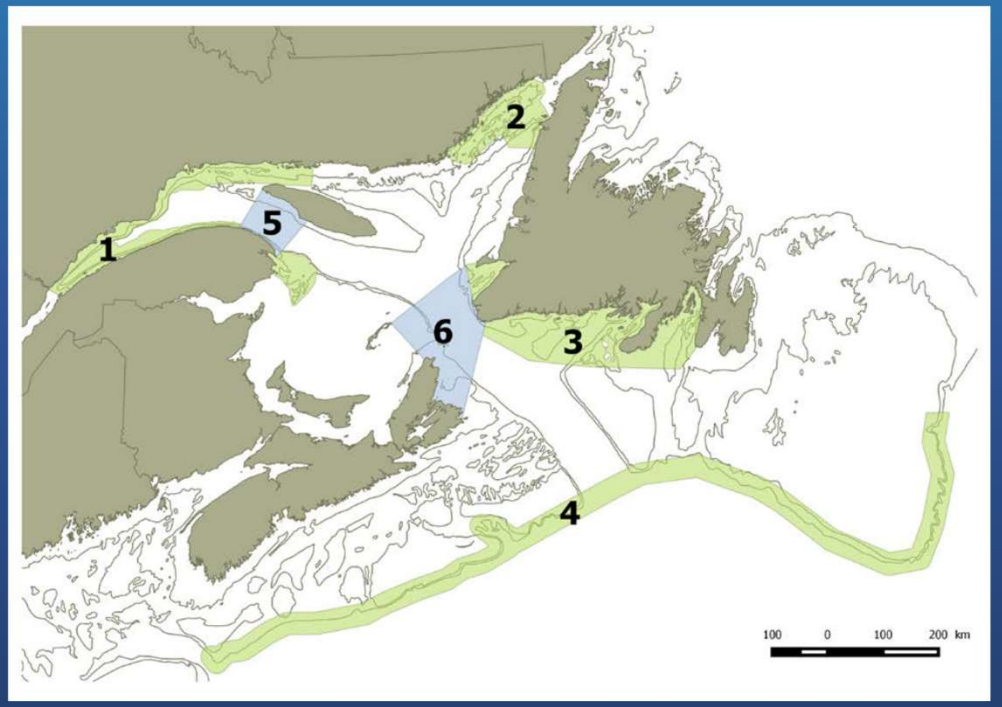


Figure from: Lesage, V., Gosselin, J.-F., Lawson, J.W., McQuinn, I., Moors-Murphy, H., Plourde, S., Sears, R., Simard, Y. 2018. Habitats important to blue whales (*Balaenoptera musculus*) in the western North Atlantic. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/080. iv + 50 p.

Identified Important Habitats

Scotian Shelf northern bottlenose whale

Critical Habitat formally designated under the SARA

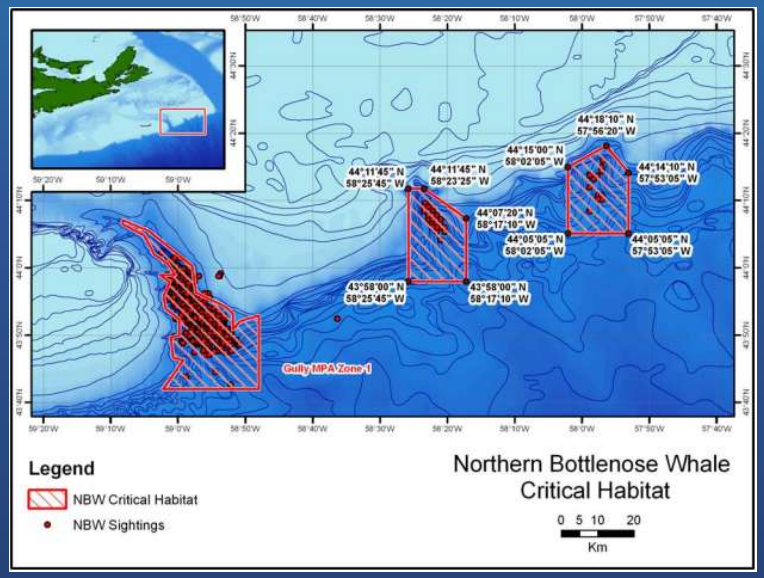


Figure from: DFO. 2010. Recovery Strategy for the Northern Bottlenose Whale, Scotian Shelf population, in Atlantic Canadian Waters. .Species at Risk Act Recovery Strategy Series. Fisheries and Oceans Canada. vi + 61p.

Photo by H. Moors-Murphy

Identified important habitat (orange)

