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October 30, 2020

West Flemish Pass Exploration Drilling Project
Impact Assessment Agency of Canada
901-10 Barters Hill
St. John's, NL, A1C 6M1

Re: WWF-Canada's Submission to the IAAC on the WEST FLEMISH PASS Exploration Drilling Project Environmental Assessment Report

Dear Impact Assessment Agency of Canada,

Thank you for the opportunity to submit comments on Chevron Canada Limited's West Flemish Pass Exploration Drilling Project Draft Environmental Assessment (EA) Report. WWF-Canada supports the federal environmental assessment process as it is an important component in ensuring that offshore oil and gas activities in Canada's Atlantic offshore are conducted safely with the lowest possible risk to human health and the environment.

World Wildlife Fund (WWF) is one of the largest independent conservation organizations in the world. WWF-Canada is part of the WWF global network, working in over 100 countries worldwide. WWF-Canada creates 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 can thrive together. WWF-Canada believes healthy coastal communities depend on healthy oceans. We work with 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.

While we support the impact assessment process, we note that the public has been given only 30 days to provide comments on three exploration drilling project Environmental Assessment (EA) Reports (BHP Canada, Central Ridge, West Flemish Pass), which total over 500 pages combined. This is likely too short a time for some stakeholders who may not have the resources to review the entirety of the documentation and will therefore limit the effectiveness of the review processes.

With the limited time available to us, WWF-Canada has reviewed all three reports, as well as the potential EA conditions, and we are submitting the following comments and recommendations specific to the West Flemish Pass EA. WWF-Canada urges the IAAC to implement the recommendations we have outlined to ensure that the climate, biodiversity and conservation impacts of the West Flemish Pass project as a whole are adequately and fully considered.

Sincerely,

<Original signed by>

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I. Summary

The following is a summary of WWF-Canada's comments on the West Flemish Pass Exploration Drilling Project draft environmental assessment report:

1. **<u>Claims of no "significant" environmental effects are unsubstantiated</u>** – 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 acknowledged in the EA, the IAAC has concluded that, overall, the project is "not likely to cause *significant* adverse environmental effects, taking into account the implementation of mitigation measures", but the Agency has failed to adequately explain how this judgment was made in the absence of a regional cumulative effects assessment (see #2 below). The methods used to assess impacts in the EA may be biased against findings of "significance" due to inadequate temporal and spatial scales of assessment and the proposed mitigation measures have been deemed "effective" without sufficient rationale.

2. **<u>Cumulative effects are assessed inadequately</u>** – The Agency has identified at least three existing development projects, one potential development project (Bay du Nord), and seven approved or proposed exploratory drilling projects occur with zones of influence that could spatially overlap with the West Flemish Pass project. No regional cumulative effects assessment has been carried out in the West Flemish Pass project area to analyze the combined impacts of all these activities, yet the EA nonetheless concludes that "Taking into account the implementation of the mitigation measures proposed for the Project, the Agency is of the view that the Project is not likely to cause significant adverse cumulative environmental effects." In drawing this conclusion, the Agency has erred in over-relying on proposed mitigation measures without providing adequate evidence of their effectiveness at a regional scale when multiple stressors are interacting simultaneously.

3. **<u>Oil spill risks and impacts are misevaluated</u>** – The probability of a well blowout has been understated by the project proponent and while the likelihood of a major accident or blowout is nonetheless still low, the risk of a major spill and the potentially catastrophic consequences have been misevaluated by the IAAC. Risk is a function of both the probability of an event *and* its consequences. While it may be true that the *likelihood* of a major accident is small, the *impact* of such an event would be more devastating in the Atlantic offshore than elsewhere, due to the difficulty of ensuring adequate oil spill response in remote offshore locations (375 km from shore) under sometimes extreme weather and ocean conditions, cold water and potential sea ice.

4. **<u>Accident prevention and response measures are inadequate</u>** – Given the risk involved, spill prevention is the most effective means of mitigating environmental damages, but the project proponents will not be required 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 may not be effective in shallow (<500m) and would need to be mobilized from Norway, which would take an estimated 27-30 days according to the proponent. Should the capping stack fail as it did in the

Deepwater Horizon blowout, it would take up to 135 days (4.5 months) for a relief drilling rig to plug an out-of-control well.

5. **The IAAC did not satisfactorily assess the project's contributions to climate change** – The direct greenhouse gas (GHG) emissions from the West Flemish Pass project will have an impact on the ability of the province to meet its carbon reduction commitments and it goes without saying that the point of exploration drilling is to find sufficient oil resources for production purposes. 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.

6. **Seismic testing** – The EA downplays 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 sometime severe and fatal impacts of these surveys. The proponent has pledged in its EIS to use marine mammal observers and "ramp-up" techniques for the purposes of mitigating the impacts of vessel strikes, vertical seismic profiling, and geophysical surveys, but these measures have been shown to be limited in their effectiveness.

7. **Protected and special areas** – Special areas with defined benthic conservation objectives, such as deep-sea coral and sponge assemblages, are highly sensitive to human impact and require additional special mitigations and be managed with a higher level of risk aversion. As it is difficult to assess the effectiveness of mitigation measures, and it is recommended that the first mitigation should be to avoid significant benthic areas to eliminate the possibility of interaction. If aggregations of corals and sponges are found during pre-drilling visual surveys, the only course of action is to relocate wells and anchors, as there is no way to offset damages to these unique habitats.

8. **Economic viability** – Although the economic considerations of the West Flemish Pass project are not considered in the EA, the IAAC appears to accept the proponent's claim that "exploration drilling is a critical activity to enable continued oil and gas discoveries to maintain production and meet global demand for energy" (page 1). It is simply untrue that global fossil fuel demand is inevitably destined to rise, or even stay at current levels, over the coming decades. This is a highly disputed assertion that is typically based on a narrow set of assumptions, as explained below. In reality, we may have in fact already reached peak oil demand, making higher cost resources such as the deep water North Atlantic less feasible. The economic viability of the West Flemish Pass project in a carbon-constrained world with oil prices in the range of $50 USD per barrel for the foreseeable future is not promising. The development of this resource in the West Flemish Pass may well result in a stranded asset for the company and/or may require significant public investment in order to make exploration and production drilling activities economically viable.

