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December 4, 2020

Canada-Nova Scotia Offshore Petroleum Board
1791 Barrington St., 8th Floor TD Centre
Halifax, Nova Scotia B3J 3K9
comments@cnsopb.ns.ca

Re: WWF-Canada's Submission to the CNSOPB on the Western Scotian Shelf Strategic Environmental Assessment

Dear Canada-Nova Scotia Offshore Petroleum Board,

Thank you for the opportunity to provide comments on the draft Western Scotian Shelf and Slope Strategic Environmental Assessment. WWF-Canada supports the Strategic Environmental Assessment (SEA) process and believes it is an important component in ensuring that offshore oil and gas activities in Canada's Atlantic waters are conducted safely with the lowest possible risk to human health and the environment, if such activities are to be carried out at all. We commend the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) for its effort to engage stakeholders and seek public input throughout this SEA process.

World Wildlife Fund (WWF) is one of the largest conservation organizations in the world, with projects in more than 100 countries. For half a century, WWF-Canada has worked to protect nature in Canada, creating solutions to the environmental challenges that matter most for Canadians. We work in places that are unique and ecologically important, so that wildlife, nature and people thrive.

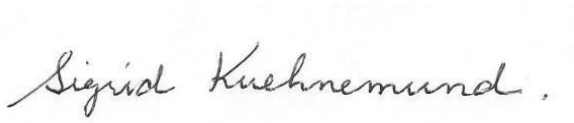
WWF-Canada believes healthy coastal communities depend on healthy oceans. We are working in partnership with coastal communities, Indigenous peoples and other groups to advocate for marine protected areas and sustainable oceans management, and to ensure the rules governing offshore oil and gas activities are consistent with international best practices for safety, accountability and environmental protection. We have reviewed the draft Western Scotian Shelf and Slope Strategic Environmental Assessment prepared by Stantec Consulting Ltd. This submission provides an overview of our key concerns with the SEA and our recommendations on how to improve the assessment.

There is no doubt that this SEA contributes some valuable research and information that will be useful for future planning and assessment. That being said, we believe there are a number of data gaps, omissions and factual misstatements that significantly limit its utility in informing decision-makers on the potential risk of oil and gas activities to the marine environment and supporting decisions on whether such activities should be carried out at all. This is especially pertinent for the Western Scotian Shelf region given that the SEA concludes on page 201 that "**There are not likely to be any new production projects in the SEA Study Area in the foreseeable future**."

The unlikelihood of future offshore oil and gas activity in Nova Scotia raises a legitimate question of whether the province should be pursuing offshore petroleum production as a viable economic development strategy. Producing offshore oil in the North Atlantic is an expensive endeavour relative to other jurisdictions, yet the SEA has not addressed the economic viability of such activities in a carbon-constrained world with low oil prices. Would other development options such as fisheries, renewable energy or eco-tourism be more suitable, and less risky, to meeting Nova Scotia's sustainable development goals? What are the potential jobs and economic benefits of the various options and will they outweigh the significant economic and environmental risks of offshore oil and gas? Will Canada's climate targets and international efforts to limit global warming to 1.5° Celsius be compatible with the exploitation of offshore oil and gas in the Western Scotian Shelf? Unfortunately, none of these central questions are answered by this SEA.

We make several recommendations below on what needs to be done to provide governments with the analysis required for the next stage of the decision-making process.

Sincerely,



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Contents

I. Summary

The following is a high-level summary of WWF-Canada's comments on the Western Scotian Shelf and Slope SEA:

1. **<u>This is not a Strategic Environmental Assessment</u> -** The SEA does not meet internationally accepted SEA standards in analyzing how a potential industry would or would not benefit local communities with respect to employment, training and financial gains. It does not address key sustainability objectives, economic alternatives to oil and gas activities, and the information needs of Nova Scotians or Canadians. Before regulators make any decisions regarding future oil and gas activities, a more complete regional SEA (with analysis of economic alternatives and potential economic benefits) needs to be completed that addresses these information gaps.

2. **<u>Cumulative effects assessment was not conducted satisfactorily</u> –** The SEA acknowledges on page 199 that "data gaps and uncertainties at the SEA level of analysis limit the confidence of cumulative effects predictions," yet nonetheless states that "considerable" effects from oil and gas activities are not expected, provided that proper mitigation measures are in place and that most effects are expected to be temporary. Both in Canada and internationally, determinations of what constitutes a significant adverse effect in environmental assessments are often subjective with no clear quantitative benchmarks in many cases and little transparency around the reasoning process involved. Despite the numerous potential environmental impacts identified in the draft report, the SEA fails to adequately explain how this judgment was reached in the absence of the required data. The methods used to assess impacts may be biased against findings of significance due to inadequate temporal and spatial scales of assessment. In addition, the SEA has deemed the proposed mitigation measures "effective" without sufficient rationale.

3. **<u>Oil spill risks and impacts should be considered</u> –** The SEA notes correctly that there have been two blowouts in the Nova Scotian offshore since 1967 and the biggest oil spill from an offshore oil and gas operation in Canadian history occurred in 2018 in the Newfoundland and Labrador offshore. We believe the SEA should also acknowledge that the drilling required would be technically ambitious, require significant exploration drilling (the riskiest form of drilling) and could take place in very deep water. In the Scotian Basin, for instance, BP planned to drill in nearly 3,000 metres of water — much deeper than the water in which the 2010 Deepwater Horizon blowout occurred in the Gulf of Mexico. When assessing the risk of a well blowout, it is necessary to consider the possible *consequences* of an accident along with its potential *likelihood*. The consequences of an uncontrolled blowout would be more devastating in the Atlantic offshore than elsewhere, particularly given the importance of the fishing industry and the sensitive marine ecosystems and species present.

4. **<u>Accident prevention and response measures in the offshore are currently inadequate</u> –** Given the risk involved, spill prevention is the most effective means of mitigating environmental damages. The SEA should therefore acknowledge that the CNSOPB does not currently require operators to keep any subsea containment resources (capping stacks,

domes or relief drilling rigs) on or anywhere near the drilling sites during drilling operations. In the event of a blowout, a capping stack device would likely not be effective in very deep water (>2500 m) and would need to be mobilized from Norway or Brazil, which would likely take about one month. Should the capping stack fail as it did in the Deepwater Horizon blowout, it could take up to 4 months for a relief drilling rig to plug an out-of-control well, as these devices are also not required by the regulator to be kept in the region.

5. **The SEA does not assess contributions to climate change** – The direct greenhouse gas (GHG) emissions from an expanded offshore program in the region will have an impact on the ability of the province of Nova Scotia to meet its carbon reduction commitments. Oil and gas production could result in significant associated GHG emissions (upstream and downstream) at a time when climate science is calling for an immediate and dramatic reduction in global emissions in order to avert catastrophic climate change. Citing the climate crisis, we note that the government of Denmark, a significant oil producer, recently announced a ban on all new offshore oil and gas licensing (including a cancellation of the 8th North Sea licensing round) and a phase-out of all offshore production. Canada and Nova Scotia appear to be heading in the opposite direction. The SEA does not consider or even acknowledge that we are in a climate emergency and studies indicate that 68-80 per cent of existing global fossil fuel reserves must stay in the ground.[1] The lowest cost reserves will be burned first, whereas higher priced oil, such as in the North Atlantic offshore, will be much less viable in a low carbon world.

6. **Protected and special areas** – There are numerous protected and special areas covered by the SEA. Marine protected areas, other effective area-based conservation measures and critical habitat for species at risk should not allow oil and gas activities in order to safeguard biodiversity and important habitats. In addition, areas with defined benthic conservation objectives should also be avoided to mitigate impacts on sensitive coral and sponge habitats.

7. **Seismic testing impacts are downplayed and mitigation measures are unproven** – The SEA understates the potentially significant impacts to marine wildlife of seismic air gun blasting programs and proposes insufficient mitigation measures to reduce the impacts of seismic testing to marine wildlife, despite a mounting body of scientific evidence showing the sometimes severe and fatal impacts of these surveys. Mitigation measures such as marine mammal observers, safety zones and "ramp-up" techniques for the purposes of mitigating the impacts of vessel strikes, vertical seismic profiling, and geophysical surveys have been shown to be limited in their effectiveness.

