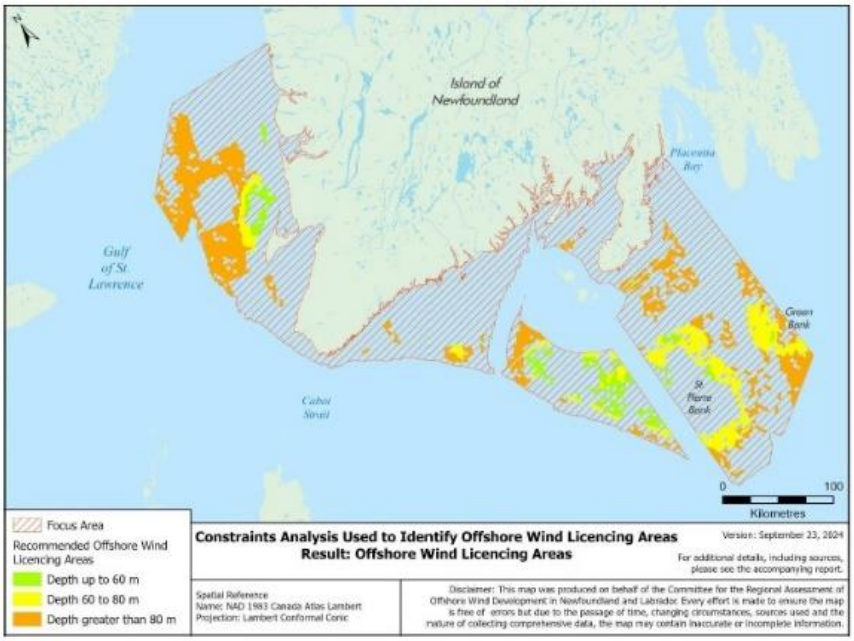
DFO Science Review of the '*Draft Report: Regional Assessment of Offshore Wind Development in Newfoundland and Labrador (October 1, 2024)*'

Background / Context: The Impact Assessment Agency of Canada's (IAAC) Committee for the Regional Assessment (RA) of Offshore Wind Development in Newfoundland and Labrador has released a *Draft Report: Regional Assessment of Offshore Wind Development in Newfoundland and* Labrador (October 1, 2024) for public comment. The draft report was provided to DFO on October 1, 2024, with a request for response by **November 29, 2024**. The following constitutes the DFO Ecosystems and Oceans Science sector's science expert advice in response to the request. In preparing the response, the DFO Ecosystems and Oceans Science sector drew upon its knowledge of marine ecosystems, species, and marine industrial activities, science literature, previous responses provided to the RA Committee, and its expertise gained from similar reviews of other marine industries, including review of the submarine cable, offshore petroleum, and tidal power sectors.



This map depicts offshore wind licencing areas, which resulted from the removal of all the above constraints. The map additionally depicts which of these areas may be suitable for technologies designed for depths up to 60 m, 60-80 m, and 80-300 m. The map was produced using Step 9 Resulting Area (from figure 6.11). Additional steps were applied to complete the resulting offshore wind licencing areas such as filling small holes and removing slivers and isolated polygons. Licencing areas were categorized by water depth (up to 60m, 60-80m and greater than 80m) and small, isolated resulting areas were combined with surrounding areas. A technical methodology report including the steps undertaken in GIS to develop this map is in progress and will be appended to the Final Report.
Sources: NRCan, 2023; Regional Assessment Committee 2024f.

Figure 1. Recommended offshore wind licensing areas identified by the RA committee for offshore wind in Newfoundland and Labrador in its draft report released for public comment on October 1, 2024. The outer boundary delineates the Focus Area for this assessment.

Question/request: The Regional Assessment Committee is seeking comments and input on its *Draft Report: Regional Assessment of Offshore Wind Development in Newfoundland and* Labrador (October 1, 2024) released for public comment:

Response: The following constitutes the DFO Ecosystems and Oceans Science response to the RA Committee's question outlined above:

General Comments

- The report and general consultative approach are reasonable. The 'constraints' analysis used to identify potential offshore wind licencing areas is a straight-forward approach whereby existing marine features and uses are removed from the Focus Area and those areas that remain are deemed options for potential offshore wind licencing. This approach does effectively remove any known potential conflicts between offshore wind development and the marine ecosystem and other ocean users. The report includes all the expected and relevant information typical of a regional assessment. In particular, the approach considers offshore wind resource and development criteria, as well as a broad range of ecosystem criteria and other human-use criteria, to arrive at general areas of minimum or unknown conflict. Inevitability, not all individual (e.g., single species, fisheries, etc.) interactions are avoidable, but likely can be assessed further through additional research and monitoring, project-specific impact assessment, mitigation, and consultation. In general, it is difficult to collate, synthesize, and convey such a large amount of information and perspectives into a single report, but the RA committee has provided justification for the proposed offshore wind licencing areas, which serve as a 'roadmap' to contemplate and assess next steps for project-specific wind development(s) in the Focus Area of the Newfoundland and Labrador offshore.
- The size/length of the report is overwhelming and difficult to review (i.e., 829pp.). The report could be structured into a series of separate themes to help simplify and shorten it into manageable units. Its size and structure are likely deterrents to any meaningful public review and comment. An executive summary that summarizes the relevant sections and analysis would be of benefit.
- The report has much redundancy that contributes to its overall length. For example, 'potential effects' and 'mitigation' are repeated under various sections of the report (e.g., fish stocks, marine mammals and turtles, etc.), although the effects and mitigation are often the same for fish stocks as for marine mammals and turtles. Restructuring the report might help eliminate or reduce its length, leading to a shorter and more streamlined report.
- DFO Science structured its science advisory responses to identify and directly summarize pertinent information related to relevant marine features, species, status, etc., with a direct connection to associated DFO science literature and data. The RA report, however, did not adopt a similar structure, rather it separates the content from the applicable literature (i.e., statements are not cited in the text). This is illustrated in species tables that do not have citations/references associated per species entry, rather the references follow below the table itself. The DFO approach that provided detailed information and references per species by management unit, health, and/or status, etc., was purposely designed to guide further reference to species-specific literature. It is difficult to link the literature cited in the RA report to the references that are provided.
- In the 'constraints' analysis, interactions and relationships between existing marine features and uses are not analyzed or considered in terms of positive, neutral, or negative interactions.

- Exclusion of Ecologically and Biologically Significant Areas (EBSA) and Significant Benthic Areas (SiBA) from the 'constraints' analysis, on the basis that they do not adhere to a legal protection standard, should not be interpreted as EBSA / SiBA being unimportant marine areas. On the contrary, EBSA / SiBA are used by DFO to inform marine conservation network planning, as well as other management measures employed to protect such areas. That is, EBSA / SiBA areas are often indirectly protected through management of the activities that pose a threat to them, rather than any direct legal protection or designation themselves.
- Many of the proposed licencing areas are small in size and incohesive in connectivity. The total areas presented on Page 108 of the report could be supported by referencing an average size of individual areas that fall within each of the three categories that are listed. If individual sites are not large enough to support offshore wind development their consideration should be described or possibly removed from the analysis.
- There are statements made that often are not cited or substantiated by science reports. For example, on Page 290 the report states "climate change and the associated warming of ocean waters is anticipated to have a negative impact on Snow Crabs and Toad Crabs as they require cold waters to develop properly.", although this point is not cited. In general, the RA report could undergo a more thorough editorial review.

Specific Comments

Chapter 1: Introduction

- Figure 1.1. Figure description indicates that water depths range from 0 m to over 10,000 m, while the figure legend says 1000 m. This figure should be revised to reflect the correct values presented on the map. In addition, the figure says that it shows the Economic Exclusive Zone (EEZ), but the EEZ is not clearly displayed on the map or in the figure legend beyond being implied by the boundary of the Focus Area through exclusion of St. Pierre Bank. The EEZ polygon should be added or the figure description should more clearly describe what parts of the EEZ the map illustrates.

Chapter 6: Identifying Recommended Offshore Wind Licencing Areas

- As noted in the general comments above, Table 6.1 indicates that EBSAs and SiBAs were not avoided when delineating Recommended Offshore Wind Licensing Areas, citing lack of legal protection. Avoidance should not be based on a defined area's legal precedence, but instead the importance of the feature in supporting biodiversity and overall ecosystem health within the Focus Area (which is consistent with an ecosystem approach to management; see: DFO 2007). This is particularly true for areas delineated based on benthic species/assemblages (e.g. SBAs), with particular consideration to the Committee's recommendation that fixed turbines or concrete gravity-based structures, which will have direct impacts on benthic communities, be used in the NL region (outlined in section 5.1.2 of the report).

  DFO. 2007. A new ecosystem science framework in support of integrated management. Fisheries and Oceans Canada publication no. DFO/2007-1296. 18pp.