II. Main Recommendations

1. Marine refuges, Northwest Atlantic Fisheries Organization (NAFO) fishery closures, marine protected areas and other ecologically or biologically significant areas should remain free of oil and gas development in order to safeguard the important benthic habitats and associated biodiversity contained within.
2. WWF-Canada does not agree that oil and gas activities are permissible within Vulnerable Marine Ecosystems (VMEs) and recommends that the proponent set aside these portions of the Project Area from development in order to help conserve biodiversity and uphold Canada's commitments to marine conservation under NAFO.
3. We cannot stress enough the necessity of conducting an analysis of the impacts of all possible cumulative effects in the project area, 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.
4. The IAAC should recommend that a greenhouse gas emissions analysis (i.e. climate test) be required at some point long before production drilling is approved, preferably during the exploration phase of the project, which should include an analysis of the potential for future upstream and downstream emissions resulting from the project.
5. The IAAC should require the proponent 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. At a minimum, the IAAC must assess what would be required to do so.
6. In cases where capping stacks would likely not be effective (i.e. shallow or deep water), drilling should not be permitted.
7. The IAAC must insist that the proponent provides detailed and adequate accident prevention measures before the exploration drilling program is approved.
8. The IAAC should review the blowout probability estimate given in the proponent's EIS and in the EA, as it is not accurate in our view and, crucially, it does not consider how the risk calculus changes when the consequences of a major spill are extremely serious and the prospects for mounting an effective spill response are uncertain.
9. 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."
10. There are known, safer alternatives to seismic testing such as Marine Vibroseis, which the IAAC should be encouraging or requiring whenever possible.
11. The IAAC 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).
12. Baseline studies of biological abundance and distribution should occur at least a year, preferably two, in advance of any seismic surveys.
13. The claim that oil and gas discoveries will be required to maintain production and meet global demand into the future is highly disputed and would lead to extremely dangerous levels of global heating. The IAAC should remove or qualify this statement in its final EA report.
14. The final report should indicate that development of this resource could potentially result in a stranded asset for the company or require continuing public/government investment in order to make exploration and production drilling activities economically viable.

III. Introduction

In its Environmental Impact Statement, the project proponent Chevron Canada Ltd. stated that they expect to drill up to 8 exploration wells in the West Flemish Pass, approximately 375 km east of St. John's. The project will entail the drilling, testing and abandonment of exploratory wells over the course of several years beginning as early as 2021. In the draft environmental assessment, the IAAC concluded that the project could lead to a range of potentially serious environmental impacts, including the following:

1. "Effects on fish habitat caused by the discharge of used drilling muds and cuttings to the marine environment.
2. "Effects on marine mammals, fish and sea turtles caused by underwater sound from well site surveys and vertical seismic profiling operations, and from support vessels and mobile offshore drilling unit operations.
3. "Effects on migratory birds caused by lights on the mobile offshore drilling unit and platform supply vessels and, if well testing is required, flaring.
4. "Interference with commercial fisheries, Indigenous or otherwise, including effects on fishing activity that may be caused by the need to avoid the 500-metre safety (exclusion) zone around drilling operations.
5. "Accidents and malfunctions could occur during exploration drilling, including batch fuel and drilling fluid spills and blowouts.
6. "Potential for effects on Atlantic Salmon, a species of importance to Indigenous cultures.
7. "(A)dverse residual environmental effects on fish and fish habitat would occur continuously (e.g., sound emissions from the MODU), regularly (e.g., waste emissions) or sporadically (e.g., VSP surveys) during drilling operations (maximum of 65 days per well).
8. "The Project may adversely affect marine mammals and sea turtles, including species at risk. Several species of marine mammals could be present year-round in the project area, including in the proponent's exploration licences, while others may be present in higher abundance during summer and fall. Sound emissions from the MODU or VSP surveys may potentially result in injury to marine mammals and sea turtles or affect the quality and use of their habitats.
9. "Birds can become "entrapped" by light sources and they are reluctant to fly out into the darkness once inside a beam of light. Fatigue sets in, collisions with other birds or the structure occurs, or the birds simply collapse from exhaustion, frequently dying from injuries or falling prey to predators…Flaring may have an effect on birds including incinerating birds that are attracted to the flare or causing birds to deplete energy resources because they become disoriented.

10. “Special areas (designated because of ecologically or biologically sensitive features) which overlap with the proponent’s exploration licences… A common defining feature of several of these special areas is the presence of important benthic habitats such as sponge and coral grounds, which are particularly sensitive because of their high biological productivity and slow recovery rates. Other special areas include marine habitats for bird, fish, mammal and sea turtle species.

11. “Access to fishing grounds may be temporarily lost or restricted due to displacement caused by safety exclusion zones required around the MODU…Damage to fishing gear could potentially occur as a result of interactions between project vessels and fishing vessels.

12. “The most likely interaction between Indigenous peoples and the Project’s routine operations would be related to potential effects on communal commercial fishing activities that could occur in the project area.

13. “Unplanned pollution events associated with (offshore exploratory drilling) activities have occurred in the past…More serious events, such as a large-scale subsea release, are far less likely to occur but could have major consequences.

14. “The potential effects of a worst-case accident or malfunction from the Project (i.e., unmitigated subsea release) on migratory birds and special areas could be significant. Similarly, considering the potential presence of species at risk, the Agency concludes that the potential effects of a worst-case accident or malfunction on fish and fish habitat and marine mammals and sea turtles could also be significant.”

15. “The residual environmental effects of the Project could interact cumulatively with the effects of other projects and activities.”

Despite these impacts, the IAAC concluded in every instance that environmental effects can be mitigated with a variety of measures and the Agency is ultimately of the view that “the proposed West Flemish Pass Exploration Drilling Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures described in this EA Report.”

Research indicates that methods used in EAs to assess impacts, both in Canada and internationally, may be biased against findings of “significance” due to inadequate temporal and spatial scales of assessment and an overreliance on often unproven mitigation measures that are deemed “effective” without sufficient rationale.[1] For the reasons outlined below, we believe this to be the case for the West Flemish Pass EA and thus the IAAC’s conclusion that there will be no “significant” adverse effects to be unsubstantiated. We provide recommendations (in bold text) on how to ensure that that the project’s viability will not depend upon public subsidies through the financial support of governments and that the project can be carried out safely with the lowest possible risk to human health, the climate and the marine environment.

[1] 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

IV. Economic Viability of West Flemish Pass

Although the IAAC does not consider the economic considerations of the West Flemish Pass project, we note that the IAAC appears to accept the proponent's claim that "exploration drilling is a critical activity to enable continued oil and gas discoveries to maintain production and meet global demand for energy." **This is a misleading and even dangerous claim that the IAAC should either qualify or remove in the final EA report. It is not true that global fossil fuel demand is inevitably destined to rise, or even stay at current levels, over the coming decades.** This is a highly disputed assertion that gives workers in the industry false hope and is typically based on a set of narrow assumptions. Even maintaining current levels of global fossil fuel production (no net increase) is likely uneconomical and would lead to devastating levels of climate heating.