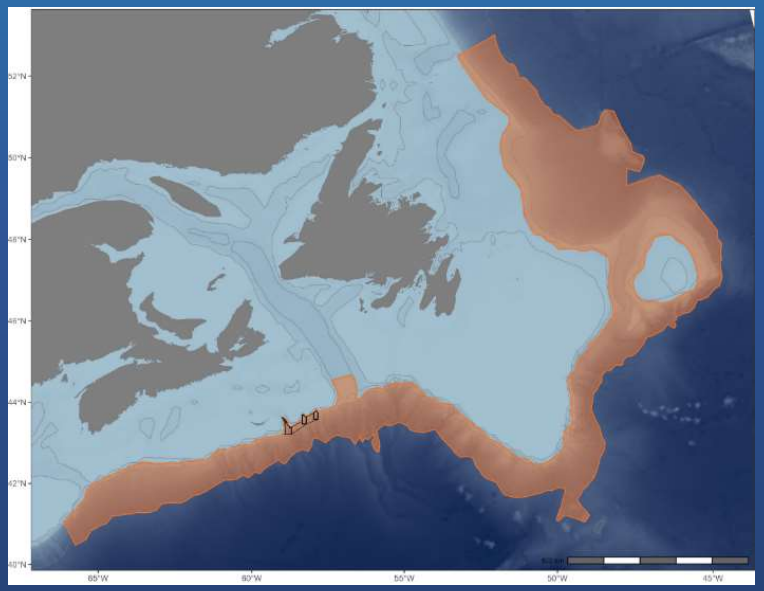
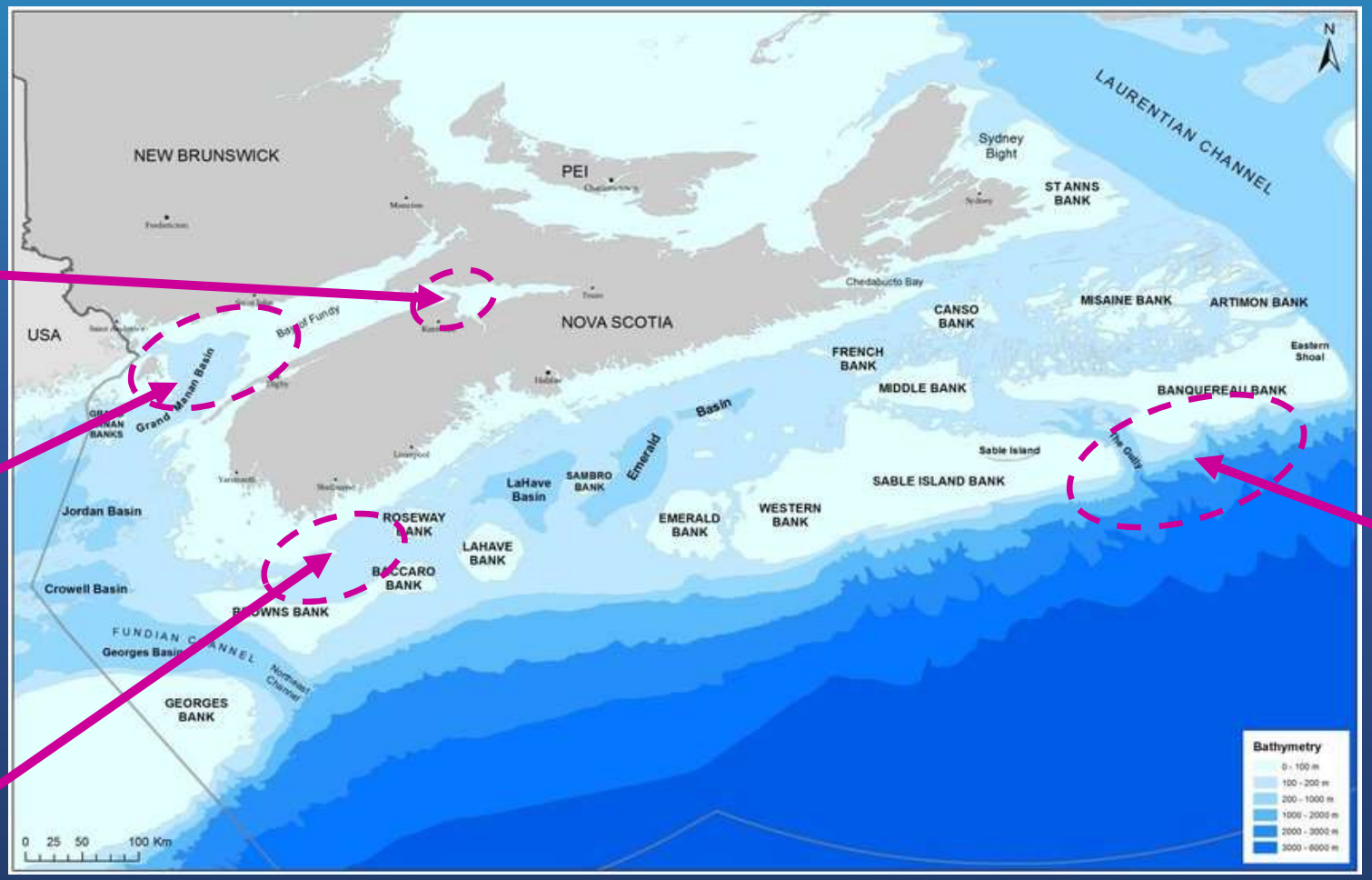


Figure from: Feyrer, L.J., Stanistreet, J.E., Gomez, C., Adams, M., Lawson, J.W., Ferguson, S.H., Heaslip, S.G., Lefort, K.J., Davidson, E., Hussey, N.E. and Whitehead, H., 2024. Identifying important habitat for northern bottlenose and Sowerby's beaked whales in the western North Atlantic. Aquatic Conservation: Marine and Freshwater Ecosystems, 34: e4064.

Vessel-Based Cetacean Studies

Right whales, humpback whales, harbor porpoise (and other species)

Right whales



Beaked whales (and other species)

* Not a complete summary of all cetacean-focused fieldwork that has occurred

Broadscale Aerial Surveys

Cetacean and other marine megafauna sightings (blue circles and red squares)

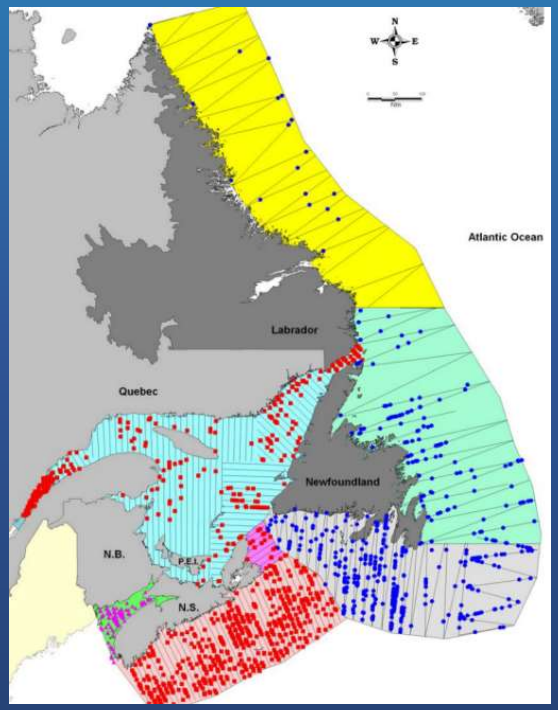


Figure from: Lawson. J.W., and Gosselin, J.-F. 2009. Distribution and preliminary abundance estimates for cetaceans seen during Canada's marine megafauna survey - A component of the 2007 TNASS. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/031. vi + 28 p.