- SiBAs represent unique benthic communities that are particularly vulnerable to physical disturbances, such as those associated with the construction, maintenance/operation, and

decommissioning of offshore wind structures. In the context of the United Nations (UN) Food and Agriculture Organization (FAO), they represent examples of Vulnerable Marine Ecosystems (VMEs) that are internationally recognized and have been widely protected through the application of fisheries measures (e.g. closures to bottom contact gear). Furthermore, Section 7.4.1.3.1 of the report indicates that EBSAs, VMEs, and SiBAs represent measures to protect corals and sponges in the Focus Area. It is unclear why these protection measures were not considered relevant in the context of the RA, but it is recommended that they be considered when delineating the boundary of Recommended Offshore Wind Licensing Areas, calls for bids for licencing areas, and/or during the project-specific impact assessment process.

- Figure 6.10. The avoidance of fishing grounds based on weight of landings requires some consideration, due to how such an approach favours heavier commercial fish species. It is noted in this report that DFO has brought this concern forward during the stakeholder engagement process and informed on the availability of additional, publicly-available, data layers produced by DFO that represent commercial fishing efforts as a function of time (https://open.canada.ca/data/en/dataset/273df20a-47ae-42c0-bc58-01e451d4897a). The linked data set was also identified by DFO Science under the "Primary, Secondary & Emerging Fish Stocks" form, as part of the DFO's summary of existing knowledge during initial engagement with the department in October 2023.
- SBA and SiBA acronyms have been used throughout the report synonymously; a single acronym should be used for consistency throughout the report.

Chapter 7.2: Air Quality and GHGs

- Figure caption 7.2.2 indicates that it represents GHG emissions for NL "by Canadian Economic Sector"; however, the figure only shows total emissions.

Chapter 7.4: Marine Fish and Fish Habitat

- The North Atlantic is seeing disproportionately higher changes in certain water mass characteristics due to climate change relative to those observed in other ocean basins globally (e.g., Bernier et al. 2023; Sabine et al. 2004). For example, the North Atlantic observes a disproportionately higher uptake of atmospheric carbon dioxide, which affects ocean carbonate chemistry and possibly pH. Changes in carbonate chemistry and ocean acidification may have varying effects on marine fish and fish habitat, including at different life stages of individual species.

  Bernier, R.Y., Jamieson, R.E., Kelly, N.E., Lafleur, C., and Moore, A.M. (eds.) 2023. State of the Atlantic Ocean Synthesis Report. Can. Tech. Rep. Fish. Aquat. Sci. 3544: v + 219 p.

  Sabine, C.L., Feely, R.A., Gruber, N., Key R.M., Lee, K., Bullister, J.L., Wanninkhof, R., Wong, C.S., Wallace, W.R., Tilbrook, B., Millero, F.J., Peng, T-H., Kozyr, A., Ono, T., and Rios, AF. 2004. The oceanic sink for anthropogenic CO2. Science 305: 367–371.

- The document is lengthy and refers to many inter-connected themes, although it only offers a limited amount of information/data available on marine fish species-at-risk (MFSAR) to support its assessment results. The document listed many of the marine fish species potentially found in the Focus Area, including all MFSAR listed under SARA and COSEWIC.

Available, and in most cases accurate, information on the life traits characteristics and population status of MFSAR are provided using up to date publications. Similarly, perceived interactions between MFSAR and the proposed offshore wind development are highlighted/hypothesized for each species, although there remain gaps in the report regarding species-specific life history characteristics in the Focus Area, with limited consideration of potential interactions at various life stages associated with offshore wind activities (e.g. underwater noise and infrastructure, benthic disturbances, sediment suspension, etc.).

- Page 283 states that "there are several protection measures in place for corals and sponges in the Focus Area, including protected and special areas such as EBSAs, VMEs, and SiBAs. Protected and Special Areas are described in Section 7.6 of this Report." However, in Chapter 6, EBSA/SiBA are not included in the constraint analysis given they are not legally-protected. This appears to be an inconsistency between sections of the report.
- Corals and sponges may be impacted at different locations in different ways by climate change, so should not be categorized generally in terms of potential climate change impacts.

  DFO. 2017. Delineation of Significant Areas of Coldwater Corals and Sponge-Dominated Communities in Canada's Atlantic and Eastern Arctic Marine Waters and their Overlap with Fishing Activity. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/007.

- The report states that "Canada does not currently have formal guidelines or regulatory thresholds that protect invertebrates, fish, sharks, and skates from the effects of underwater sound." Although thresholds may not exist, DFO Science has provided guidance and other mitigation-type considerations related to seismic sound that may be relevant in context of offshore wind development. See:

  DFO. 2020. Review of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/005.