The proponent makes the common error of citing U.S. Energy Information Administration (EIA) "forecasts" for increased energy demand (i.e. fossil fuel consumption) in the coming decades and the IAAC has erred in accepting this assertion in the draft EA. The EIA clearly emphasizes in its reports that it does <u>not</u> make forecasts.[2] Their reports are *projections,* not *predictions,* based on energy policies that are currently in place around the world. "Reference case projections in each edition of the International Energy Outlook are not predictions of what is most likely to happen, but rather they are modeled projections under various alternative assumptions."

In other words, the EIA does not include projections for a world that meets carbon reduction targets under the Paris Agreement because current policies around the world are not yet in place to meet these targets. It is difficult, if not impossible, to imagine that the business-as-usual energy policy approach prevailing in today's rapidly worsening climate crisis. *If* governments were to take their Paris and net-zero commitments seriously and put in policies to ensure this happens, as they are increasingly doing, rising global oil and gas demand until mid-century could not possibly take place and the case for offshore oil and gas in Newfoundland and Labrador is far less promising.

The 2020 World Energy Outlook (WEO) report from the International Energy Agency confirms as much in its various possible scenario projections.[3] The WEO states that the world is not currently on track to meet carbon reduction commitments set out in the Paris Agreement in 2015 and its 'stated policies scenario' (i.e. business as usual) projects that oil and gas production (and consequent GHG emissions) will continue to rise for decades as suggested by the proponent. However, under the WEO's new 'Sustainable Development scenario', which is consistent with the carbon reduction targets required to avert catastrophic climate change and hold global heating to "well below 2°C", renewable energy accounts for the vast majority of future energy demand growth whereas fossil fuel use declines precipitously.

Put another way, one could argue that the future success of the offshore industry in Newfoundland and Labrador is predicated upon the global community <u>not</u> 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

[2] https://www.eia.gov/outlooks/ieo/pdf/ieo2019.pdf
[3] https://www.iea.org/reports/world-energy-outlook-2020
[4] https://www.carbontracker.org/reports/breaking-the-habit/
[5] http://www.energyintel.com/pages/eig_article.aspx?DocID=1076248

of this year, 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] 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, 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), below 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 federal government recently announced almost $400 million in payments to the province of Newfoundland and Labrador to bolster the volatile and struggling offshore oil and gas sector. The provincial government is now reportedly considering how to best support the industry which may involve a direct investment in the White Rose project by purchasing an equity stake.[11] These moves underscore the economic uncertainty surrounding oil and gas projects in Newfoundland and Labrador's offshore. The economic viability of the West Flemish Pass project in a carbon-constrained world with oil prices under $50 USD per barrel for the foreseeable future is highly dubious. **The development of this resource must not result in a stranded asset for the company or require continuing public/government investment in order to make exploration and production drilling activities economically viable.**

Our global energy future is not pre-ordained and will depend on the decisions we make today. By continuing to make the claim that fossil fuels will be necessary for "decades to come" to meet global demand for energy, oil companies and governments are perpetuating a self-fulfilling prophecy that would lead to ruinous climate disruption, the mass extinction of species and human suffering on an unimaginable scale.

V. Cumulative Effects

The eastern Newfoundland offshore area is subject to ongoing and planned offshore exploration drilling programs which were in progress, being subject to EA review or recently approved. The Agency has identified that at least three existing development projects, one potential development project (Bay du Nord), and seven approved or proposed exploratory drilling projects that occur

[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
[11] https://www.cbc.ca/news/canada/newfoundland-labrador/offshore-announcement-o-regan-furey-1.5738954

with zones of influence that could spatially overlap with the West Flemish Pass project. In addition, the provincial government has announced its intention to see 100 exploratory wells drilled in the region over the coming decade.[12] These impacts will be layered onto the ongoing effects of climate change, ocean temperature increases, ocean acidification, batch spills and chronic oil leaks, geophysical exploration, fishing, marine vessel traffic and other activities in the region. Nonetheless, the EA concludes that "Taking into account the implementation of the mitigation measures proposed for the Project, the Agency is of the view that the Project is not likely to cause significant adverse cumulative environmental effects."

The question is not so much whether the West Flemish Pass project alone will *cause* cumulative effects but how much it will *contribute* to the many impacts on marine life that already exist in the area. This we do not know. 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. Given that a comprehensive regional assessment of cumulative effects has yet to be carried out for the West Flemish Pass project area, it is not reasonable for the IAAC to conclude unequivocally that the project is "not likely" to cause significant adverse cumulative environmental effects. Adequate regional-scale analysis simply has not been performed to justify such a conclusion and the IAAC has failed to adequately explain how the Agency made this determination in the absence of a 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.[13] Regrettably, this appears to be the case for the West Flemish Pass EA.

In reaching its conclusion, the Agency has erred in over-relying on the proposed mitigation measures, which are meant to reduce the impacts of *individual* project activities on specific valued components (VCs). The EA 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.

The recent Regional Assessment (RA) for Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador was mandated to carry out a regional cumulative effects analysis in the region, yet the RA Committee ultimately declined to do a full assessment due to "difficulties in modelling cumulative effects and their ecological outcomes" and because it had "neither the time nor the capacity to evaluate cumulative effects in a predictive/quantitative sense." The Committee acknowledged nonetheless that "The widespread and migratory nature of marine mammals and sea turtles increases the potential for individuals and populations to be affected by multiple disturbances in various locations, and thus for cumulative effects to occur."

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

[12] https://www.gov.nl.ca/nr/files/advance30-pdf-oil-gas-sector-final-online.pdf

[13] 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

declining by almost 75 per cent.[14] For example, 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.[15] These latest numbers represent a decline from last year's total and are another ominous sign for this highly endangered species. 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 temporary and permanent 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. The proposed West Flemish Pass project will only add more stressors onto the north Atlantic marine environment.

We recommend that an assessment of all cumulative impacts in the project area be conducted before any drilling activity proceeds.

VI. Greenhouse Gas Emissions

According to the EA, the proponent estimated greenhouse gas (GHG) emissions from drilling operations would be approximately 41,450 tonnes of carbon dioxide equivalent (CO2e) per well drilled. The proponent also stated that they expect to drill up to 8 exploration wells for this project. Assuming zero to three wells could be drilled in any given year, annual emissions could be as high as 124,349 tonnes of CO2e, representing up to 1.2 percent of total reported provincial greenhouse gas emissions for 2016. The overall greenhouse gas emissions over the Project life cycle will ultimately depend on factors such as the number of wells drilled, the time required to drill each well and whether well testing with flaring is conducted.