Aerial survey efforts off eastern Canada in 2024

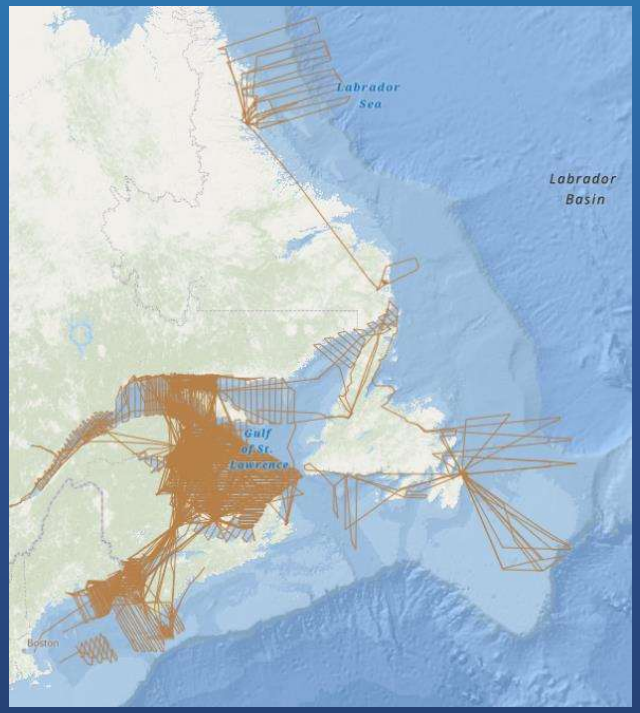


Figure from: Whales Insight online interactive mapping tool (https://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/narightwhale-baleinenoirean/alert-alerte/index-eng.html)

My Research Program

Cetacean Research and Monitoring Program:

main objective is to increase knowledge of cetacean behaviour and occurrence in eastern Canada, through innovative collection, analyses, and management of broadscale, long-term passive acoustic monitoring and sightings data

Photo by H. Moors-Murphy

Fisheries and Oceans Canada | Pêches et Océans Canada

COLLECTING KEY INFORMATION ON LIVE, FREE-SWIMMING CETACEANS

Team Whale Canada

Your Information

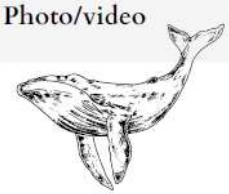
- Vessel/platform name
- Purpose of trip (E.g. fishing, whale watch, commercial shipping, research)
- Recorders name and affiliation

Sighting Information

- Date (dd-mm-yy)
- Time (24h, please specify UTC or local time zone)
- Latitude (DD.ddddd)
- Longitude (DD.ddddd)
- Species (to the best of your knowledge)

Additional Information

Species certainty	1 = unsure, 2 = probable, 3 = definite
ID features	Features used to identify the species (e.g. dorsal fin)
# of animals	Estimate number of animals sighted (min, max & best guess)
Distance	Distance (specify ft or m) of animal from the vessel or platform
Direction	Animal's bearing relative to vessel or platform (compass bearing or clock position)
Beaufort/sea state	Using the Beaufort scale (1-12)
Comments	Relevant information including description of behaviour, weather conditions and vessel activity at time of sighting
Photo/video	Please provide any media available

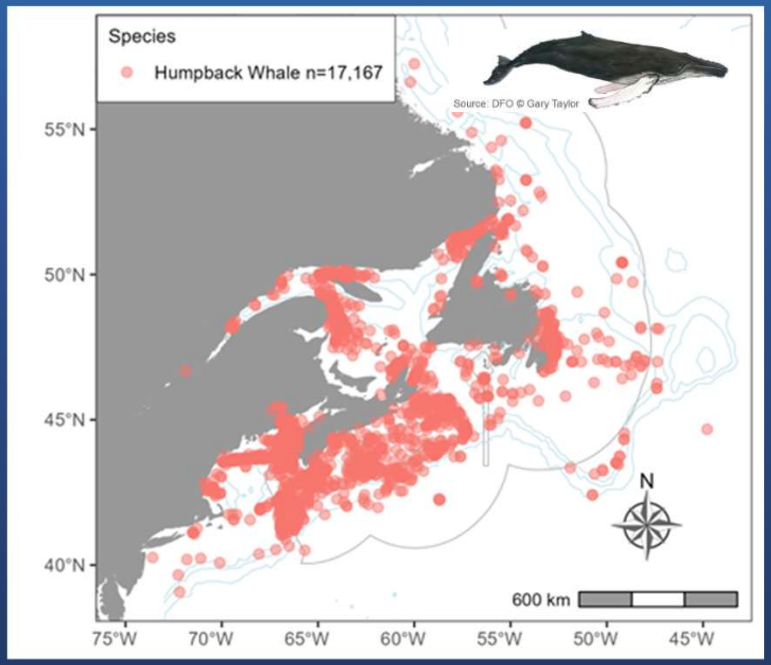


Please forward sightings to:
XMARWhaleSightings@dfo-mpo.gc.ca

Opportunistic Sightings Data

DFO Maritimes Region Whale Sightings Database:
https://www.mar.dfo-mpo.gc.ca/en/maritimes-region-whale-sightings-database