8. **Insufficient baseline data** – The SEA rightly acknowledges that there is a problem with significant gaps in baseline data, particularly with respect to fully understanding cumulative effects and marine ecology in the region. For example, important data gaps exist with regards to population abundance and distribution of certain marine species. At least one species in the region (North Atlantic right whales) is on the verge of possible extinction with just 356

[1] See Carbon Tracker Initiative. 2011. Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? https://www.carbontracker.org/reports/carbon-bubble/; M. Raupach et al. 2014. Sharing a quota on cumulative carbon emissions. *Nature Climate Change* 873; Oil Change International. Sept. 2016. The Sky's Limit: Why the Paris Climate Goals Require A Managed Decline of Fossil Fuel Production. (http://priceofoil.org/2016/09/22/the-skys-limit-report/

individuals left in the world, yet oil and gas drilling projects continue to be considered without the research required to know if the cumulative effects of these and other activities, such as underwater noise, potential oil spills and routine discharges, are impacting right whales and other marine biodiversity. In the absence of sufficient data, the SEA should state unequivocally that, based on the current state of knowledge, it is difficult to accurately predict the impacts of oil and gas development, information that is critical for the decision-making process.

9. **Unknown economic viability of offshore operations and development** - The SEA has not addressed the economic viability of offshore development or the scale of oil and gas activities under consideration. We may have already reached peak oil demand, making higher cost resources such as the deep water North Atlantic less feasible. The economic viability of offshore projects in a carbon-constrained world with oil prices in the range of $50 USD per barrel for the foreseeable future is not promising. Furthermore, the SEA did not consider a variety of possible development scenarios either for the oil and gas sector or for other economic alternatives. The number of potential wells in the region is a critical consideration when assessing the potential risk of accidents and the effects of drill and mud cuttings, routine discharges, underwater noise, oil spills and the possible extent of impacts on sensitive and ecologically significant areas. SEA should at a minimum acknowledge that impacts will vary at different scales of development.

I. Main Recommendations

1. Marine protected areas, other effective area-based conservation measures and critical habitat for species at risk should remain free of oil and gas development in order to safeguard the biodiversity contained within.
2. Given the significant data gaps acknowledged in the SEA, it is crucial that an analysis of the impacts of all possible cumulative effects in the project area be conducted, including all oil and gas drilling, pollution, batch spills and chronic oil leaks, geophysical exploration (seismic surveys), fishing, vessel traffic, climate change, ocean temperature increases and other activities before any drilling activity proceeds.
3. The SEA should adhere to international Strategic Environmental Assessment best practices, including establishing clear development and sustainability goals for Nova Scotia; analyzing the potential effects, risks and benefits of the proposed hydrocarbon development and its alternatives; and considering a wide range of development alternatives that focus on "doing the most good."
4. The SEA should make note of the elevated risk of oil and gas operations in the Nova Scotian offshore, given that the consequences of a major spill would be extremely serious and the prospects for mounting an effective spill response are uncertain.
5. The SEA should acknowledge that operators in the Nova Scotian offshore are not currently required to have immediate access to surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control.
6. The SEA should recognize that the use of chemical dispersants to clean up oil spills is a last resort, which should produce a net environmental benefit and must be constrained by socioeconomic and environmental considerations.
7. The SEA should recommend that a climate analysis be required at some point long before any oil and gas activities are approved.
8. We recommend that conditions for the project be updated to reflect updated mitigations in the recently released Canadian Science Advisory Secretariat Report *Review of the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*.
9. There are known, safer alternatives to seismic testing such as Marine Vibroseis, which the SEA should recognize and encourage.
10. The SEA should require that air gun surveys be separated from areas rich in marine life and sensitive species, and the source level should be lowered (i.e. quiet the noise).
11. The final report should indicate that development of this resource may be economically unviable and could potentially result in a stranded asset or require continuing public/ government investment in order to make exploration and production drilling activities more feasible.

II. General Comments on the SEA

According to international Strategic Environmental Assessment best practices, a SEA should adhere to the following generic principles:[2]

- Establish clear development and sustainability goals;
- Provide explicit justification for the selection of preferred options and for the acceptance of significant trade-offs related to hydrocarbon development;
- Be flexible, iterative and customised to the local context;
- Analyze the potential effects, risks and benefits of the proposed hydrocarbon development and its alternatives, against a framework of sustainability objectives, principles and criteria tailored to Nova Scotians;
- Address the linkages and trade-offs between environmental, social and economic considerations;
- Involve key stakeholders and encourage public involvement;
- Include an effective and independent SEA quality assurance system;
- Be transparent throughout the process and communicate the results in ways local communities can fully understand;
- Assist in the development of outcomes that respect economic, social and environmental constraints and opportunities specific to Nova Scotia and its communities;
- Encourage formal reviews of the SEA process after completion and monitor SEA and final decision outputs.

The Western Scotian Shelf SEA is thus not consistent with international standard practice, which will significantly limit its decision-making utility. Figure 1 below from the International Centre for Environmental Management (ICEM) provides an example of a more instructive and widely-accepted approach.[3] The ICEM approach focuses on cross-sectoral issues and meeting specific goals, considers a wide range of development alternatives, and focuses on "doing the most good."

[2] For example, see: Organization for Economic Cooperation and Development. 2006. *Applying Strategic Environmental Assessment: Good practice guidance for development cooperation.* Paris. See additional resources in section 4.7 below.

[3] International Centre for Environmental Management. 2014. *Introduction to Strategic Environmental Assessment: Purpose, Principles and Process.* https://www.slideshare.net/ICEM-Centre-Environmental-Management/sea-intoduction

SEA and EIA compared	
SEA	**EIA**
• Takes place at earlier stages of decision-making cycle	• Takes place at end of decision-making cycle
• Multi-stage process with variations e.g. policy vs. plans/programs	• Well-defined process, clear beginning and end
• Broad level of analysis (e.g. focus on cross-sector links and issues	• Reacts to specific development proposal
• **Considers potentially wide range of development alternatives**	• Detailed, cause-effect analysis of the impact of project components
• Gives early warning of cumulative impacts	• Considers limited range of feasible alternatives (how to carry out projects)
• Emphasis on meeting goals and safeguards for the environment	• Limited opportunity to address cumulative impacts at project level
• **Focus on 'do the most good'**	• Emphasis on mitigating and minimizing impacts
	• Focus on do no/least harm

Figure 1: International Centre for Environmental Management recommended approach to Strategic Environmental Assessments

This is especially pertinent for the Western Scotian Shelf region given that the SEA states on page 201 that "**There are not likely to be any new production projects in the SEA Study Area in the foreseeable future**." If this is the case (as seems likely), is offshore oil and gas in Nova Scotia the approach that will "do the most good" or would other development options such as fisheries or tourism be more suitable to meeting Nova Scotia's sustainable development goals? What are the potential jobs and economic benefits and will they outweigh the significant risks of offshore oil and gas? Will Canada's climate targets and international efforts to limit global warming to 1.5° C be compatible with the exploitation of offshore oil and gas in the Western Scotian Shelf (i.e. cross-sectoral analysis)? None of these central questions are answered by this SEA.

The question of whether the offshore petroleum industry *should* be developed cannot be answered in an informed manner if overall sustainability objectives are not considered and the potential jobs, benefits and impacts of offshore oil and gas remain unknown. Without this information, decision-makers and regulators will not have the analyses and data required to make an informed decision on whether the promotion of the hydrocarbon sector in the region meets community, provincial and national development objectives. Further work will need to be done to ensure governments and Canadians can make a properly informed decision on whether such activity should proceed at all in the Western Scotian Shelf and Slope.