If estimates are correct, GHG emissions from the West Flemish Pass exploration project combined with emissions from other exploration projects in the region (e.g. Central Ridge and BHP Canada) will contribute to a notable increase in the province's total emissions and will have to be offset elsewhere in the economy. Moreover, 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 a large and commensurate increase in 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. Existing production platforms offshore of Newfoundland-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.[16, 17]

In 2016, total CO_2 emissions in the province were 10.8 Mt, with oil and gas operations in Newfoundland and Labrador accounting for 25 per cent of the total, or 2.7 Mt.[18] In 2018, the provincial government set an aspirational target of reducing greenhouse gas emissions to 6.9 Mt/year by 2030.[19] This means GHG emissions from offshore oil production (which are projected

[14] WWF 2015. Living Blue Planet Report. https://www.worldwildlife.org/publications/living-blue-planet-report-2015
[15] https://www.cbc.ca/news/canada/nova-scotia/356-north-atlantic-right-whales-left-2020-population-1.5779931
[16] Climate Accountability Institute. 2017. The Carbon Majors Database: CDP Carbon Majors Report 2017.
[17] 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
[18] https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/nl-eng.html?=undefined&wbdisable=true
[19] https://www.exec.gov.nl.ca/exec/occ/publications/The_Way_Forward_Climate_Change.pdf

to increase to 4.9 Mt annually by 2030) would account for 71 per cent of the province's total annual emissions in 2030, making it virtually impossible for the province to meet its 2030 GHG reduction target.

Unfortunately, there is no "climate test" in Canadian legislation to ensure that environmental assessments such as the West Flemish Pass EA 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 for compatibility with climate targets and the urgent need to transition to renewable sources of energy. If there were such a climate test in Canada's impact assessment process, projects such as West Flemish Pass, BHP Canada and Central Ridge may not be approved due to incompatibility with provincial emissions targets.

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.[20] 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. To stay within this target, studies indicate that 68-80 per cent of existing global fossil fuel reserves must stay in the ground.[21] 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.

It is therefore incumbent upon the IAAC, at a minimum, to recommend that a climate analysis be required at some point long before production drilling is approved, preferably during the exploration phase of the West Flemish Pass project.

VII. Spills, Discharge and Blowouts

Chronic spills and other discharges

We note in the EA that over the course of the West Flemish Pass project, a batch spill is virtually certain to occur if 8 wells are drilled. The proponent predicted there would be a "one-in-five chance of a spill occurring if a single well were drilled, meaning that it would be likely to occur if five or more wells are drilled." In addition, spills of synthetic-based mud and drill cuttings will be discharged into the marine environment. 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 from climate change, ocean temperature increases, ocean acidification, geophysical exploration, fishing, marine vessel traffic and other activities. As noted, marine wildlife and biodiversity around the world, including the North Atlantic, are already in precipitous decline.

[20] 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/

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.[22] 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.[23]

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.[24] A range of biological effects can result from chronic oil inputs such as repeated small spillages in coastal waters, with those effects ranging from localized and subtle to severe and long lasting.[25] In the UK 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.[26]

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.[27] 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.[28] Colonies of the cold-water corals, *Lophelia pertusa*, have been identified around many oil and gas platforms in the northern North Sea,[29] 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.[30]

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).[31] 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.

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[22] Covington, R. December 29, 2017. *Taylor Energy Cumulative Spill Report – 2017 Update.* https://skytruth.org/2017/12/taylor-energy-site-23051-cumulative-spill-report-2017-update/

[23] 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

[24] 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

[25] 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.

[26] 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

We are in the midst of a massive biodiversity crisis with at least one species in the region (North Atlantic right whales) on the verge of possible extinction. We cannot stress enough the necessity of conducting an analysis of the impacts of all possible cumulative effects in the project area, including pollution, batch spills and chronic oil leaks, geophysical activities, fishing, vessel traffic, climate change, ocean temperature increases and other activities <u>before any drilling activity proceeds</u>.

Well Blowout Risk

Page 53 of the EA states the following:

> "Based on a review of national and international records of historical offshore spills, the proponent noted that the probability of a well blowout or other release would be low, and if one were to occur, chances are it would be a small volume. For a single well in deeper water, the proponent predicted a one-in-11,765 chance per well that there would be a blowout of any volume over the exploration period. For the shallower water site, a one-in-3125 chance over the same time period was predicted, with the difference in probability attributed to water depth."

Beyond citing "national and international records", it is not clear how the proponent arrived at this blowout probability calculation. For comparison, in the Bay du Nord EIS, the proponent cited a blowout probability of 2.8×10^{-4} per well for development drilling, which is roughly three times higher than the figure given by Chevron. Moreover, of all the phases of offshore operations, exploration drilling typically entails the highest risk of blowout.[32]

Exploration drilling will be taking place at water depths of 400 to 2,200 metres (deep water drilling). A Scandower report based on SINTEF data concludes that the blowout risk of "normal" wells in deep water is actually 3.1×10^{-4} and, if the West Flemish Pass project entails drilling 'high pressure, high temperature' (HPHT) wells, the blowout frequency is 1.9×10^{-3} according to SINTEF, an order of magnitude higher than the estimate provided by the proponent.[33] It is not clear whether the proponent will require HPHT wells. The severity of the kick (which precedes a blowout scenario) will depend on the porosity and the permeability of the formation. If HPHT drilling wells are required, the blowout risk will be much higher than stated in the EA.

In any case, 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[34]

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, as stated in the EA, that the likelihood of a blowout is very small, the *consequences* of such an event would be more devastating in the Atlantic offshore than elsewhere, due to the difficulty of

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[32] Officer of the Watch. August 6, 2013. *The Probability of an Offshore Accident.* *https://officerofthewatch.com/2013/08/06/the-probability-of-an-offshore-accident/*

[33] Ibid.

[34] 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

ensuring adequate oil spill response in remote offshore locations (roughly 375 km from shore) under sometimes extreme weather conditions, exceptionally cold water and potential sea ice.

On page 51 of the EA, the Agency acknowledges that the potential effects from a worst-case accident would be “more severe” than what the proponent has claimed in its EIS, but the IAAC errs in not considering how the adverse consequences of a major spill would fundamentally change the overall risk assessment of the project. Utilizing a standard risk matrix, we can estimate that, although the probability of a major spill would be low, the magnitude of such an event make the overall risk level medium to high.