- Database developed in 2002
- Records from 1963-present
- Contributions from a variety of sources



Species Distribution Models

Fin whale sightings by season collected from 1975-2015, with species distribution modelling outputs (in yellow) which indicate areas of suitable habitat based on high relative occurrence rate (60-100%) during summer and fall

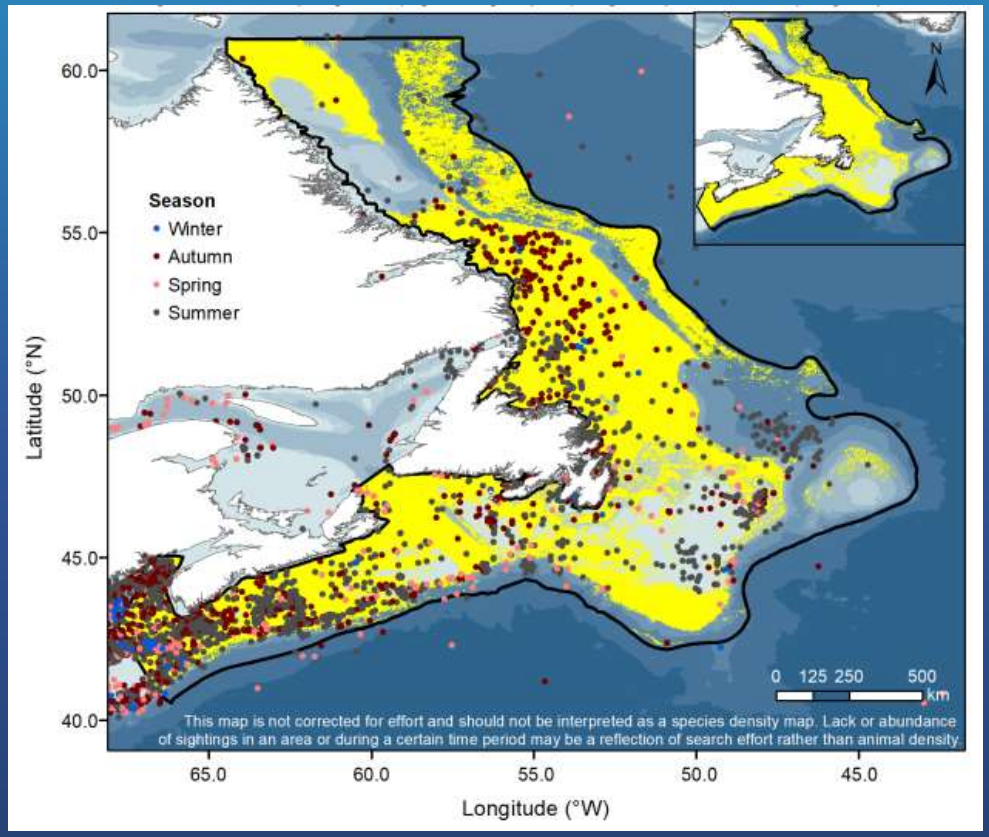
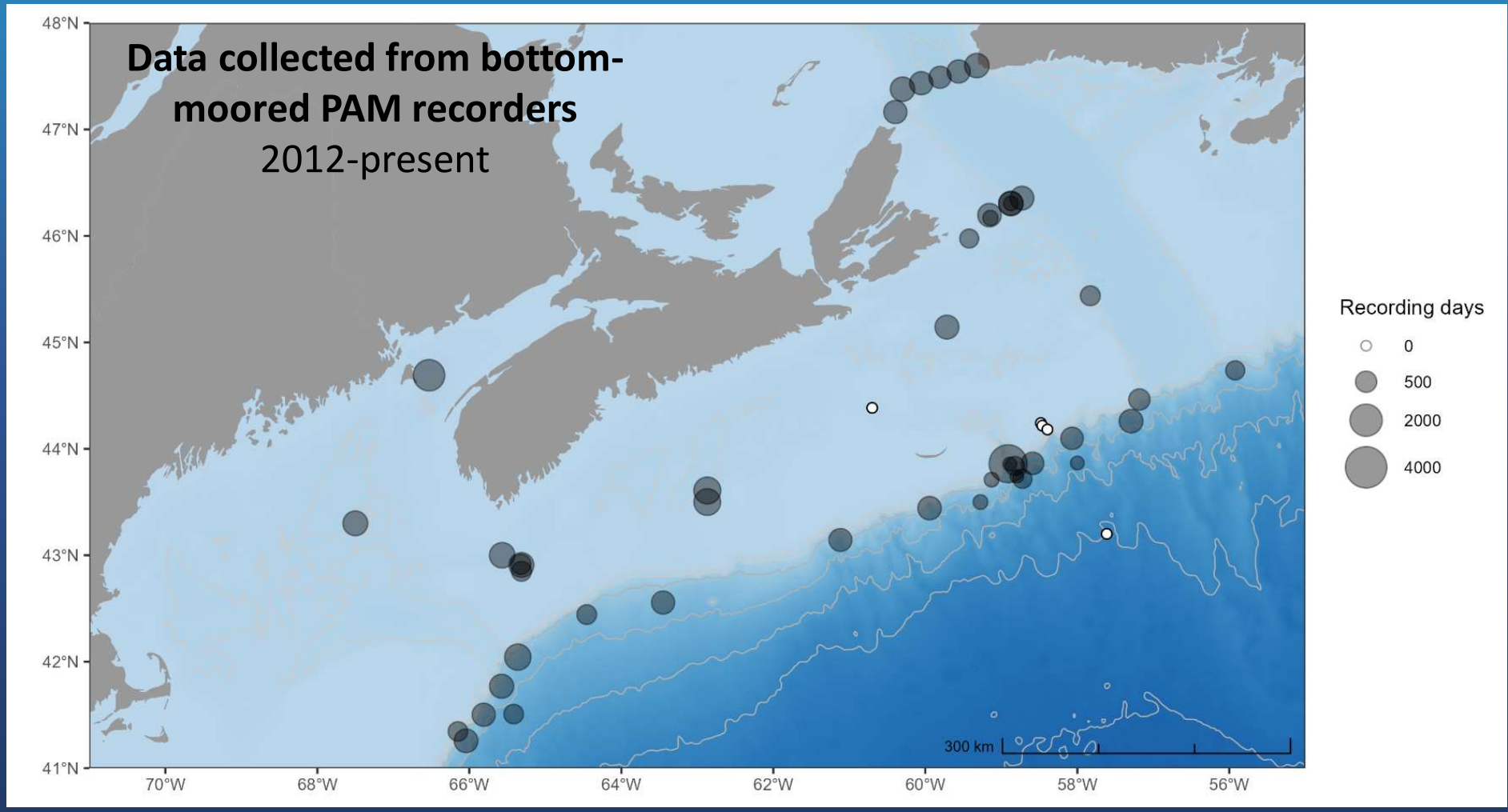