- Hermans et al. (2022) provides an updated overview of the potential environmental impact of EMF associated with subsea offshore wind cables and describes the uncertainty and limitations of existing literature. In addition to the proposed mitigation listed in the report related to EMF, Hermans et al. (2022) also noted that advanced modeling of wind farm design could help minimize the use of EMF-emitting cables. See:

  Hermans, A, Schilt, B., Bekkers, J., and Tams, J. 2022. Current state of knowledge of Electromagnetic fields Electromagnetic fields and the Marine Strategy Framework Directive Descriptor 11.

- Figure 7.4.5. The OBIS data used to illustrate the distribution of corals underrepresents coral distribution as reflected in the DFO trawl data. While it is understood that the focus of the RA report is to use publicly-available data, the figure should note that coral distribution in the Focus Area is much broader than illustrated.
- Section 7.4.2 (Potential Effects) could briefly speak to potential effects of accidents, spills, and/or malfunctions or link this section to Section 9 (Accidental Effects and Effects) of the RA report.

- Some references used in this section are incorrect nor adhere to common practices in citing scientific literature. For example, the following reference is a summary of information provided to the RA committee by DFO Science. Applicable references in the DFO summary should be cited directly in the RA report, given the DFO summary is not published publicly, rather is only listed on the IAAC public registry. Example of incorrect reference:

  DFO. (2023g). Corals and Sponges (Canadian Science Advisory Secretariat Impact Assessment Program: Summary of Existing Knowledge). Fisheries and Oceans Canada.

- Page 312 states "Spawn in spring and fall at both locations; fall dominant at Fortune Bay" with respect to Atlantic Herring (3Ps). The dominant component in Fortune Bay are the spring spawners, not the fall spawners.
- Page 321 states "Distribution ranges from Labrador Sea (*A. denticulatus* and *A. minor*) and Baffin Island (*A. lupus*)". This statement should also include " to the Grand Bank of Newfoundland (all species), the GSL (Atlantic and Spotted Wolffish) and Scotian Shelf (Atlantic Wolffish)."
- Page 330 states "Three species of diadromous fish found in the Focus Area are species at risk. The greatest existing anthropogenic threats to diadromous fish in Newfoundland and Labrador are climate change, changes to ocean ecosystems and habitats including obstruction of migration routes, pollution, and fishing (COSEWIC, 2010b, 2011b, 2012a, 2012g; DFO, 2022f; Waldman and Quinn, 2022)." Interbreeding between wild and aquaculture salmon, which has been observed to impact wild fish, should be added as another important threat, based on recent publications; see:

  Bradbury I.R., Lehnert SJ, Kess T, Van Wyngaarden M, Duffy S, Messmer AM, Wringe B, Karoliussen S, Dempson JB, Fleming IA, et al. 2022. Genomic evidence of recent European introgression into North American farmed and wild Atlantic salmon. Evol Appl. 15: 1436–1448. doi: 10.1111/eva.13454.

  Bradbury I.R., Duffy S, Lehnert SJ, Jóhannsson R, Fridriksson JH, Castellani M, Burgetz I, Sylvester E, Messmer A, Layton K, et al. 2020. Model-based evaluation of the genetic impacts of farm-escaped Atlantic Salmon on wild populations. Aquac Environ Interact. 12: 45–59. doi: 10.3354/aei00346.

  Dempson J.B. Travis E. Van Leeuwen, Ian R. Bradbury, Sarah J. Lehnert, David Coté, Frédéric Cyr, Christina Pretty & Nicholas I. Kelly 2024: A Review of Factors Potentially Contributing to the Long-Term Decline of Atlantic Salmon in the Conne River, Newfoundland, Canada. Reviews in Fisheries Science & Aquaculture. dOI: 10.1080/23308249.2024.2341023.

  7.4.1.1.1 Oceanographic Conditions

- Section 7.4.1.2.1 (on P.270): It is not clear what "declining thickness" refers to, since it is separated from the list associated with sea ice and combined with increasing acidity "reductions in sea ice duration, arial coverage, and/or volume; declining thickness, increasing acidity; changes in the thickness… of the CIL". In the CIL volume row of Table 7.4.1 (on P.274), the following statement "Weakening of the CIL can impact fish and fish habitat through changing nutrient and oxygen concentrations, affecting the North Atlantic Oscillation (NAO), as well as having direct effects on invertebrate mortality and fecundity" is inaccurate.

Typically, the relationship is the other way around, where the NAO affects sea temperatures. It is recommended that this statement be rephrased to read "Weakening of the CIL can impact fish and fish habitat through changing nutrient and oxygen concentrations as well as having direct effects on invertebrate mortality and fecundity."