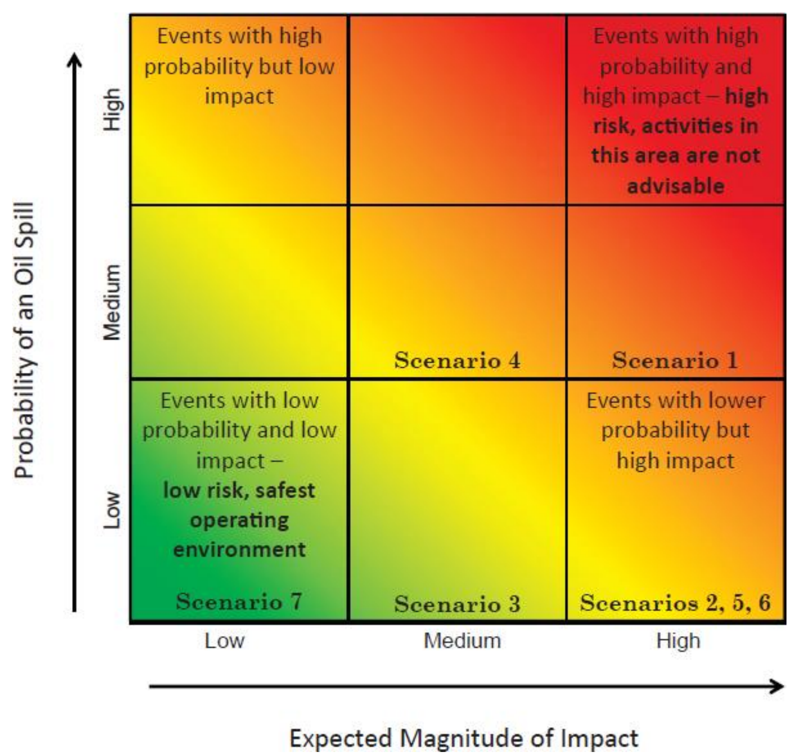

Figure 1: Oil spill risk matrix with low-probability/low-impact events in the lower left corner (low risk) and high-probability/high-impact events in the upper right corner (high risk).

History of blowouts and major accidents

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. It is worth noting here that some of the conditions that can increase the risk of a well blowout are present in the West Flemish Pass project such as deep water, extreme weather and the need for some exploration and development drilling. For instance, the 2018 Husky Sea Rose FPSO accident off the coast of Newfoundland and Labrador, the largest spill in the province’s history, was the result of a severe storm (not uncommon in the North Atlantic) and poor judgement by the operator to resume operations by attempting to reconnect a flowline in high sea state conditions – storm conditions deemed unsafe to deploy on-water response to the spill.

Offshore, deep water drilling can be risky given the possibility for extremely serious consequences in the event of an accident. There have been many other offshore rig accidents and blowouts over the past 40 years, including two events rated as extremely large (greater than 150,000 barrels): Gulf of Mexico in 1979 (3 million barrels) and Deepwater Horizon in 2010 (4 million barrels). Although not all accidents have resulted in significant oil spills, some accidents involved considerable loss of life and/or environmental damage, and each had the *potential* to become major oil spill events. These include the following:

- The Ocean Ranger oil drilling rig disaster which occurred in the North Atlantic off the coast of Newfoundland in February 1982 is one of the deadliest offshore oil rig accidents in history. The offshore oil drill rig capsized and sank killing all 84 crew members onboard. The semi-submersible mobile offshore drilling rig owned by Ocean Drilling and Exploration Company (ODECO) was hired by Mobil Oil of Canada for drilling exploration at the Hibernia field at the time of accident. The rig capsized due to a very strong storm which produced 190km/h winds and up to 65ft (20m) high waves.
- The Piper Alpha rig explosion in 1988 was the deadliest offshore oil rig accident in history, resulting in the deaths of 167 workers. It was also the largest insured human-caused catastrophe in history up until that time. A huge amount of oil and gas would likely have been spilled into the North Sea had it not burned off in the explosion.
- In March 1989, the Exxon Valdez oil tanker struck a reef, tearing open the hull and releasing 4.2 million liters of oil into Prince William Sound in Alaska. Clean-up response efforts were insufficient to contain much of the spill, and a storm blew in soon after, spreading the oil widely. Challenging environmental conditions meant that only 15 to 25 per cent of oil was recovered by mechanical means and, in a study published in Scientific Reports in 2015, researchers found that the spill was even more ecologically catastrophic than originally predicted as even very low levels of oil contamination can disrupt normal ecosystem development.[35] Oil also degrades much more slowly in cold water because low temperatures change the chemical properties of spilled oil making it more viscous and thereby inhibiting the efficiency of oil-eating microbes, which are more effective when oil is broken up into small droplets.[36] Eventually, more than 1,000 miles of coastline were fouled, and hundreds of thousands of animals perished. Many Alaskan beaches remain polluted to this day with crude oil buried just inches below the surface.
- The Alexander L. Kielland was a semi-submersible platform accommodating the workers of the bridge-linked Edda oil rig in the Ekofisk field, about 235 miles east of Dundee, Scotland, in the Norwegian continental Shelf. The Platform, operated by Phillips Petroleum, capsized in March 1980, killing 123 people. The platform capsized after the failure of one of the bracings attached to one leg of the five-legged platform structure, after strong winds created waves of up to 12m high on the day of the accident, conditions that are not uncommon in regions such as Baffin Bay and Davis Strait. An official investigation concluded that the root cause of the accident was an undetected fatigue crack in the weld of an instrument connection on the bracing.

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[35] Incardona, John P. et al. 2015. Very low embryonic crude oil exposures cause lasting cardiac defects in salmon and herring. *Scientific Reports* volume5, Article number: 13499 (2015) https://www.nature.com/articles/srep13499

[36] Aarhus University. February 21, 2018. Oil-eating microbes are challenged in the Arctic. *Phys.org.* https://phys.org/news/2018-02-oil-eating-microbes-arctic.html

- The Seacrest Drillship disaster in the South China Sea 430 km south of Bangkok, Thailand, killed 91 crew on November 3, 1989. The drillship was capsized by the Typhoon Gay which produced 40ft high waves on the day of the accident.
- The Glomar Java Sea Drillship disaster, which took place in October 1983 in the South China Sea, caused the death of 81 people when the drillship capsized and sank at depth of 317 feet about 63 nautical miles south-west of Hainan Island, China, 80 nautical miles east of Vietnam. Operations ceased prior to the arrival of tropical storm Lex as it approached from the east of the drilling site. Global Marine's office in Houston, Texas, reported that the drillship was experiencing 75kt (138.9km/h) winds over the bow, but the contact was abruptly lost.
- The Enchova Central Platform disaster in the Campos Basin near Rio de Janeiro, Brazil, killed 42 people in August 1984. The accident occurred due to a blowout which caused a fire and explosion at the central platform of the Enchova field operated by Petrobras. Another disaster struck the Enchova platform in April 1988 as one of its 21 wells blew out and eventually ignited. The well suffered a blow out while undergoing a work-over to convert it from oil production to gas production. The fire caused by the blowout on the platform led to massive damage topside, and the platform remained on fire for a month. Petrobras eventually had to drill two relief wells to control the blowout.
- The Mumbai High North disaster in July 2005 in the Arabian Sea, around 160km west of the Mumbai coast, killed 22 people. Mumbai High North, one of the producing platforms of the Mumbai High Field, owned and operated by India's state-owned Oil and Natural Gas Corporation (ONGC), caught fire after a collision with the multipurpose support vessel (MSV) Samudra Suraksha.
- The Usumacinta Jack-up disaster, which occurred in October 2007 in the Gulf of Mexico, claimed 22 lives after a collision with the PEMEX-operated Kab-101 platform in the Bay of Campeche. A storm with winds of 130 km/h and up to 8m waves created an oscillating movement, which eventually caused its cantilever deck to hit the production valve tree on the Kab-101 platform. The collision resulted in oil and gas leakage leading to the closure of the safety valves of two production wells at the platform. 21 people were declared to have died during the evacuation and one worker missing in the rescue operation was presumed dead. Approximately 5,000 barrels of oil was reported to have lost from the well without being recovered.