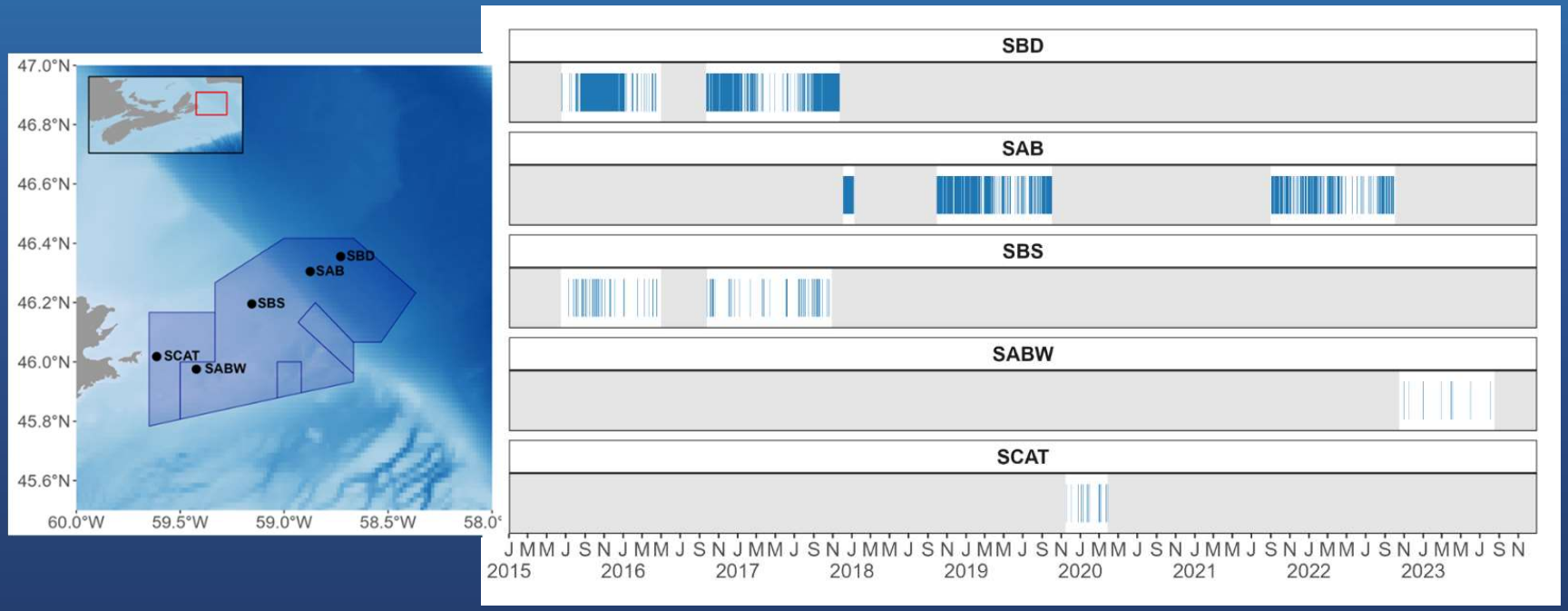
Figure from: Gomez, C., Konrad, C.M., Vanderlaan, A., Moors-Murphy, H.B., Marotte, E., Lawson, J., Kouwenberg, A-L., Fuentes-Yaco, C., Buren, A. 2020. Identifying priority areas to enhance monitoring of cetaceans in the Northwest Atlantic Ocean. Can. Tech. Rep. Fish. Aquat. Sci. 3370: vi + 103 p.

Passive Acoustic Monitoring (PAM)