The SEA has also not addressed the economic viability of offshore development or the scale of oil and gas activities under consideration. One could argue that the future success of the offshore industry in Nova Scotia is predicated upon the global community not taking the actions necessary to limit global warming sufficiently, as the demand for higher cost North Atlantic oil is likely to be significantly

reduced in a low carbon or Paris-compliant world.[4] Moreover, the Covid-19 pandemic may well have accelerated the decline of fossil fuel production with some analysts speculating that the world has already reached so-called "peak oil" and global demand may continue to fall as the price of renewable energy becomes increasingly cost competitive.[5] In June of 2020, the ratings agency Moody's predicted that the economic slowdown and behavioral shifts that have emerged from the pandemic will likely accelerate the low-carbon energy transition and could deliver "lasting changes in energy consumption".[6]

A February 2018 report by Wood McKenzie speculated that the breakeven price for deep water oil offshore Newfoundland and Labrador is one of the highest in the world at roughly $50 USD per barrel, which is above the current market price.[7] The breakeven price offshore Nova Scotia may well be in the same range. Future oil prices are predicted to remain highly volatile in coming decades, further undermining the prospects for North Atlantic offshore oil and elevating the subsequent financial and climate risks of investing in these projects.[8] It is notable that in March of this year, the proponent of the Bay du Nord Development Project, Equinor Canada Ltd., announced they would be deferring the project to make it "more robust for low commodity prices."[9]

The oil giant BP wrote off $17.5 billion USD of its assets in June 2020 based on the company's predicted average future oil price of just $55 USD per barrel (to 2050), just barely above the price required for most Canadian offshore Atlantic oil projects to be viable.[10] There is also increasing pressure on governments around the world to increase carbon pricing in response to the climate crisis, which would reduce global demand for fossil fuels and further undermine the economic case for North Atlantic oil.

The economic viability of offshore petroleum projects in the Western Scotian Shelf region in a carbon-constrained world with oil prices under $50 USD per barrel for the foreseeable future is highly dubious.

The SEA should adhere to international Strategic Environmental Assessment best practices, including establishing clear development and sustainability goals for Nova Scotia; analyzing the potential effects, risks and benefits of the proposed hydrocarbon development and its alternatives; and considering a wide range of development alternatives that focus on "doing the most good."

III. Cumulative environmental effects

The SEA rightly acknowledges that there is a problem with significant gaps in baseline data, particularly with respect to fully understanding cumulative effects and marine ecology in the region.

[4] https://www.carbontracker.org/reports/breaking-the-habit/
[5] http://www.energyintel.com/pages/eig_article.aspx?DocID=1076248
[6] https://www.moodys.com/research/Moodys-Coronavirus-effects-likely-to-speed-energy-transition--PBC_1234616
[7] https://www.gov.nl.ca/nr/files/publications-energy-competitiveness-oil-gas-investment.pdf
[8] https://oilprice.com/Energy/Oil-Prices/Citigroup-Oil-Will-Never-Return-To-100.html
[9] https://www.cbc.ca/news/canada/newfoundland-labrador/bay-du-nord-deferred-1.5501559
[10] https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-revises-long-term-price-assumptions.html

For example, important data gaps exist with regards to the following:

- "Baseline data for the evaluation of effects of oil and gas exploration activity on seabirds at sea in the Northwest Atlantic is sparse" (page 168).
- "Scientific data gaps associated with the environmental effects of sound emissions limit the degree of certainty associated with environment effects predictions" (page 168).
- "The specific distribution of species of special status in the Study Area is a data gap in this assessment" (page 178).
- "There is a general lack of information regarding the deeper areas of the marine benthic environment on the Scotian Slope" (page 179).
- "Data gaps also exist for the hearing abilities of sea turtles, many shark species and nearly all invertebrates" (page 179).
- "It is acknowledged that there is a need for more information related to the distribution and abundance for migratory birds in the Study Area. Also, there remains considerable uncertainty as to the effects of lights on migratory birds and actual zone of influence of light on the attraction of migratory birds" (179).

At least one species in the region (North Atlantic right whales) is on the verge of possible extinction with just 356 individuals left in the world, yet oil and gas drilling projects continue to be considered without the research required to know if the cumulative effects of these and other activities, such as underwater noise, potential oil spills and routine discharges, are impacting right whales and other marine biodiversity.[11] The SEA states, in fact, that "The distribution of the North Atlantic Right Whale throughout most of the study area is also unknown" (page 178). In the absence of sufficient data, the SEA should state unequivocally that, based on the current state of knowledge, it is difficult to accurately predict the impacts of oil and gas development, information that is critical for the decision-making process.

Any impacts from oil and gas activities in the Western Scotian Shelf region will be layered onto the ongoing effects of climate change, ocean temperature increases, ocean acidification and geophysical exploration, as well as other existing activities in the region such as fishing and marine vessel traffic. The SEA acknowledges that some oil and gas activities, such as oil spills, vessel traffic and seismic or exploratory drilling may result in some adverse environmental effects and states on page 199 that "Considered in isolation, residual effects of a project may not be considered to be significant; however, when considered in the context of other stressors created by other physical activities in the past, present or future, *the cumulative effects may be significant and/or require additional mitigation measures*" (emphasis added). However, in most cases "considerable" effects from oil and gas activities are not expected according to the SEA, provided that proper mitigation measures are in place and "Most effects are expected to be temporary and may not overlap spatially or temporally with exploration activities to result in cumulative effects" (page 203).

Thus, despite acknowledging that data gaps and uncertainties at the SEA level of analysis limit the confidence of cumulative effects predictions, the SEA attempts to do just that: make a prediction that cumulative effects will be temporary or may not manifest at all. The question is not only whether oil

[11] https://www.theguardian.com/environment/2020/oct/30/north-atlantic-right-whale-extinction-faster-than-believed

and gas activities will alone *cause* significant environmental impacts but how much they will *contribute* to the many impacts on marine life that already exist in the region. This we do not know, and the SEA does not satisfactorily address the issue.

Cumulative effects assessments are often done poorly at the site-specific level, which is why it is so important that they are assessed at the regional level. Yet the SEA acknowledges that, given the data gaps and uncertainties at the SEA level, the focus of the report is on the "characterization of potential interactions and effects associated with other physical activities *to help provide context for a cumulative effects assessment* and help identify potential mitigation and planning considerations to reduce potential cumulative effects" (page 199, emphasis added). In other words, a thorough and comprehensive cumulative effects assessment has yet to be carried out.

Given this fact, it is not reasonable for the SEA to conclude on page 203 that "Most effects are expected to be temporary and may not overlap spatially or temporally with exploration activities to result in cumulative effects." Adequate regional-scale analysis simply has not been performed to justify such a conclusion and the SEA fails to adequately explain how this determination was made in the absence of a fulsome regional cumulative effects assessment.

Determinations of what constitutes a "significant adverse effect" in environmental assessments is ultimately subjective with no clear quantitative benchmarks in many cases and little transparency around the reasoning process involved. Methods used to assess impacts can be biased against findings of "significance" due to inadequate temporal and spatial scales of assessment and proposed mitigation measures that are deemed "effective" without sufficient rationale.[12]

In reaching its conclusion, the consultant has erred in over-relying on the mitigation measures that are meant to reduce the impacts of *individual* project activities on specific valued ecosystem components. The SEA does not provide an analysis on whether these measures will be effective in mitigating against the impacts of multiple, *cumulative* activities in the region over time.

Marine wildlife and biodiversity are already in steep decline globally due to habitat destruction, overfishing, increasing industrial activities, pollution and climate change, with populations of marine vertebrates having declined by 49 per cent between 1970 and 2012 and some fish species declining by almost 75 per cent.[13] As noted, there are just 356 North Atlantic right whales left in the world, according to a newly-released estimate from the North Atlantic Right Whale Consortium, and these latest numbers represent a decline from last year's total.[14] A research scientist at the Anderson Cabot Center for Ocean Life predicted that, at this rate, there could be no more females left in the next 10 to 20 years. The Canadian government has taken protection measures, such as ship speed reduction zones and temporary fisheries closures, yet oil and gas drilling projects continue to go ahead without the research required to know if the cumulative effects of these multiple projects are impacting right whales and other marine biodiversity. What we do know is that any drilling in the Western Scotian Shelf region will only add more stressors onto the North Atlantic marine environment.