What connects all these major accidents is human error and the inherently unpredictable nature of offshore oil drilling, both of which can never be completely ruled out. Equipment malfunctions, extreme weather, deep water and mistakes are unavoidable risk factors that can be minimized to some extent but will always be present in offshore operations.

Although the amount of oil spilled annually in the world's oceans has trended downward in recent years, even as production has increased, the SINTEF Offshore Blowout Database includes 573 offshore blowouts/well releases that have occurred worldwide since 1955, suggesting that such incidents are not uncommon.[37] There is no clear trend regarding the frequency of well blowouts and amount of oil spilled from blowouts. However, oil exploration and extraction activities are moving into ever-deeper waters under higher pressure, in stormier and icier seas, in more remote

[37] SINTEF Offshore Blowout Database. https://www.sintef.no/en/projects/sintef-offshore-blowout-database/

area, all of which increases potential risks as deep-water blowouts are much harder to cap, tend to last longer and result in the release of larger quantities of oil.[38]

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. The West Flemish Pass project will be drilling in 1,000 – 1,200 meters of water — just slightly less than the depth of the Deepwater Horizon accident.

As noted, in terms of the probability of a well blowout or large oil spill (the likelihood of which is deemed "extremely low" by the EA), the estimate given in the proponent's EIS and in the EA is not accurate in our view and, crucially, it does not consider how the risk calculus changes when the consequences of a major spill are extremely serious and the prospects for mounting an effective spill response 375 km offshore in severe weather conditions are uncertain.

VIII. Spill Prevention and Response

Prevention and Containment

In November 2018, the Husky Sea Rose drilling platform off the coast of Newfoundland 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 of sea birds, possibly over 100,000, may have been killed as a result of the Sea Rose spill.[39] This was the second serious incident by Husky Energy's SeaRose FPSO in the last few years. In May 2017, a huge iceberg came within 180 metres of the same vessel, so close that the crew were told to "brace for impact," yet oil production was not halted.[40] Another 136,000 litres of untreated synthetic-based muds were accidentally released offshore Nova Scotia in 2018.

That two 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. We note in the EA that over the course of the West Flemish Pass project, a batch spill is virtually certain to occur if 8 wells are drilled. The proponent predicted there would be a "one-in-five chance of a spill occurring if a single well were drilled, meaning that it would be likely to occur if five or more wells are drilled."

Unfortunately, we are not convinced that the measures required by the IAAC in the EA to mitigate against the possibility of batch spills will be sufficient with the proponent only required to have "appropriate measures in place" and to develop "thresholds for cessation of a work or activity,

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[38] Jernelov, A. July 2010. The Threats from Oil Spills: Now, Then and in the Future. *Ambio*. 39(5-6): 353-366. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3357709/

[39] 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

[40] https://www.cbc.ca/news/canada/newfoundland-labrador/husky-energy-searose-production-federal-court-application-1.4658934

with respect to meteorological and oceanographic conditions experienced at the (project) location…which reflect the facility's design limits." These are fairly typical safety precautions in the offshore and it is not evident that these measures would have prevented the SeaRose incident in 2018 in which Husky re-started operations during an extremely violent storm.

Accident prevention is the most effective means of mitigating environmental damages. The proponent states in its EIS that a number of measures will be put in place to maintain well control, including the installation of a blowout preventer, fluids, steel casing and monitoring procedures. The EA reiterates this point by stating that "The proponent would have primary barriers to maintain well control and prevent kicks (e.g., continuous monitoring, managing and controlling drilling and formation fluid density, pressure and circulation) and secondary barriers (e.g., blowout preventer system) to regain well control." These are all standard control measures that are found on virtually every offshore drilling rig and the proponent's contingency plans for the West Flemish Pass project (beyond standard accident prevention measures) have not yet been developed. **In our view, IAAC must insist that the proponent provides detailed and adequate accident prevention measures before the exploration drilling program is approved.**

According to the EA, the proponent will not be required to keep any subsea containment resources (capping stacks, domes or relief drilling rigs) on or near the project site during drilling operations. There will be no containment devices kept on standby in St. John's or even anywhere on the Atlantic seaboard for that matter. Instead, in the event of a subsea well blowout, the IAAC is allowing the capping stack to come from Norway, which would take an estimated 27-30 days.

An uncontrolled well blowout for up to a month, 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 be onsite within 24 hours of a well blowout.[41]

The IAAC should similarly require the proponent 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. Instead, the project conditions require only that "The Proponent shall develop and implement procedures to maintain up-to-date information on the availability of capping stack(s), vessels capable of deploying the capping stack(s), and drilling rigs capable of drilling a relief well at the Designated Project site prior to and during the drilling of each well….In the event of an uncontrolled subsea release from the well, the Proponent shall begin the immediate mobilization of subsea containment and capping equipment to the site of the uncontrolled subsea release. Simultaneously, the Proponent shall commence mobilization of a drilling installation to the site to drill a relief well."

A capping stack is typically about 6 X 6 X 7 metres in size and weighs roughly 100 metric tonnes (see photo).[42] It is difficult to believe that there is no location in or near the port of St. John's that is capable of storing and maintaining a device of this size. Further, capping stacks are usually broken up into multiple pieces for ease of storage and transportation.[43]

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

[42] https://www.oilspillresponse.com/swis-appreciation-site/cappingsirt-process/readiness/capping-stack-system-css-storage/#:~:text=The%20Capping%20Stack%20dimensions%20are,(for%20the%2010k%20PSI).

[43] https://www.oilspillresponse.com/swis-appreciation-site/cappingsirt-process/readiness/capping-stack-system-css-storage/

We acknowledge that a capping stack would not be utilized immediately following a blowout because other emergency containment options are deployed first and the site would have to be cleared for capping stack installation. However, it is disingenuous to assert that up to 17 days would be required for site preparation.