- In the stratification row of Table 7.4.1 (on P.275), the following statement "Weakening of the CIL can impact fish and fish habitat through changing prey availability (plankton), nutrient, and oxygen concentrations, as well as potentially affect the North Atlantic Oscillation" is out of place and redundant to a similar statement in an overlying CIL row. The comment itself is inaccurate and should be supported by reference/citations. It is recommended that this statement be rephrased to read "Changes in stratification can impact fish and fish habitat through changing prey availability (plankton), nutrient, and oxygen concentrations."
- In Table 7.4.1 (on Pp. 274-275): Mean Sea Level 1st bullet: "due to melting ice and". This statement is incorrect without specifying what type of ice is being considered. Sea ice melt does not affect RSL. Neither does iceberg melt. An appropriate replacement is "due to melting glaciers and ice sheets, and…"
- In general, reference to NAO is not needed, but if it is retained for discussion it should be corrected. The following provides a general description of NAO and its impact on sea temperatures: https://www.psu.edu/news/research/story/north-atlantic-oscillation-contributes-cold-blob-atlantic-ocean.
- Section 7.4.1.8 (on P.335): It is unclear what the following statement means: "Temperature varies seasonally, north-south with currents, and by depth, with deeper water, colder". If this is attempting to convey that deeper water is colder than shallower water, this is only true where the CIL is in contact with the bottom.
- The report does not include analysis related to the impact of wind farms on oceanographic conditions (e.g., wake effects) that may have an impact on ecosystem structure and function across trophic levels. DFO Science did note this as a consideration, as well as provided some relevant references in previous submission to the RA Committee.
- The following are minor, grammatical items for consideration:
    - Section 7.4.1.1 (on P.268): "NAFO was established in 1979 as the intergovernmental fisheries science and management organization." The use of "the" in this way suggests exclusivity that does not think exist when no spatial delimiter is provided.
    - Section 7.4.1.1 (on P.269): "AZMP survey locations are shown in Figure 7.4.2 including there are six locations within…" looks like two sentences spliced together incorrectly.
    - Section 7.4.1.2.1 (on P.271): "consistently measures" should read "consistently measured".
    - Section 7.4.1.2.1 (on P.271): "NCLI" should read "NLCI".
    - Section 7.4.1.2.1 (on P.271): Footnote 56 "NLI" should read "NLCI".
    - Figure 7.4.4 caption "with warmest year on record" should read "with the warmest year on record"
    - Table 7.4.1 first bullet under Ocean Temperature (sea surface) "Sea temperature varies… and are measured" should read "Sea temperature varies … and is measured".
    - Table 7.4.1 4th bullet "series.for" should read "series for".
    - Table 7.4.1 6th bullet "amoung" should read "among".
    - Table 7.4.1 Sea ice 1st bullet "correlated heavily" is not common usage, while stating as "highly correlated" is more common.
- In Table 7.4.7 (on Pp. 305-309) on Large Pelagic species:
  P. 306 – Porbeagle Shark:

- This species is *not* found in the "Focus Area year-round", because it migrates out of that Area every early-Winter (as water temperatures decrease further) and swims to the South for over-wintering, as well as for pregnant females to give birth in the Sargasso Sea.
- ERRONEOUS statement "Move into GSL and NLS in ~~summer/fall~~.". It should state: "Move into GSL and NLS in spring and remains until early-Winter."
- ADD: "; average litter of 4 pups" in "Bear live young (females at age 13 years plus; average litter of 4 pups);"
- ADD: "Thermoregulator: can increase or decrease its internal body temperature relative to surrounding water temperatures."
- ADD: "Highly susceptible to external stressors (examples: hooking on fishing line; handling and release aboard fishing boat), resulting in physiological lactic acidosis and post-release mortality."

P. 306 – White Shark:

- ADD: "at least" in "Long lived (at least to 40 years) with a low reproductive rate." [Possibly to 70 years.]
- ADD: "Thermoregulator: can increase or decrease its internal body temperature up to 10 degrees difference with surrounding water temperatures."
- ADD: "Adults are opportunistic scavengers of dead whales."

Pp. 306-307 – Basking Shark:

- This species is *not* found in the "Focus Area year-round", because it migrates out of that Area every late-Fall (as water temperatures decrease) and swims to the South for over-wintering.
- DELETE "spring" & "winter occurrence is unknown)" and ADD "late-Fall" in "Migratory, moving north in summer and south in late-Fall ~~spring winter occurrence is unknown)~~."
- DELETE "and basking" in "Swims in near surface waters for feeding ~~and basking~~." Filtering plankton is the *only* reason that this species swims in sea surface waters; *not* to increase its internal body temperature through solar heating.
- DELETE "strain" & ADD "filter" in "Feeds on plankton, using gill rakers to filter ~~strain~~ prey."