[12] Singh, Gerald G. et al. 2020. Scientific shortcomings in environmental impact statements internationally. People and Nature. March 2020: 00: 1-11. https://www.researchgate.net/publication/340097916
[13] WWF 2015. Living Blue Planet Report. https://www.worldwildlife.org/publications/living-blue-planet-report-2015
[14] https://www.cbc.ca/news/canada/nova-scotia/356-north-atlantic-right-whales-left-2020-population-1.5779931

We are in the midst of a biodiversity crisis with at least one species in the region on the verge of possible extinction. Given the significant data gaps acknowledged in the SEA, we recommend that an assessment of all cumulative impacts in the project area be conducted before any drilling activity proceeds.

IV. Spills, Discharge and Blowouts

The SEA notes correctly that there have been two blowouts in the Nova Scotian offshore since 1967 and the biggest oil spill from an offshore oil and gas operation in Canadian history occurred in 2018 in the Newfoundland and Labrador offshore. We believe the SEA should also acknowledge that the drilling required in the Western Scotian Shelf and Slope would be technically ambitious, require significant exploration drilling (the riskiest form) and could take place in very deep water. In the Scotian Basin, for instance, BP planned to drill in nearly 3,000 metres of water — much deeper than the water in which the 2010 Deepwater Horizon blowout occurred in the Gulf of Mexico.

Chronic Spills and Other Discharges

Page 14 of the SEA states that "Cuttings (both WBM and SBM) may be discharged at the drill site provided they are treated (SBM) prior to discharge to meet the OWTG", but that drilling waste will not result in significant effects on fish health and habitat. While the environmental impacts of a single small spill or chronic oil leak are likely to be minimal, the cumulative impacts of many small spills can be significant and they add to the numerous stressors that already exist in the region. As previously noted, marine wildlife and biodiversity around the world, including in the North Atlantic, are already in precipitous decline with pollution being one of the primary causes.

To take a particularly egregious example of a slow but persistent oil leak, the Taylor oil spill in the Gulf of Mexico has been leaking an estimated 10,000-30,000 gallons of oil per day since 2004.[15] Researchers at Florida State University have found that small oil spills — ranging from oil-drilling mishaps to ships discharging fuel — occur with surprising regularity in the Gulf of Mexico, and tend to escape the public's attention that follows big spills.[16]

Discharges of water-based and low-toxicity oil-based drilling muds and produced water are also common and can extend over 2 km, while the ecological impacts at the population and community levels on the seafloor are most commonly on the order of 200–300 m from their source. These impacts may persist in the deep sea for many years and likely longer for its more fragile ecosystems.[17] A range of biological effects can result from chronic oil inputs such as repeated small spillages in

[15] Covington, R. December 29, 2017. *Taylor Energy Cumulative Spill Report – 2017 Update.* https://skytruth.org/2017/12/taylor-energy-site23051-cumulative-spill-report-2017-update/

[16] Daneshgar Asl, S. et al. 2014. Chronic, anthropogenic hydrocarbon discharges in the Gulf of Mexico. Topical Studies in Oceanography. Vol. 129, pages 187-195. https://www.sciencedirect.com/science/article/pii/S0967064514003506

[17] Cordes, Erik E. et al. Environmental Impacts of the Deep-Water Oil and Gas Industry. *Environmental Science.* September 2016. https://www.frontiersin.org/articles/10.3389/fenvs.2016.00058/full

coastal waters, with those effects ranging from localized and subtle to severe and long lasting.[18] In the United Kingdom (U.K.) sector of the North Sea there is evidence to show that the impacts of drilled cuttings (solid material removed from drilled rock, together with muds and chemicals) containing oil-based muds can persist for at least 6–8 years where cutting piles accumulate at the base of a drilling platform.[19]

Experiments into the impacts of sediments from offshore drilling activities, including large amounts of drilling cuttings have shown a significant reduction in number of taxa, abundance, biomass and diversity when cuttings were added to natural sedimentation thresholds.[20] The disturbance caused by drilling has been shown to have an impact on deep-water megafaunal density and diversity, for example, with recovery and recolonization being only partial after 3 years, and the effects of such activities being still visible after a decade.[21] Colonies of the coldwater corals, *Lophelia pertusa*, have been identified around many oil and gas platforms in the northern North Sea,[22] and there is evidence to suggest that coverage of coral colonies by sediments, including cuttings from oil platforms, is sufficient to damage or even kill such colonies, despite their resilience to short-term sedimentation events.[23]

Other likely sources of marine contamination include drips from gas flares, deck spills of diesel fuel, and discharges of produced water (usually the biggest contributor).[24] In stormy, temperate, ice-free waters, most of this chronic, low-level pollution eventually evaporates or dissipates; in frigid waters, it would be more likely to accumulate, particularly in winter.

Well Blowout Risk

The probability of a blowout varies depending on many factors, including characteristics of the well; well pressure; water depth; operating conditions (for example, weather); and whether it is an exploration, appraisal, development or production well. Exploration drilling in the Western Scotian Shelf could be taking place at water depths of greater than 1000 metres (deep water drilling), and possibly more than 2,500 metres. A Scandower report based on SINTEF data concludes that the blowout risk of "normal" wells in deep water is 3.1×10^{-4} and, if 'high pressure, high temperature' (HPHT) wells are required, the blowout frequency is 1.9×10^{-3} according to SINTEF, an order of magnitude higher than the average blowout risk for offshore drill rigs.[33]

[18] Dicks, B. & J. R. Hartley, 1982. The effects of repeated small oil spillages and chronic discharges. Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences 297: 285–307.

[19] Henry, L.-A., D. Harries, P. Kingston & J. M. Roberts, 2017. Historic Scale and persistence of drill cuttings impacts on North Sea benthos. Marine Environmental Research 129: 219–228.

[20] Schaanning, M. T., H. C. Trannum, S. Øxnevad, J. Carroll & T. Bakke, 2008. Effects of drill cuttings on biochemical fluxes and macrobenthos of marine sediments. *Journal of Experimental Marine Biology and Ecology* 361: 49–57.

[21] Jones, D. O. B., A. R. Gates & B. Lausen, 2012. Recovery of deep-water megafaunal assemblages from hydrocarbon drilling disturbance in the Faroe-Shetland channel. *Marine Ecology Progress* Series 461: 71–82.

[22] Gass, S. E. & J. M. Roberts. 2006. The occurrence of the cold-water coral *Lophelia pertusa* (Scleractinia) on oil and gas platforms in the North Sea: colony growth, recruitment and environmental controls on distribution. Marine Pollution Bulletin 52: 549–559.

[23] Allers, E., R. M. M. Abed, L. M. Wehrmann, T. Wang, A. I. Larsson, A. Purser & D. de Beer. 2013. Resistance of *Lophelia pertusa* to coverage by sediment and petroleum drill cuttings. Marine Pollution Bulletin 74: 132–140.

[24] Wills, Jonathan W.G. 2016. *Out of Sight, Out of Mind? Chronic polluting discharges from marine oil and gas installations.* Paper presented at WWF-Canada's Offshore Oil & Gas Symposium, Sept. 27-28, 2018. Ottawa.

According to the SINTEF database, an average of 2.3 well releases or blowouts per year occurred in the U.K. and Norwegian waters between 1980 and 2008. Even after the Deepwater Horizon catastrophe, there were seven losses of well control – the precursor to a blowout – in the Gulf of Mexico between 2010 and 2015. Operators are attempting increasingly technically ambitious operations; they are expanding their operations to new, often environmentally sensitive areas, such as the North Atlantic; and the industry continues to tackle ever more challenging projects.