Figure 2: Typical capping stack device

Every additional day required to cap a blowout corresponds with potentially hundreds of thousands of litres of oil being released into the marine environment. Chevron may not want to keep a capping device in Newfoundland due to the additional cost involved but this should not be a concern of the IAAC. Safety, environmental protection and the precautionary principle should be paramount in minimizing the risk to the marine environment and human health. **Keeping a capping device in St. John's is almost certain to significantly reduce the overall installation response time in the event of well blowout. At a minimum, the IAAC must assess what would be required to do so.**

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. The only guaranteed method to stop a blowout is to drill a relief well but, again, the EA indicates that the proponent will not be keeping a relief drilling rig on site or even nearby. Instead, the proponent estimated it could take up to 135 days to plug an out-of-control well, an unacceptably long period of time. **Therefore, in cases where capping stacks would likely not be effective (i.e. shallow or deep water), drilling should not be permitted.**

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.[45]

The EA cites several standard spill response tactics including mechanical containment, natural degradation, chemical dispersion and in situ burning. All of these have drawbacks and limited effectiveness depending on the environmental conditions at the time. In the event of a major spill,

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[44] https://www.workboat.com/news/offshore/deepwater-horizon-blowout-preventer-failed-due-to-unrecognized-pipe-buckling-report-says/#:~:text=The%20blowout%20preventer%20(BOP)%20that,the%20offshore%20drilling%20industry%20remains

[45] 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.

it is likely that much of the oil would never be recovered given the remote location of the West Flemish Pass project area and the probability of adverse weather conditions.

Spill Response

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.

Research amassed to date through various studies suggest that oil behaves differently in icy, freezing water than in the warmer waters. Furthermore, the combination of natural variability and climate-forced changes in the northern marine system make it particularly challenging to predict the ice conditions from one year to the next. Sea ice adds a new dimension to the movement of oil, and therefore, understanding how far oil spilled on sea ice-infested waters will spread is of particular importance.[46] Oil spilled in these conditions will generally gather on the surface among the floes, but wind and current can move the floes together squeezing the oil between them, or drift apart allowing the oil to spread out over a larger area of the sea surface.

The EA 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.[47] 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

[46] Wilkinson, J. et al. 2017. Oil spill response capabilities and technologies for ice-covered Arctic marine waters: A review of recent developments and established practices. *Ambio* 46 (Supp 3): S423-S441.

[47] 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 Deep-Sea 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

blowouts is highly questionable and more research is required to inform response plans in future oil spills.[48]

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 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.

Finally, it is important to keep in mind that mechanical recovery methods such as oil controlling booms start to lose their effectiveness in meter-high waves (not uncommon in the West Flemish Pass project area) and stop working entirely when the waves reach two meters high.[49]

IX. Marine Environmental Impacts

WWF-Canada is disappointed that many of the conditions for reducing impacts on the marine environment appear to be business as usual mitigations, especially for seismic sound and sensitive areas, despite recently released Canadian Science Advisory Secretariat reports that identify enhanced mitigation measures.

We note that page 39 of the EA states there is overlap of critical habitat with the exploration licenses for this project. We do want to highlight, however, that critical habitat designations stop at the boundaries of Canada's Exclusive Economic Zone (EEZ), as can be seen with Northern and Spotted Wolffish mentioned in the EA.[50] Legally, Canada cannot designate critical habitat outside of its EEZ, so it is neither appropriate nor accurate to characterize any lack of critical habitat in this way in the EA. Important habitat for these species may exist outside the EEZ, and though it cannot legally be designated as critical habitat, IAAC should be working with other members of the federal family to identify mitigations to protect endangered species in areas where Canada will be approving industrial activity, in order to minimize industrial pressures on wildlife. IAAC should also work with international bodies with relevant competencies to provide scientific advice when approving projects outside of its EEZ consistent with the approach being developed for a new internationally legally binding instrument under the United Nations Convention on the Law of the Sea (UNLOS) on the Conservation and Sustainable Use of Biodiversity of Areas Beyond National Jurisdiction.

Protected and Sensitive Areas

The ecological importance of deep-sea coral and sponge assemblages is well established, in addition to their known sensitivity to disturbance. As such, mitigation measures, in particular avoidance by activities that could come in contact with the seafloor, need to be put in place in order to protect these fragile habitats. Canada also has obligations to protect its oceans as a

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[48] 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.

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

[50] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery/wolffish-northern-spotted-atlantic-strategy-management-plan.html#toc35

signatory to the Convention on Biological Diversity (CBD), and through recent commitments by Prime Minister Trudeau to protect 25 per cent of its ocean by 2025, and 30 per cent by 2030.[51]

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.[52] 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 West Flemish Pass project 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 for areas with defined benthic conservation objectives 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 m from seafloor infrastructure with no expected discharges, and 2 km from any discharge points and/or surface (i.e. floating) infrastructure. It also suggested setback distances of 50 m from corals and other sensitive benthic species and habitats for associated pipelines.

Another recently released report "Review of the Impact Assessment Agency's Draft Regional Assessment of Offshore Oil and Gas exploratory Drilling East of Newfoundland and Labrador" noted that special areas such as significant benthic areas and vulnerable marine ecosystems have been identified in the Regional Assessment Area which has overlap with the West Flemish Pass project area.[53] These special areas, especially those with defined benthic conservation objectives, are highly sensitive to human impact and require additional special mitigations and be managed with a higher level of risk aversion.

While the West Flemish Pass exploration licenses do not overlap with any marine refuges within Canada's EEZ or Northwest Atlantic Fisheries Organization Fisheries Closures outside Canada's

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

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

[53] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2020/2020_033-eng.pdf

EEZ, habitat-forming aggregations of corals and sponges can still exist outside these protected areas. The proponent has noted that research vessel surveys in the project area have indicated the presence of large gorgonian coral, small gorgonian coral, sea pens and sponges. As such, the proponent needs to exercise a heightened level of caution so as to not impact these important and fragile benthic habitats. Page 17 of the EA outlines requirements by the proponent to conduct benthic surveys prior to drilling to determine if habitat-forming corals and sponges or other environmentally sensitive features are present, and if found, that wells and anchors should be moved and well cuttings redirected unless not technically feasible. **WWF-Canada attests that if aggregations of corals and sponges are found during pre-drilling visual surveys, the only course of action is to relocate wells and anchors, as there is no way to offset damages to these unique habitats.**

Seismic Testing

First, WWF-Canada would first like to note that the IAAC has mischaracterized our comments on geophysical surveys in the 'Views Expressed' section of the draft EA (page 22).