P. 307 – Shortfin Mako & Blue sharks:

- Both species are *not* found in the "Focus Area year-round", because they migrate out of that Area every late-Fall (as water temperatures decrease) and swim to the South for over-wintering.

7.4.1.4.2 Small Pelagics – Forage species

- The Newfoundland and Labrador capelin stock did not collapse due to overexploitation; this statement should be removed from the report. The citations provided do not support this statement.
- In Table 7.4.8 (on Pp. 311-313) on Small Pelagic species:
  - CORRECTION: highest distribution of capelin on the Newfoundland and Labrador shelves not just Newfoundland.
  - DELETE 'participates' in schooling and re-phrase to "A small schooling forage fish".
  - Insert 'and food availability' after '…oceanographic conditions… '
  - DELETE 'participating adults' and end sentence/bullet point after '…. mortality rates'
  - Identifying 4RST Stock Status as Healthy might create confusion given the 4RST stock does not have a Precautionary Approach Framework implemented and its 'Healthy Zone' has not been identified.

7.4.1.4.3 Demersal Fish and Skates

- In Table 7.4.9 (on Pp. 315-323) on Demersal species:
- P. 317 – Lumpfish: DELETE "and summer" in "Migrate during late spring ~~and summer~~ to shallow coastal waters to spawn, laying sticky masses of eggs on the rocky sea bottoms." ADD: "Inshore fishery for female roe (eggs) established in 1976, with discarding of males at sea."
- P. 318 – White Hake: ERRONEOUS statement "Stock assessment has not been completed". The NAFO SME conducts the stock assessment of this species in Divisions 3NO**Ps** every 2 years. Read the latest publication "**NAFO SCR Document 2023/036** An assessment of White Hake (*Urophysic tenuis*, Mitchill 1815) in NAFO Divisions 3N, 3O, and Subdivision 3Ps_by K. Sosebee, M.R. Simpson, and C.M. Miri".
- P. 321 – Wolffishes: MISLEADING statement for three Wolffish species lumped-together: "Adult diet consists primarily of echinoderms (*A. minor*), jellyfish, crustaceans, molluscs and sometimes fish." It should state: "Adult diet consists primarily of echinoderms, crustaceans, molluscs and sometimes fish (*A. minor* and *A. lupus*), while the main prey for *A. denticulatus* are jellyfish, ctenophores (comb jellies) and infrequently fish."
- P. 322 – Smooth Skate: ADD: "Appears in bycatch of numerous commercial fisheries."
- P. 323 – Thorny Skate:
    - ERRONEOUS statement "~~Catches~~ have declined since the 1990s". It should state: "Reported **landings** have declined since 2000". Firstly, Canadian landings *increased* during 1994–1999 (due to a new Canadian-directed Thorny Skate fishery). Secondly, because commercial "catch" refers to Total Catch [= landings + discards-at-sea], plus the fact that *only* At-Sea Observers [ASOs] record discards-at-sea in fisheries, ongoing & significant bycatch & discards of Thorny Skate continue to *not* be reported by harvesters and consequently these removals remain "invisible" to commercial statistics & Fisheries Managers. Essentially, 0–5% annual ASO coverage of most Atlantic Canadian groundfish fisheries precludes reliable estimates of total skate catch & removals from the population.
    - Must also ADD: "Appears in bycatch of numerous commercial fisheries."
    - The NAFO SME conducts the stock assessment of this species in Divisions 3LNOPs every 2 years. Read the latest publication:

      NAFO (Northwest Atlantic Fisheries Organization. 2024. Assessment of Thorny Skate (*Amblyraja radiata* Donovan, 1808) in NAFO Divisions 3LNO and Subdivision 3Ps. By K. Sosebee, M.R. Simpson, and C.M. Miri. Serial No. N7544, DRAFT SCR Doc. 24/038. 28pp.

- p. 323 – Winter Skate
    - ERRONEOUS "(~~110-370~~ m)". Change to "(1-723 m)".
    - ERRONEOUS statement "~~Adult~~ diet consists of crustaceans...polychaetes". It should state: "Winter Skate diet changes with increasing size: crustaceans decrease in importance as skate length (and mouth gape) increases, while fish become increasingly important prey for larger (81+ cm) Winter Skates and can constitute >50% of the diet."
    - Review the following publication:

      DFO. 2017. Recovery Potential Assessment for Winter Skate (Leucoraja ocellata): Eastern Scotian Shelf and Newfoundland Population. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/014.