Finally, the probability of a well blowout is only one component of the risk assessment process. Risk is typically defined by the following:

Risk = Probability of Event x Consequence of Event[25]

In other words, when assessing the risk of a deep water well blowout, it is necessary to consider the possible *consequences* of an accident along with its potential *likelihood*. While it may be true that the likelihood of a blowout is small, the *consequences* of such an event would be more devastating in the Nova Scotian offshore than elsewhere, particularly given the importance of fishery resources in the area, due to the difficulty of ensuring adequate oil spill response in remote offshore locations sometimes extreme weather conditions. **The SEA should make note of the elevated risk of oil and gas operations in the Nova Scotian offshore.**

V. Spill Prevention and Response

Prevention and Containment

Given the risk involved, spill prevention is the most effective means of mitigating environmental damages, but the CNSOPB does not currently require operators to keep any subsea containment resources (capping stacks, domes or relief drilling rigs) on or anywhere near drilling sites during operations. In the event of a blowout, a capping stack device would likely not be effective in very deep water (>2500 m) and would need to be mobilized from Norway or Brazil, which would likely take about one month. Should the capping stack fail as it did in the Deepwater Horizon blowout, it could take up to 4 months for a relief drilling rig to plug an out-of-control well, as these devices are not required to be kept in the region. An uncontrolled well blowout for one to four months, however unlikely, would be devastating to the marine environment and fishery resources within the region as most of the oil would likely never be cleaned up. It should be noted that in Alaska, operators are required to have a capping stack onsite within 24 hours of a well blowout.[26]

In 2018, 136,000 litres of untreated synthetic-based muds were accidentally released offshore Nova Scotia in 2018. In the same year, the Husky Sea Rose drilling platform off the coast of Newfoundland and Labrador spilled at least 225,000 liters of crude oil into the North Atlantic, the largest spill in the province's history, after Husky attempted to re-start operations during an extremely violent storm, which led to a flowline being disconnected. Some experts have estimated that a "horrendous" number

[25] Oil Spill Response Joint Industry Project. 2013. *Oil spill risk assessment and response planning for offshore installations.* http://www.oilspillresponseproject.org/wp-content/uploads/2016/02/JIP-6-Oil-spill-risk-assessment.pdf

[26] https://www.federalregister.gov/documents/2016/07/15/2016-15699/oil-and-gas-and-sulfur-operations-on-the-outer-continental-shelfrequirements-for-exploratory

of sea birds, possibly over 100,000, may have been killed as a result of the Sea Rose spill.[27] This was the second serious incident by Husky Energy's SeaRose Floating Production Storage and Offloading (FSPO) unit in the last few years.

That such serious incidents could occur over such a short time span indicates the hazards common in the North Atlantic and highlights the need both for adequate preventative measures to ensure that a major spill never takes place and for an extremely effective oil spill response strategy on the part of the operator. Unfortunately, we are not convinced that the measures required by the CNSOPB and noted in the SEA to mitigate against the possibility of spills (e.g. continuous monitoring, managing and controlling drilling and formation fluid density, blowout preventers, barriers to maintain well control, etc.) are sufficient to avert future incidents. These safety precautions are standard control measures that are found on virtually every offshore drilling rig around the world and are not tailored to the conditions and circumstances of the Nova Scotian offshore.

The SEA should acknowledge the anticipated time required to cap an out-of-control well blowout in the Nova Scotian offshore and recommend that operators be required to have immediate access to surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control.

Every additional day required to cap a blowout corresponds with potentially hundreds of thousands of litres of oil being released into the marine environment. Operators may not want to keep capping devices on hand due to the additional cost involved but this should not be a concern for the regulator. Safety, environmental protection and the precautionary principle should be paramount in minimizing the risk to the marine environment and human health.

Finally, the SEA should acknowledge that capping devices can be ineffective in water depths less than 500m or greater than 2500m, and sometimes killing the well with a capping stack or some other containment method at the wellhead is not always successful. As for the blowout preventer (BOP), a standard safety device, it is not foolproof and has a failure risk. The BOP is the last pressure barrier; if this barrier fails, an uncontrolled well blowout occurs. The BOP that was intended to shut off the flow of high-pressure oil and gas from the Macondo well in the Gulf of Mexico in 2010 failed to seal the well because the drill pipe buckled.[44] Even with a BOP in place, blowouts with a flow path to the sea bottom outside the casing cannot be controlled with BOPs and such blowouts are reported to constitute between 20 per cent and 55 per cent of offshore drilling blowouts, thus more than half of drilling blowouts may not be susceptible to any BOP control or effects.[28] The only guaranteed method to stop a blowout is to drill a relief well but, again, operators in the Nova Scotian offshore are not required to keep relief drilling rigs on site or even nearby.

Spill Response

The SEA cites several standard spill response tactics including mechanical containment, natural degradation, chemical dispersion and in situ burning. All of these have drawbacks and limited

[27] Stokes, C. Think few reported oiled seabirds is good news? Not so fast, says MUN biologist. *CBC News.* https://www.cbc.ca/news/canada/newfoundland-labrador/searose-spill-seabird-threat-1.4914730

[28] Bercha, Frank. G. 2010. Arctic and Northern Offshore Oil Spill Probabilities. *Proceedings in the International Conference and Exhibition on Performance of Ships and Structures in Ice (ICETECH 2010).* Anchorage, Alaska. September 20-23, 2010.

effectiveness depending on the environmental conditions at the time. In the event of a major spill, it is likely that much of the oil would never be recovered given the remote location of the project area and the probability of adverse weather conditions.

Oil spill response in the North Atlantic is challenging because of extreme weather, sea ice and environmental conditions, logistical challenges and significant distances. Remote locations mean response times for large-scale cleanup and storage equipment can be much longer than in more southern locations. Cold air and water temperatures persist for much of the year in the region with rain, blowing snow, fog, gale-force winds and periods of darkness limiting visibility. Mechanical recovery methods such as oil controlling booms start to lose their effectiveness in meter-high waves (not uncommon in the study area) and stop working entirely when the waves reach two meters high.[29]

The SEA indicates that spill response measures may include the application of chemical dispersants. The applications of chemicals such as Corexit can be toxic, sometimes more so than oil, and cold weather and the presence of ice can make it difficult to apply dispersants to oil slicks, as dispersants rely on ocean waves to mix the oil and chemicals together. As one of several response techniques, **the use of chemical dispersants may be necessary in certain circumstances, however, their use must be a last resort, produce a net environmental benefit and must be constrained by socioeconomic and environmental considerations.**

The environmental rationale for attempting to chemically disperse spilled oil is that removing the oil from the water surface and driving it into the water column as suspended droplets could prevent damage to shorelines, seabirds and marine mammals. The practical problem with this idea is that it can only work if a very high fraction of the oil can be driven into the water column. Otherwise, enough oil will remain on the surface to contaminate shorelines despite the dispersant application. It should also be noted that there are trade-offs involved in moving oil from the surface to the water column.

The potential ecological consequences of the physical and toxicological properties of dispersed oil are far from fully understood. What is clear, however, is that broadcasting dispersants can compound the ecological damage of oil spills. The impacts to plankton communities, which are the foundation of marine food webs and the impacts to the seabed are detrimental.[30] Hence the use of dispersants has socioeconomic consequences as well as environmental and there are still many unknowns about their use. One recent study found that, given the potential for toxic chemical dispersants to cause environmental damage by increasing oil bioavailability and toxicity while suppressing its biodegradation, unrestricted dispersant application in response to deep-sea blowouts is highly questionable and more research is required to inform response plans in future oil spills.[31]

The use of dispersants in the North Atlantic marine environment should never be used in ecologically sensitive areas and would likely be limited in its effectiveness even when

[29] http://nukaresearch.com/download/projects/estimating-an-oil-spill-response-gap-for-the-us-arctic-ocean-revised.pdf

[30] Buskey, E., H. White, and A.J. Esbaugh. 2016. Impact of Oil Spills on Marine Life in the Gulf of Mexico: Effects on Plankton, Nekton, and DeepSea Benthos. *Oceanography* 29(3): 174-181. https://www.researchgate.net/publication/307518241_Impact_of_Oil_Spills_on_Marine_Life_in_the_Gulf_of_Mexico_Effects_on_Plankton_Nekton_and_Deep-Sea_Benthos

[31] Paris, C. B. et al. 2018. BP Gulf Science Data Reveals Ineffectual Subsea Dispersant Injection for the Macondo Blowout. *Frontiers in Marine Science*. November 2018.

it is used. Once again, given the difficulty in adequately responding to an oil spill in this region, emphasis should be placed on the avoidance and prevention of accidents.