> "The World Wildlife Fund – Canada expressed its concern regarding the effectiveness of mitigation measures to reduce the impacts of noise on marine mammals. In particular, it noted that visual observation of marine mammals can be very difficult and often ineffective, and that Marine Mammal Observers are often not sufficiently trained, nor sufficiently rested, nor are they necessarily listened to when they indicate a marine mammal sighting. The World Wildlife Fund – Canada also questioned the effectiveness of VSP sound source ramp up and recommended that the proponent use the most up to date advice on how to mitigate noise impacts on marine species using the recently released *Canadian Science Advisory Secretariat Science Advisory Report "Review of the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* (DFO, 2020a)."

Our point is not primarily that the proponent should use the "most up to date advice"; it is that the proponent should not be using seismic air guns at all given the fact that research is increasingly confirming the often severe and potentially lethal impacts of geophysical surveys and that there are known, safer alternatives (Marine Vibroseis). Moreover, our main point about Marine Mammals Observers (MMOs) is not that they are insufficiently trained or rested (although this is a factor), but that they often do not work. They can be entirely ineffective in spotting marine wildlife for reasons explained below. We believe that mitigation measures in the *Canadian Science Advisory Secretariat Science Advisory Report "Review of the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* are not consistent with the current state of science on the impacts of seismic blasting programs.

The EA indicates that offshore geophysical surveys may include two-, three-, or four-dimensional geophysical data acquisition (i.e. seismic testing surveys). The EA concedes the effects of sound on marine mammals but ultimately downplays the potentially significant impacts to marine wildlife of seismic blasting programs. Despite a mounting body of scientific evidence showing the sometime severe and fatal impacts of these surveys, the IAAC proposes insufficient mitigation measures to reduce the impacts of seismic testing to marine wildlife.

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 dB, which is almost inconceivably loud.[54] A loud indoor rock concert is roughly 120 db. The threshold at which humans can die from sound is reportedly 160 db.

The IAAC acknowledges that seismic air gun surveys may "potentially result in injury to marine mammals and sea turtles or affect the quality and use of their habitats" and "The Project could result in exceedances of thresholds for both auditory injury (as far as 250 metres from an operating MODU or 4.52 kilometres from the VSP sound source) and behavioural effects (as far as 32 kilometres from an operating MODU) in marine mammals." Ultimately, however, the IAAC concludes that, with standard mitigation measures, any impacts from the project, including seismic air gun surveys will be "low-magnitude, short-term and reversible."

To mitigate the effects of sound emissions from seismic activities, the proponent would have to follow the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*. The proponent will be required to conduct VSP surveys in accordance with or exceeding 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 cetacean 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),
- adopting a pre-ramp up watch of 60 minutes whenever survey activities are scheduled to occur and delaying ramp up if a marine mammal or sea turtle is observed within the safety zone;
- shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500-metre safety zone
- using marine mammal observers (MMO) for the purposes of mitigating the impacts of vessel strikes, VSP, and geophysical surveys.

The proponent's assertion of the "short-term", "reversible" and "low-magnitude" impacts of seismic testing programs on the marine environment is not consistent with the latest research. Moreover, the proposed mitigation measures have been shown to be limited in their effectiveness. For instance, the IAAC's claim that "auditory injury would require continuous exposure over a 24-hour period and marine mammals are not likely to remain in areas that could cause permanent auditory injury" is not supported by science.

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.[55] 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

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

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

unresponsive to disruption.[56,57] 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.[58]

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[59] 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. **WWF-Canada recommends that conditions for the project be updated to reflect these updated mitigations.**

When the National Energy Board (NEB) issued its Environmental Assessment Report for the Northeastern Canada Seismic Survey of Baffin Bay and Davis Strait, it acknowledged the sound produced by underwater air guns can lead to serious sensory and physical disturbances in birds, marine mammals and fish.[60] The NEB identified the potential for adverse effects to marine mammals, traditional harvesting of marine mammals and fish, and commercial fish harvesting as "the main concerns associated with this project". The Board has also acknowledged that the sound produced by underwater air guns can lead to serious sensory and physical disturbances in birds, marine mammals and fish.[61]

The claim that shutting down the blasting should any mammals be detected within 500 meters of the air gun is sufficient to safeguard marine life is not supported by the scientific evidence. It should be noted that this '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 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.[62]

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.[63] Most whales are rarely visible at the surface, especially the deep divers (Northern bottlenose whales)

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[56] 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

[57] 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

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

[59] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2020/2020_005-eng.pdf

[60] https://www.neb-one.gc.ca/nrth/dscvr/2011tgs/nvssssmnt/nvssssmnt-eng.html

[61] https://www.neb-one.gc.ca/nrth/dscvr/2011tgs/nvssssmnt/nvssssmnt-eng.html

[62] Gordon, J. et al. 2003. A Review of the Effects of Seismic Surveys on Marine Mammals. *Marine Technology Society Journal.* 37(4): 16-34

[63] 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.

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.[64] Other species might be slightly easier to sight, but monitoring cannot be relied upon to be satisfactorily effective.

Underwater noise from vessel traffic can readily propagate over 100 kilometers 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.[65] 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 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.[66] While more research is needed, we know enough from studies so far, especially those involving seismic airgun 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."[67] 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.

There are known, safer alternatives to seismic testing such as Marine Vibroseis (MV), which the IAAC should be encouraging or requiring whenever possible.[68] 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.[69] 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.

[64] 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.
[65] 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.
[66] Weilgart, 2018.
[67] 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
[68] Weilgart, L. 2016. Alternative Quieting Technology to Seismic Airguns for Oil and Gas Exploration and Geophysical Research. Brief for GSDR – 2016 Update.
[69] Ibid.

MV is much quieter, both near the source and at distance.[70] 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.[71] 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.

Ramp-ups or soft starts, where the number of air guns firing are gradually and audibly increased, do not appear to be consistently and reliably effective in causing humpback whales to move away from the source vessel.[72] 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.[73] 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.[74] 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.

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 IAAC 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).

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)
- 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,[75] and we do not yet have sufficient information on the abundance and distribution of

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[70] 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.277-288.
[71] 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.
[72] 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.
[73] Ibid.
[74] 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.
[75] Gordon et al. 2003.

some north Atlantic marine wildlife.[76] **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, 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.

WWF-Canada urges the IAAC to implement the recommendations we have outlined herein to ensure that the climate, biodiversity and conservation impacts of the West Flemish Pass project as a whole are adequately and fully considered.

Thank you again for the opportunity to submit comments on the West Flemish Pass Exploration Drilling Project Draft Environmental Assessment Report.

[76] Weilgart, 2019.