Species occurrence at specific areas of interest

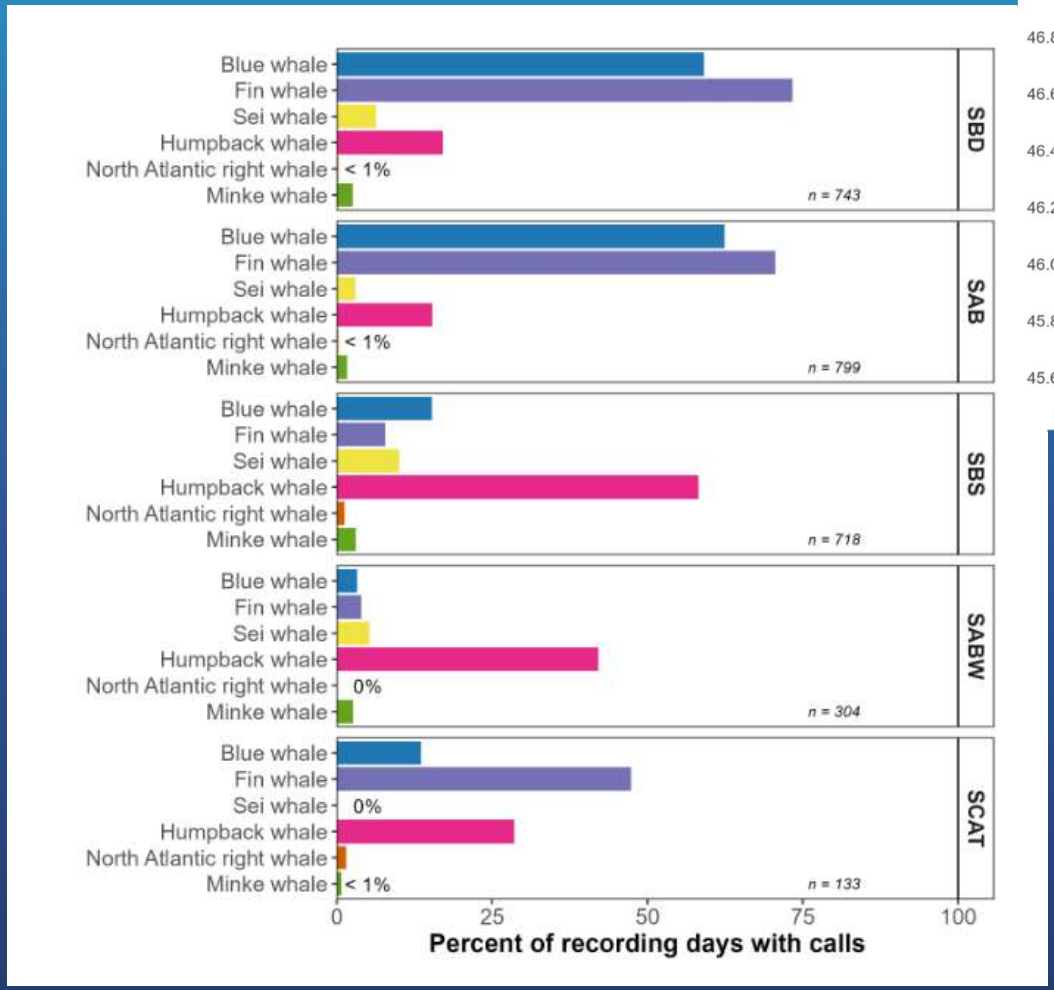
Daily occurrence of confirmed blue whale calls at each recording station in St. Ann's Bank Marine Protected Area; grey shading represents periods with no recording effort

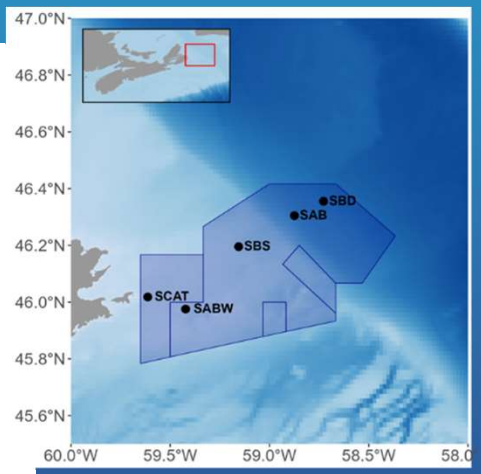


Figures from: Macklin, G.F., Moors-Murphy, H.B., Stanistreet, J.E., Wingfield, J. E. *In prep.* Cetacean Monitoring and Occurrence in St. Anns Bank. Can. Tech. Rep. Fish. Aquat. Sci.

Multispecies comparisons

Prevalence of baleen whale calls recorded in St. Ann's Bank Marine Protected Area





Figures from: Macklin, G.F., Moors-Murphy, H.B., Stanistreet, J.E., Wingfield, J. E. *In prep.* Cetacean Monitoring and Occurrence in St. Anns Bank. Can. Tech. Rep. Fish. Aquat. Sci.

Seasonal patterns in species occurrence

Percent recording days with confirmed North Atlantic right whale upcalls present by season at 27 recording sites (indicated by circles), all years combined (2017-2022)