VI. Greenhouse Gas Emissions

The direct greenhouse gas (GHG) emissions from an expanded offshore program in the Western Scotian Shelf region will have an impact on the ability of the province to meet its carbon reduction commitments. Oil and gas production could result in significant associated GHG emissions (upstream and downstream) at a time when climate science is calling for an immediate and dramatic reduction in global emissions in order to avert catastrophic climate change.

Citing the climate crisis, we note that the government of Denmark, a significant oil producer, recently announced a ban on all new offshore oil and gas licensing (including a cancellation of the 8th North Sea licensing round) and a phase-out of all offshore production.[32] The country will join Costa Rica, Ireland, France, Spain, New Zealand, Portugal and Belize as jurisdictions that are at various stages of banning oil and gas expansion. Canada and Nova Scotia appear to be heading in the opposite direction. The SEA does not consider or even acknowledge that petroleum exploration and production activities on the Western Scotian Shelf would be taking place during a global climate emergency in which Canada has made a net-zero carbon emissions commitment by 2050 and the international community is taking increasingly ambitious actions to reduce emissions rapidly.

According to the SEA, exploration projects in the study area will generate GHG emissions, but these emissions are "generally short-term (weeks to months), do not generally meet threshold for regulatory reporting, and are controlled through existing regulatory standards" (page 157). However, it goes without saying that the purpose of exploration drilling is to find sufficient oil resources for production. As such, exploration activities may lead to oil and gas production with significant associated GHG emissions (upstream and downstream) at a time when climate science is calling for an immediate and dramatic reduction in global emissions in order to avert catastrophic climate change.

GHG emissions from exploration and production activities could contribute to a notable increase in the province's total emissions and will have to be offset elsewhere in the economy. Existing production platforms offshore of Newfoundland and Labrador (e.g. Hibernia, SeaRose, etc.) each produce roughly 500,000 tonnes of upstream GHG emissions annually and will do so for many years to come. When downstream emissions from are factored in, a facility's total GHG output can increase by up to ten times.[33,34]

Unfortunately, there is no "climate test" in Canadian legislation to ensure that environmental assessments ensure that fossil fuel development is compatible with national and international climate targets, both in terms of upstream and downstream emissions. Decisions about whether and under what conditions to allow offshore oil and gas activities can be made without fully accounting

[32] https://www.theguardian.com/business/2020/dec/04/denmark-to-end-new-oil-and-gas-exploration-in-north-sea

[33] Climate Accountability Institute. 2017. The Carbon Majors Database: CDP Carbon Majors Report 2017.

[34] Lee, M. 2017. Extracted Carbon: Re-examining Canada's Contribution to Climate Change through Fossil Fuel Exports. *Canadian Centre for Policy Alternatives*, p.5. https://www.policyalternatives.ca/publications/reports/extracted-carbon

for compatibility with climate targets and the urgent need to transition to renewable sources of energy.

The world's energy transition is driven by the global consensus that to avoid disaster, the Earth's overall rise in temperature must be no more than 2°C, according to the Paris Agreement, with a safer aspirational target of 1.5°C.[35] However, carbon emissions from the full production of currently operating oil and gas fields and coal mines across the world will almost certainly lead to global temperature rise beyond 2°C. Studies indicate that 68-80 per cent of existing global fossil fuel reserves must stay in the ground.[36] The lowest cost reserves will be burned first, whereas higher priced oil, such as in the North Atlantic offshore, will be much less viable in a low carbon world.

The SEA should, at a minimum, acknowledge the urgency of the global climate crisis and recommend that a carbon emissions analysis be required at some point long before exploration or production drilling is approved.

VII. Marine Environmental Impacts

The SEA area contains a number of special areas, including a proposed marine protected area (MPA) – the Fundian Channel/Browns Bank Area of Interest, numerous other effective-area based conservation measures (OECMs) protected under the *Fisheries Act*, including the Northeast Channel Coral Conservation Area, the Corsair and Georges Canyon Conservation Area, the Sambro Bank Sponge Conservation area and the Western/Emerald Banks Conservation Area, and critical habitat for species at risk such as the critically endangered North Atlantic right whale. These areas are important for the conservation of biodiversity and require a higher level of risk aversion than other parts of the ocean in order to safeguard wildlife and important habitats.

Canada, as a signatory to the Convention on Biological Diversity (CBD), committed to protecting 10 per cent of ocean and coastal spaces by 2020. Canada has additionally committed to protecting 25 per cent of its ocean by 2025, and 30 per cent by 2030, as outlined by Prime Minister Trudeau in his mandate letter to the Honourable Bernadette Jordan, Minister of Fisheries, Oceans and the Canadian Coast Guard.[37]

The International Union for Conservation of Nature (IUCN), which creates guidance for protected area practitioners that is used globally, states that management of MPAs and OECMs should not have environmentally-damaging industrial activities and infrastructure development occurring in them.[38] This includes activities such as oil and gas exploration and extraction, consistent with IUCN

[35] United Nations Climate Change. The Paris Agreement. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement [21] See Carbon Tracker Initiative. 2011. Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? https://www.carbontracker.org/reports/carbon-bubble/; M. Raupach et al. 2014. Sharing a quota on cumulative carbon emissions. *Nature Climate Change* 873; Oil Change International. Sept. 2016. The Sky's Limit: Why the Paris Climate Goals Require A Managed Decline of Fossil Fuel Production. (http://priceofoil.org/2016/09/22/the-skys-limit-report/

[36] See Carbon Tracker Initiative. 2011. Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? https://www.carbontracker.org/reports/carbon-bubble/; M. Raupach et al. 2014. Sharing a quota on cumulative carbon emissions. *Nature Climate Change* 873; Oil Change International. Sept. 2016. The Sky's Limit: Why the Paris Climate Goals Require A Managed Decline of Fossil Fuel Production. (http://priceofoil.org/2016/09/22/the-skys-limit-report/

[37] https://pm.gc.ca/en/mandate-letters/2019/12/13/minister-fisheries-oceans-and-canadian-coast-guard-mandate-letter

[38] https://portals.iucn.org/library/sites/library/files/documents/PATRS-003-En.pdf

Recommendation 102 adopted at the 2016 World Conservation Congress, based on scientific evidence that this type of industrial activity and infrastructure development has adverse impacts on biodiversity and is never compatible with conservation.[39]

In 2019 the Minister of Fisheries, Oceans and the Canadian Coast Guard announced that all new federal marine protected areas would prohibit oil and gas activities in order to strengthen the conservation of our oceans.[40] For the SEA area this would mean that, if designated, the Fundian Channel/Browns Bank Area of Interest would prohibit oil and gas activities, in addition to any future MPAs established during MPA network planning processes which are currently underway in the Maritimes Region. While this minimum standard does not currently apply to OECMs protected under the *Fisheries Act*, WWF-Canada attests these areas should remain free of this type of development in order to safeguard the important benthic habitats and associated biodiversity contained within.

WWF-Canada has repeatedly requested, based on the best available scientific advice and in line with international guidance for the protection of biodiversity, that oil and gas activities not be permitted within protected areas, including OECMs and other closures that aim to protect important benthic habitats.[41] **WWF-Canada does not agree that oil and gas activities are permissible within OECMs or MPAs and recommends that the SEA note that development should not occur in these areas in order to help conserve biodiversity and uphold Canada's commitments to marine conservation under the Convention on Biological Diversity.** It is also important to note that sensitive benthic habitats such as areas containing deepwater coral and sponge species also exist outside MPAs and OECMs and will also need additional mitigation measures in order to protect these fragile ecosystems.