7.4.5 Data Gaps

- The only statements regarding oceanographic data gaps are in relation to sea floor mapping. In DFO's summary of existing knowledge provided to the RA committee, the department noted the following additional data gaps that are not mentioned in the draft RA report: 1) most of the Focus Area is considered data poor with regards to physical oceanographic data, since data is primarily restricted to transects; and 2) seasonality of oceanographic conditions is important to the functioning of the ecosystem and the timing of phytoplankton blooms, etc.; with measurements performed 2 to 4 times a year, this seasonality is not well understood in this area.
- In section 7.4.5.1.1 (on P.353), it is unclear what the following sentence is trying to convey "Limitations such as there are the cause of the existing data gaps and limitations in regard to oceanographic conditions…"; perhaps review and clarify. In addition, "Geological survey of Canada)" has an extra parenthesis.

Chapter 7.5: Marine Mammals and Sea Turtles

- Common language for marine mammal and sea turtle occurrence is "detected" rather than "found", while the frequency of detection is often a function of effort or reporting (e.g., survey effort or seasonal conditions such as winter often limit ability to detect and report on marine mammal and sea turtle presence).
- The RA report notes that North Atlantic right whale is "found in Atlantic Canada from summer to late fall, pregnant cows head south to calve in the winter", although there have been NARW observations reported in Atlantic Canada throughout the year.
- Some species (e.g., fish stocks) may be better represented in the RA report using maps or figures (acknowledging that the report is already 829pp). That said, caution on use of maps/figures is also warranted given some individuals tend to only focus on graphical data and not the accompanying text; in such instances, map/figure captions should be of sufficient detail. For example, Figure 7.5.5 (Sea Turtles) on Page 410 implies that species presence is limited or constrained to certain areas along the coast. It remains, however, that although the south coast of NL is an important NW Atlantic feeding area for Leatherback sea turtle in the late-summer and fall, the species is also known to occur in Canadian waters around Newfoundland and as far north as southern Labrador (this is not reflected in the map). again, figure captions in the report should include sufficient detail, such as stating limitations or other important considerations relevant to the information being presented. See:

  DFO. 2022. Recovery Potential Assessment of the Leatherback Sea Turtle (Dermochelys coriacea), Northwest Atlantic subpopulation. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2022/004.

  Mosnier, A., Gosselin, J.-F., Lawson, J., Plourde, S., and Lesage, V. 2018. Predicting seasonal occurrence of leatherback turtles (*Dermochelys coriacea*) in eastern Canadian waters from turtle and sunfish (*Mola mola*) sighting data and habitat characteristics. Can. J. Zool. 97: 464-478

- Table 7.5.1 – minke whales are not most common in the winter, but rather the summer and fall (as are fin whales)

- P. 397 – it is believed that the increased numbers of “porpoises” being reported are actually white-beaked dolphins, which have become much more abundant in recent decades in the Study Area
- Figure 7.5.3 is somewhat of an underrepresentation of the available data for these odontocetes (particularly white-beaked dolphins) as DFO now have more sightings than this (including many acoustic detections by DFO autonomous recorders on the NL south coast). White-beaked dolphins are now the most abundant cetacean in NL waters.
- Table 7.5.2 – sperm whales have been reported in shallow waters around NL as well as deep; True’s beaked whales are rare in the Focus Area like Sowerby’s, but should be added to this table; data sources should include Lawson and Gosselin 2009.
- Figure 7.5.4 – they is a regular summering aggregation of grey and harbour seals on the island of Miquelon that forage in the general area (including the Focus Area), and disperse into the Focus Area of the south coast in the Fall and Winter (the map doits do not reflect this).
- P. 418 – the statement that concludes “high frequencies created during pile driving” as a risk for odontocetes is incorrect. Much of the noise energy during pile driving, particularly for hard seafloor geology or areas with subsea permafrost, is a feature of the low- and mid-frequency ranges. With acoustic coupling with the seafloor such underwater impulses can propagate great distances, even in shallow waters
- Table 7.5.8 – a potentially significant environmental effect of large offshore wind farm installations is alteration of ocean current amplitude and direction. Such alterations would be long-term and could have effects of marine mammal and sea turtle prey density and distribution. For example, it is known that leatherback turtles feed at oceanic fronts, and such hydrographic features could be compromised near (and even distant from) offshore wind installations. Again, a Before, After, Control, Impact (BACI) study of prey productivity near and downstream of the installations should be undertaken.
- Table 7.5.10 – one consideration for the list of mitigation measures is that aerial monitoring, which is one of the standard techniques to assess marine megafauna abundance and distribution will be compromised by the windfarm installation. This is because DFO aerial surveys are often flown at 600-900 feet to be at a height that allows detection of smaller animals such as sea turtles and small cetaceans. The large size of the wind turbines means that survey aircraft will have to fly at 1500-1200 feet in altitude, making it much harder to detect animals. And in the case of turtles, which do not vocalize at sea, monitoring using acoustic approaches cannot fill this type of monitoring gap.
- Table 7.5.10 – The plan to implement “acoustic deterrent devices such as pingers and Lofi tech seal scarers to deter marine mammals and sea turtles from approaching when construction is active” may not work as a long-term solution as studies have shown rapid habituation to such sounds by a number of marine mammals species. In addition, such devices introduce loud and additional acoustic energy sources into the area, further degrading the soundscape.
- P. 432 – except for North Atlantic right whale, the common bottlenose dolphins, striped dolphins, Beluga, and Cuvier’s beaked whale, should not be excluded from the list of species for which data gaps exist. Striped dolphins and Cuvier’s beaked whales are believed to be rare in all NL waters.