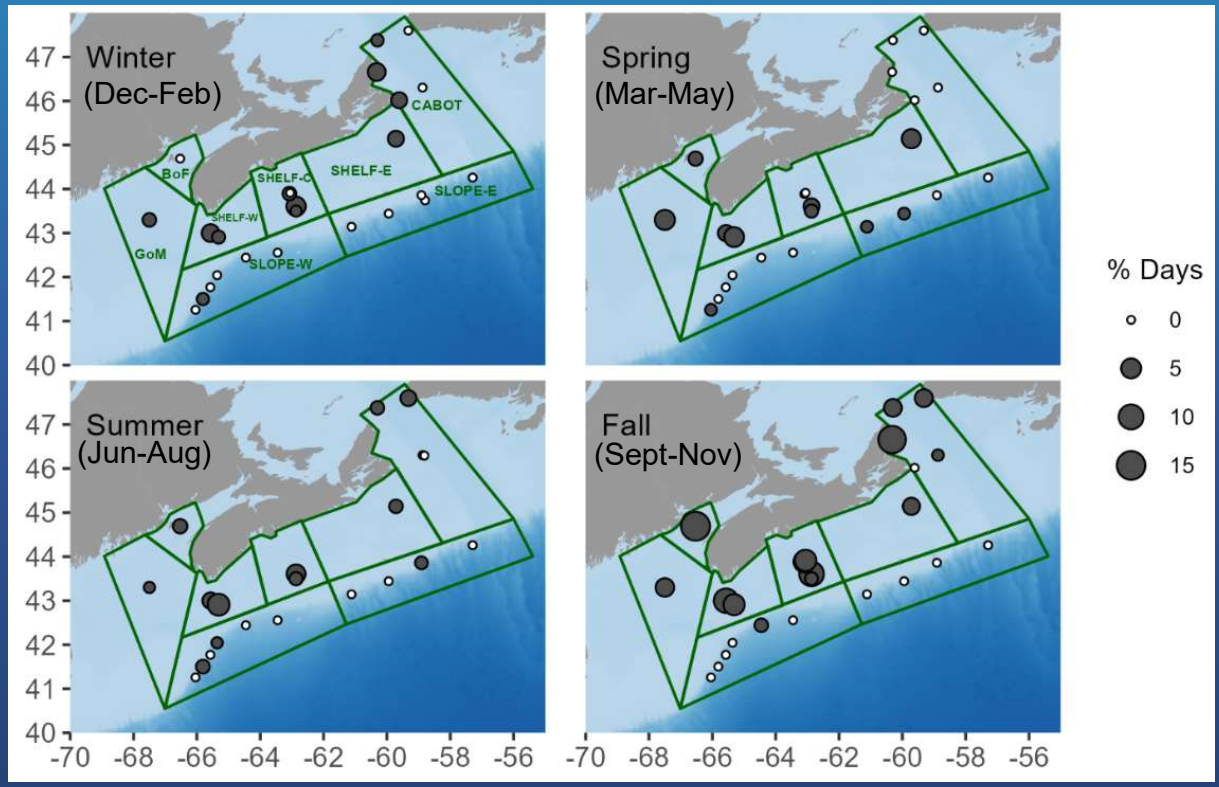
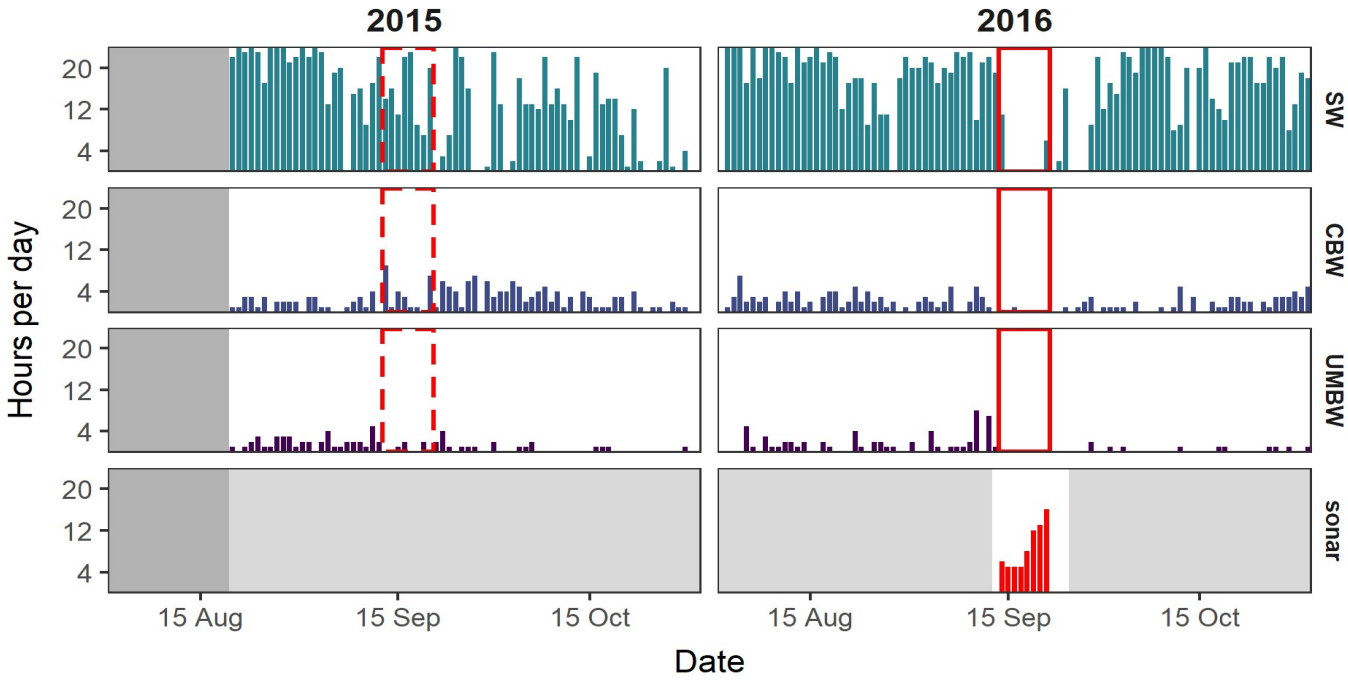
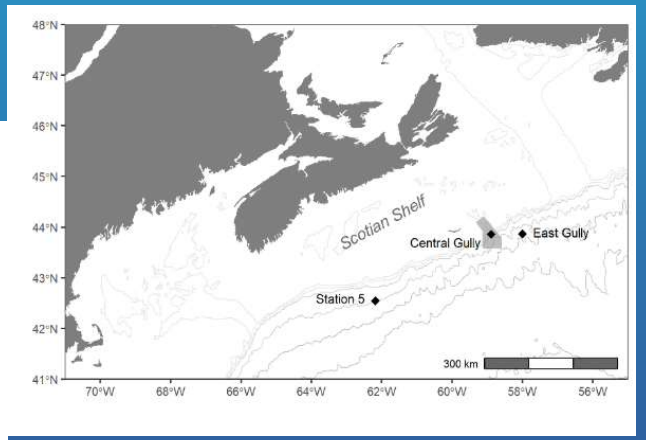


Figure from: Moors-Murphy, H.B., Macklin, G.F., Evers, C. Stanistreet, J., Colbourne, N., Wingfield, J.E., Xu, J. and Vanderlaan , A.S.M. (*Submitted*). Acoustic occurrence of North Atlantic right whales (*Eubalaena glacialis*) from 2017-2022 off Nova Scotia, Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2024/nnn. iv + xx p.