The Canadian Science Advisory Secretariat document "Proceedings of the National Peer Review Meeting on the Assessment of the Effectiveness of Mitigation Measures in Reducing the Potential Impacts of Oil and Gas Exploration and Production on Areas with Defined Benthic Conservation Objectives" was recently released.[42] It noted that few studies have been conducted on coral and sponge species in Canadian waters, and that little is known about coral and sponge reproductive biology. As such, it is difficult to assess how these species will respond to oil and gas activities, though it noted that potential impacts could include direct mortality to sub-lethal effects including tissue and/or physiological damage. Infrastructure can disturb sediments and crush organisms, cause habitat fragmentation, and, with coral and sponge species that need to be perfectly upright in order to feed, cause mortality with even slight disturbance. It was also noted that it is difficult to assess the impacts of drill muds and cuttings on areas with defined benthic conservation objectives, as most of the literature is based on studies done in laboratories or shallow waters environments, which doesn't necessarily translate to the deep-water species and environments present in the SEA area, and that scale and magnitude of impacts may differ.

The Proceedings document also noted how difficult it was to assess the effectiveness of mitigation measures, as there is insufficient scientific literature on the topic. As such, it was recommended that

[39] https://portals.iucn.org/library/sites/library/files/resrecfiles/wcc_2016_rec_102_en.pdf
[40] https://www.canada.ca/en/fisheries-oceans/news/2019/04/backgrounder-new-standards-to-protect-canadas-oceans.html
[41] http://www.wwf.ca/newsroom/?30661/northeast-newfoundland-marine-refuge-2019
[42] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/Pro-Cr/2020/2020_021-eng.pdf

for areas with defined benthic conservation areas that the mitigation hierarchy be applied: (1) avoid; (2) mitigate; and, (3) offset (though recognizing that offsetting will not be possible for areas with benthic conservation objectives as there is no way to offset these unique, structurally complex habitats). As the first mitigation measure should be to avoid significant benthic areas by eliminating the possibility of interaction, video surveys should be done to confirm the presence or absence of sensitive species and/or habitats, and minimum setbacks applied to planed well and infrastructure locations. The report suggested minimum proposed setbacks for areas with defined conservation objectives as 200 meters from seafloor infrastructure with no expected discharges, and 2 kilometers from any discharge points and/or surface (i.e. floating) infrastructure. It also suggested setback distances of 50 meters from corals and other sensitive benthic species and habitats for associated pipelines.

It is important to note that current mitigation for sensitive benthic species and/or habitats is based on knowledge and best practices from Norwegian oil and gas exploration and production activities, which are not appropriate in the Canadian context. For example, *Lophelia* is a coral indicator species in Norway and has been applied to oil and gas activities in parts of Canada, but it is not a good indicator as this species is rare in Canadian waters. Norwegian guidelines also characterize coral aggregations as 5 colonies greater than 30 centimeters, which excludes Canadian sea pen fields.[43] To provide regionally appropriate guidance, regionally relevant guidelines similar to those provided by the Norwegian Oil and Gas Authority must be developed, including development of a regionally appropriate species list and criteria for setback distances to support determination of what level of coral and/or sponge occurrences/densities are consistent with significant concentrations in Canadian waters. Until that time, the significance of impacts and related mitigation for oil and gas exploration activities should be carefully determined using the precautionary approach, and on a case-by-case basis to account for site-specific ecology and environmental conditions, with emphasis on avoiding sensitive areas.

VIII. Seismic Testing

The SEA understates the potentially significant impacts to marine wildlife of seismic air gun blasting programs and proposes insufficient mitigation measures to reduce the impacts of seismic testing to marine wildlife, despite a mounting body of scientific evidence showing the sometimes severe and fatal impacts of these surveys. Mitigation measures such as marine mammal observers, safety zones and "ramp-up" techniques for the purposes of mitigating the impacts of vessel strikes, vertical seismic profiling, and geophysical surveys have been shown to be limited in their effectiveness.

The SEA indicates that offshore geophysical surveys may include two-, three-, or four-dimensional geophysical data acquisition (i.e. seismic testing surveys). The assessment concedes that the effects of sound on marine mammals can be harmful but ultimately downplays the potentially lethal impacts to marine wildlife of seismic blasting programs. Research is increasingly confirming the often severe and potentially lethal impacts of geophysical surveys.

[43] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/Pro-Cr/2020/2020_021-eng.pdf

There are typically 18-48 air guns involved in seismic testing programs, all firing simultaneously around the lock for days on end. Air source arrays currently in use can output sound source levels of up to 260 decibels (dB), which is almost inconceivably loud.[44] A loud indoor rock concert is roughly 120 db. The threshold at which humans can die from sound is reportedly 185-200 db. The SEA acknowledges that seismic airgun surveys may result in some physiological and behavioural effects on fish, invertebrates, marine mammals, sea turtles and birds, and could result in adverse" (page 163). Ultimately, however, the SEA concludes that, with standard mitigation measures, seismic blasting operations will be "localized", "short-term", and "temporary" (Table 5.1).

To mitigate the effects of sound emissions from seismic activities, an operator would have to follow mitigations identified in the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment,* including:

- Establishing a safety (observation) zone of a minimum of 500 metres around the sound source;
- Implementing detection technology, such as passive acoustic monitoring, concurrent with visual observations;
- Gradually increasing the sound source intensity over a period of at least 20 minutes (ramp up);
- Shutting down the sound source upon observing or detecting any marine mammal or sea turtle within "appropriate" safety zones; and,
- Using marine mammal observers (MMO) for the purposes of mitigating the impacts of vessel strikes, VSP, and geophysical surveys.

These mitigation measures are unproven in their effectiveness. Some species are incapable of moving away from the sound source and, for some species and in certain situations, the weaker the behavioural response, the more serious the impact on the population.[45] Individuals with lower energy reserves or no alternative habitat cannot afford to flee repeatedly from disturbance but are forced to remain and continue feeding, apparently unresponsive to disruption.[46,47] Yet these individuals are in fact more vulnerable to disturbance. Animals do not always react in an outwardly observable or obvious manner even if they are seriously impacted.[48]

The claim that shutting down the blasting should any mammals be detected within a "safety zone" (minimum 500m radius) of the air gun is sufficient to safeguard marine life is not supported by the scientific evidence. It should be noted that a 500 metre 'shut-down' radius is much smaller than the 1500-meter safety zone for divers set out in section 12(3) of the Canada Oil and Gas Geophysical Operations Regulations. There is no consensus regarding what constitutes a "safe" exposure for marine life, although research suggests that a 500-meter radius is insufficiently small to adequately

[44] https://rsea.inuvialuit.com/docs/brsea_final.pdf

[45] Weilgart, L., 2018. *The impact of ocean noise pollution on fish and invertebrates*. Report for OceanCare, Switzerland.

[46] Gill, J.A. et al. 2001. Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation* 97 (2001) 265-268. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.546.453&rep=rep1&type=pdf

[47] Stillman, R.A. & Goss-Custard, J.D. 2002. Seasonal changes in the response of Oystercatchers Haematopus ostralegus to human disturbance. *J. Avian Biol*. 33: 358–365. http://obpa-nc.org/DOI-AdminRecord/0064594-0064602.pdf

[48] Bejder, L. et al. 2006. Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance. Conservation Biology. 20(6). 1791-98.

protect marine mammals from seismic impacts. The safety radius is highly dependent on the sound transmission conditions which change with bathymetry, nature of the seafloor, and the sound speed profile which can change between seasons. Impacts from air guns also can vary based on past exposure, recovery time, species, age and sex, as well as context.[49]

Even if it were possible to determine a safe 'shut down zone' radius, it can be extremely difficult for marine mammal observers on board seismic vessels to detect marine wildlife within that zone. Survey activities often take place at night or in other limited-visibility conditions and many marine mammals and turtles are hard to sight as they are elusive and often underwater.[69] Most whales are rarely visible at the surface, especially the deep divers (Northern bottlenose whales) and especially in anything but perfect visibility. Quantitative analysis has shown that mitigation monitoring detects fewer than 2 per cent of beaked whales (e.g. Northern bottlenose whales) even if the animals are directly in the path of the ship.[50] Other species might be slightly easier to sight, but monitoring cannot be relied upon to be satisfactorily effective.