Chapter 7.6: Protected and Special Areas

- As noted in the general comments above, the RA may re-consider inclusion or acknowledgement of EBSA / SiBA in the ‘constraints’ analysis section, focusing on those

areas that likely support a broad range of marine ecosystem structure and functioning, including a connection to benthic habitat that is fixed in place. For instance, species 'critical habitat' is included in the constraints analysis, although it is only connected to single at-risk species, while certain EBSA / SiBA were not given similar consideration even though may support multiple species and also be a consideration for future site conservation designation.

- Table 7.6.9 – there is a thorough DFO review of pathways of effects of vessel activities, that includes potential impacts of anchoring; see:

  Hannah, L., Thornborough, K., Murray, C.C., Nelson, J., Locke, A., Mortimor, J., Lawson, J. 2020. Pathways of Effects Conceptual Models for Marine Commercial Shipping in Canada: Biological and Ecological Effects. Can. Sci. Advis. Sec. Res. Doc. 2020/077. viii + 193 p.

Chapter 7.10: Acoustic Environments

- The report could emphasize the importance and need for noise measurements and modeling. There are publications and reports that describe the soundscapes in and near the Study Area that could be revised; for example:

  Cominelli, S., Halliday, W.D., Pine, M.K., Hilliard, R.C., Lawson, J.W., Dumang, N.I., and Devillers, R. 2020. Vessel noise in spatially constricted areas: Modeling acoustic footprints of large vessels in the Cabot Strait, Eastern Canada. Ocean Coastal Management. 194: 105255.

- It is recommended that sound measurement and propagation studies being conducted before, during, and after operation of the wind development. Changes in marine water temperature, salinity, and pH as a result of climate change can significantly effect sound propagation

  Hester, K.C., Peltzer, E.T., Kirkwood, W.J., and Brewer, P.G. 2008. Unanticipated consequences of ocean acidification: A noisier ocean at lower pH. Geophysical Research Letters **35**: L19601.

Chapter 8: Cumulative Effects

- The chapter seems unnecessarily long given that the primary conclusion of the RA is that "unfortunately, there are too many unknowns and too many data gaps with not enough time in the Committee's mandate to fill them to be able to undertake a CEA in this Regional Assessment." This section could be shortened to focus on the primary gaps and perhaps recommend a path-forward for resolution. It is noted, however, that the RA Committee has recommended need for further research and monitoring of the potential impacts of offshore wind development on marine ecosystems and other ocean users.
- It is acknowledged that cumulative assessments are very difficult to conduct as both direct and synergistic impacts can occur as a result of anthropogenic activities. As such, this section may be better structured by highlighting the main information gaps as a basis to recommend further work to address the gaps. Before, After, Control, Impact (BACI) studies will be important as projects evolve, while with sufficient monitoring, direct and cumulative effects might be detectable.

- The sentences “While modelling the “worst case” (i.e., the project design with the potential for the most significant impact) may not be problematic for a project-level CEA, doing so where multiple developers propose projects in the same licencing area may result in **overly negative predictions of the combined impacts of all the proposed projects**. **In turn, this could affect overall growth of the sector** (Caine, 2022).” This project assessment should highlight the biophysical impacts of the proposed projects irrespective of the potential “growth of the sector”. If a precautionary approach is adopted then the pace and scope of offshore wind development may very well be reduced.
- In terms of the statement “real-world assessments are needed to ground-truth these models”, examples of models do exist, such as:

  Lawson, J.W., and Lesage, V. 2013. A draft framework to quantify and cumulate risks of impacts from large development project for marine mammal populations: A case study using shipping associated with the Mary River Iron Mine project. Can. Sci. Advis. Sec. Res. Doc. 2012/154, Ottawa, ON. vi + 22 p.