Understanding threats



Number of hours/day with echolocation clicks from sperm (SW), Cuvier's beaked (CBW), and unidentified Mesoplodont beaked whales (UMBW), and sonar signals at the Station 5 recording site. Dark grey shading indicates period with no data; light grey shading on the sonar plot indicates periods not analyzed for sonar signals. Solid red box delineates period with sonar detections in 2016; dashed box delineates corresponding control period in 2015.

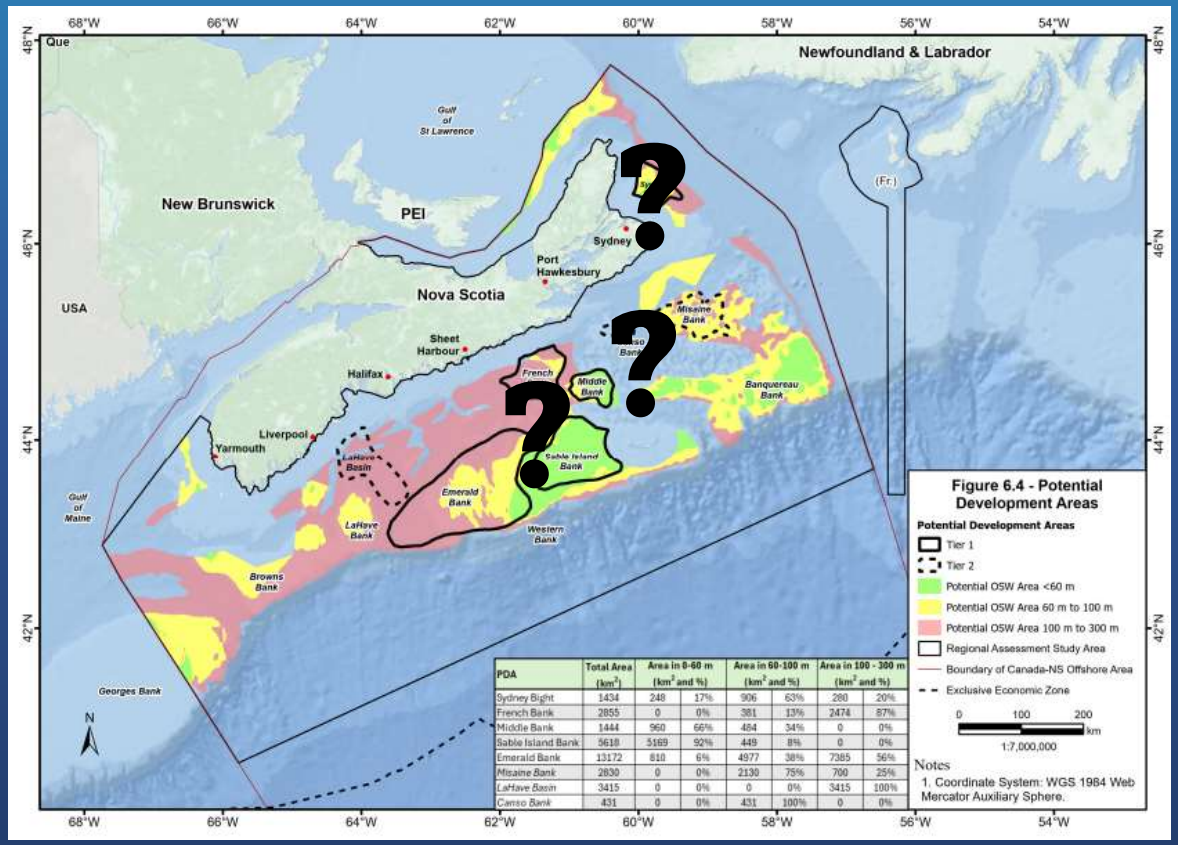


Changes in beaked and sperm whale vocal behavior associated with military sonar activities

Figures from: Stanistreet, J.E., Beslin, W.A.M., Kowarski, K., Martin, S.B., Westell, A. and Moors-Murphy, H. 2022 Changes in the acoustic activity of beaked whales and sperm whales recorded during a naval training exercise off eastern Canada. Scientific Reports. 12: 1973.

Offshore Wind Development Areas and Cetaceans

Potential development areas for offshore wind



PDA	Total Area (km²)	Area in 0-60 m (km² and %)		Area in 60-100 m (km² and %)		Area in 100 - 300 m (km² and %)	
Sydney Bight	1434	248	17%	906	63%	280	20%
French Bank	2855	0	0%	381	13%	2474	87%
Middle Bank	1444	960	66%	484	34%	0	0%
Sable Island Bank	5618	5169	92%	449	8%	0	0%
Emerald Bank	13172	810	6%	4977	38%	7385	56%
Misaine Bank	2830	0	0%	2130	75%	700	25%
LaHave Basin	3415	0	0%	0	0%	3415	100%
Canso Bank	431	0	0%	431	100%	0	0%

There remain many gaps in our understanding of the finer scale distribution, movement patterns, and habitat use of cetaceans throughout the Scotian Shelf region, including in proposed offshore wind development areas

Figure from: Daborn et al. 2024. Regional Assessment of Offshore Wind Development in Nova Scotia Draft Report. Available online: https://iaac-aeic.gc.ca/050/documents/p83514/159507E.pdf


Continued research efforts are needed,
and passive acoustic monitoring will be an important
component of future research and monitoring for cetaceans
Photo by H. Moors-Murphy

Team Whale

Thank You!

Photo by H. Moors-Murphy