Ramp-ups or soft starts, where the number of air guns firing are gradually and audibly increased, do not appear to be a consistently and reliably effective mitigation measure in causing humpback whales to move away from the source vessel.[51] There is large variation in whale behavior, with some groups swimming away from the sound source whereas others approached even relatively loud noise levels, possibly viewing them as a challenge that needed to be confronted. Whales that did avoid the (source) vessel emitting air gun noise may have avoided the vessel itself, not the noise.[52] Although the sound source was different (naval sonar vs. seismic air guns), and the ramp-up procedures are different, gradually increasing the sonar source intensity has been found not to be an effective method to reduce the risk of physiological effects for humpback whales overall, mainly because most whales did not exhibit very strong avoidance responses to the sonar signals.[53] Animals that had not been exposed to sonar recently, were not feeding, or were with a small calf were more responsive. This again illustrates how difficult it is to form conclusions about innocuous noise impacts since whales, but also fish, show great variation in their behavior in the wild. Moreover, when animals have a strong motivation not to move away from their current location, ramp-ups are unlikely to be effective.

Underwater noise from vessel traffic can readily propagate over 100 km and the noise from seismic surveys can be heard almost continuously in some areas for distances of up to 4,000 km as seismic air gun surveys are among the loudest of human produced sounds, and sound travels very fast and efficiently in water.[54] Science to date clearly suggests that there can be serious negative effects from seismic testing on some important species, including plankton, benthic organisms, whales, including narwhals, harbour porpoises, dolphins, invertebrates including squid, and fish . These impacts can

[49] Gordon, J. et al. 2003. A Review of the Effects of Seismic Surveys on Marine Mammals. *Marine Technology Society Journal.* 37(4): 16-34 [69] Weilgart, L. 2019. Best Available Technology and Best Environmental Practice for Three Noise Sources: Shipping, Seismic Airgun Surveys and Pile Driving. The Journal of Ocean Technology. Vol. 14, No. 3. 1-9.

[50] Barlow, J. and Gisiner, R. 2006. Mitigating, monitoring and assessing the effects of anthropogenic sound on beaked whales. *Journal of Cetacean Research and Management*, *7*(3), pp.239-249.

[51] Dunlop, R.A. et al. 2017. Response of humpback whales to ramp-up of a small experimental airgun array. *Marine Pollution Bulletin*. 103: 1-2.

[52] Ibid.

[53] Wensveen et al. 2017. Lack of behavioural responses of humpback whales indicate limited effectiveness of sonar mitigation. Journal of Experimental Biology. 220(22): 4150-4161.

[54] Nieukirk, S. L., Mellinger, D. K., Moore, S. E., et al. (2012). Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999– 2009. Journal of the Acoustical Society of America, 131, 1102–12.

linger for months or even a year after the surveys have ceased. To date, roughly 130 species have been documented to be impacted by human-caused underwater noise pollution.[55] While more research is needed, we know enough from studies so far, especially those involving seismic air gun surveys, to conclude that anthropogenic underwater noise is a serious and transboundary pollutant, which can degrade huge ocean areas and do harm to marine ecosystems.

A 2015 report by Marine Conservation Research on the impacts of seismic testing on whales concluded that "It is indisputable that seismic noise has adverse impacts on marine life…From the research at hand, it is clear that noise from seismic activity impacts whales. It can damage their hearing, ability to communicate, disrupt diving behavior, feeding and migration patterns. There are increasing indications that this could cause serious injury to whales. It may also disrupt reproductive success and increase the risk of strandings and ice entrapments."[56] Notably, the report also concluded that there is a massive research gap in this field and that decision-makers should use "extreme caution" before allowing seismic activity.

The SEA acknowledges on page 12 that "Alternative technologies such as seismic airguns with controlled bandwidth sources which enable suppression of high frequency energy, may also be considered on a project-specific basis." **However, there are also known, safer alternatives to seismic testing such as Marine Vibroseis (MV), which the SEA should acknowledge**.[57] Penetration into the seafloor is largely a function of sound frequency, and MV can produce the same well-penetrating, low frequencies as air guns and send sound waves just as deeply into the seafloor as air guns.[58] Moreover, MV is a controlled source and as such, the source characteristics (frequency, duration, type of sound) can be altered in real-time, to optimize the output for each environment and situation. This technology is less environmentally impactful, as the unnecessary high frequencies that air guns emit (up to 100,000 Hz), are not used by MV. Frequencies over about 150 Hz are not recorded or used by the oil and gas industry. Thus, a great deal of energy is emitted by air guns that is wasted. The high frequencies that air guns emit can unnecessarily disturb species such as narwhals, belugas, northern bottlenose whales, and harbour porpoises. MV is much quieter, both near the source and at distance.[59] Researchers have estimated that a MV survey would expose only about 1-20 per cent of whales and dolphins to high noise levels when compared to those exposed to an air gun survey, based on their models.[60] MV is roughly one-thousand times quieter than traditional seismic air guns and does not have a "shot-like" quality, something that is particularly injurious to living tissues.

[55] Weilgart, 2018.

[56] https://www.greenpeace.org/usa/wp-content/uploads/2015/08/A-Review-of-the-Impact-of-Seismic-Survey-Noise-on-Narwhal-and-other-Arctic-Cetaceans-.pdf

[57] Weilgart, L. 2016. Alternative Quieting Technology to Seismic Airguns for Oil and Gas Exploration and Geophysical Research. Brief for GSDR – 2016 Update.

[58] Ibid.

[59] Duncan, A.J., Weilgart, L.S., Leaper, R., Jasny, M. and Livermore, S., 2017. A modelling comparison between received sound levels produced by a marine Vibroseis array and those from an airgun array for some typical seismic survey scenarios. *Marine Pollution Bulletin*, *119*(1), pp.277288.

[60] LGL & MAI. 2011. Environmental Assessment of Marine Vibroseis. LGL Rep. TA4604-1; JIP contract 22 07-12. Rep. from LGL Ltd., environ. res. assoc., King City, Ont., Canada, and Marine Acoustics Inc., Arlington, VA, U.S.A., for Joint Industry Programme, E&P Sound and Marine Life, Intern. Assoc. of Oil & Gas Producers, London, U.K. 207 p.

The recently released Canadian Science Advisory Secretariat Report "Review of the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment[61] documents new modifications and additions that should be incorporated into the Mitigation of Seismic Sound in the Marine Environment Statement of Canadian Practice based on the most updated scientific information. As this report states, business as usual mitigations are not sufficient to avoid unnecessary impacts on marine species and outlines ways to minimize negative effects.

The most effective mitigation measure for seismic air guns is simply to prohibit their use, particularly when safer alternatives such as Marine Vibroseis are known to exist. At a minimum, the SEA should recommend that air gun surveys be separated from areas rich in marine life and sensitive species, and the source level should be lowered (i.e. quiet the noise).

Rules and mitigation measures for seismic air gun surveys must be substantially strengthened and based on the best available science. The most effective mitigation for seismic air gun surveys are:

- Remove the surveys from areas/seasons rich in marine life and sensitive species;
- Lower the source level (quiet the noise); and,
- Require the use of air gun alternatives such as Marine Vibroseis, which can drastically cut noise levels and limit the frequencies (pitches) of noise output.

Significant gaps in knowledge exist regarding the effects of seismic air gun noise on marine mammals,[62] and we do not yet have sufficient information on the abundance and distribution of some North Atlantic marine wildlife.[63] **Baseline studies of biological abundance and distribution should occur at least a year, preferably two, in advance of any seismic surveys,** as we have a legitimate reason to expect negative impacts severe enough to impact the health, welfare, and sustainability of at least some animal populations, from plankton through fish to whales.

The long-term impacts of seismic testing and the cumulative effects of multiple oil drilling projects on the ecosystem and population biology in the region, together with other threats such as climate change, pollution, marine vessel traffic, fishing and ocean acidification, should be thoroughly studied. Such research is very challenging to carry out, but the burden of proof (to show no harm) should be on the project proponent(s), who wish to alter the environment, rather than those wishing to preserve it.

[61] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2020/2020_005-eng.pdf
[62] Gordon et al. 2003.
[63] Weilgart, 2019.