Comments on the DRAFT ENVIRONMENTAL ASSESSMENT REPORTS and POTENTIAL CONDITIONS UNDER THE *CANADIAN ENVIRONMENTAL ASSESSMENT ACT, 2012* for the BHP CANADA, CENTRAL RIDGE, and WEST FLEMIST PASS EXPLORATION DRILLING PROJECTS

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By the NunatuKavut Community Council
200 Kelland Drive, PO Box 460, Stn. C
Happy Valley-Goose Bay, NL A0P1C0
http://www.nunatukavut.ca

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I. INTRODUCTION

The NunatuKavut Community Council ("NCC") is pleased to present its comments on the Draft Environmental Assessment Reports ("Draft EA Reports") and the Potential Conditions under CEAA 2012 document ("Potential Conditions documents") prepared by the Impact Assessment Agency of Canada ("IAAC" or "Agency") for the BHP Canada, Central Ridge and West Flemish Pass Exploration Drilling Projects, proposed by BHP Canada, Equinor Canada Ltd. and Chevron Canada Limited, respectively.

NunatuKavut means "Our Ancient Land." It is the territory of the Inuit of NunatuKavut, the Inuit residing primarily in southern and central Labrador. Our people lived in Labrador long before Europeans set foot on North American soil. As it was in times of old, and still today, we are deeply connected to the land, sea and ice that make up NunatuKavut, our home. Today, our people continue to hunt and fish to harvest country food that is important for health and well-being and which connects us to our culture and traditions of the past. Atlantic salmon, thick-billed murres (known locally as "turrs") and eider ducks are among the species that we harvest for these purposes and that may potentially be affected by oil and gas drilling projects offshore Eastern Newfoundland, such as the BHP Orphan Basin Project. Additionally, NCC's communal commercial fisheries play an important role in the life and economy of NunatuKavut communities and are a leading source of employment for our people.

NCC serves as the representative governing body for the Inuit of south and central Labrador. A council elected by our membership and comprised of members representing each of the six regions of our territory and led by a President and Vice-President governs the NCC, whose primary function is to ensure the land, ice and water rights and titles of its people are recognized and respected. We are also fully present at the grassroots level in our communities, which are many and remote, the vast majority of which are located along Labrador's coast south of Hamilton Inlet. NCC provides a variety of services to NunatuKavut residents living in over 20 communities[1] in Labrador.

II. CONTEXT FOR NCC'S COMMENTS ON THE DRAFT EA REPORTS AND POTENTIAL CONDITIONS

As an Indigenous group, a key part of the context for our comments on natural resource projects relates to developments in our relationship with the Government of Canada. On September 4, 2019 the Government of Canada signed a *Memorandum of Understanding* (MOU) on self-determination with NCC, representing a significant step forward in our relationship with Canada on the recognition of our Inuit rights and self-determination. Through the MOU, NCC looks forward to finding shared and balanced solutions to a wide variety of issues – including impact assessments, regional assessments and strategic environmental assessments – that advance reconciliation in a way that respects the interests of the people of NunatuKavut and all Canadians. The MOU, which represents the culmination of formal talks that began in July 2018, further heightens our interest in Nation-to-Nation dealings with Canada in relation to Canada's impact assessment regime and the regional assessment of offshore oil and gas development.

As the traditional stewards and guardians of our territory of NunatuKavut, our people are in the best position to provide relevant knowledge, and to make decisions, monitor and enforce protections with respect to projects that may affect the natural resources on which we depend, and thus our rights in relation to those resources. NCC asserts its Indigenous and treaty rights to lands and resources within Labrador and also along the Labrador coast, including the rights to hunt, fish and gather. These facts have

[1] For the locations of these communities, please see https://nunatukavut.ca/about/our-communities/.

been referenced in the EIS documents for several exploration projects in NL offshore area.[2]

The NCC was highly engaged in the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador ("NL RA"). As such, and given the fact that the three projects that are the subject of the EA Reports are located within the NL RA Study Area, a number of our comments on the Project naturally connect to that larger context.

III. ORGANIZATION OF THESE COMMENTS

NCC has identified various issues in need of further detail, clarification or improvement in the three Draft EA Reports as well as the Potential Conditions documents for each project. Given the close similarities among the three Draft EA Reports and Potential Conditions documents, NCC has chosen to consolidate its comments relative to the three projects. Thus, except where indicated, the comments below represent NCC's feedback on all three exploration drilling projects: BHP Canada, Central Ridge and West Flemish Pass.

Key concerns sections. Our top-line concerns in relation to both the EA Reports and Potential Conditions documents are outlined in bullet-point form in the next two sections.

Specific comments sections. Following the two "Key Concerns" sections, NCC presents specific comments with more detail on the key concerns as well as other issues in tow sections, titled, "Comments on the Draft EA Reports" and "Comments on Potential Conditions". These specific comments sections mirror, as much as possible, the order of the topics in the Draft EA Reports and Potential Conditions documents.

IV. KEY CONCERNS RELATING TO THE DRAFT EA REPORTS

- **General concern:** Some of the sources relied upon in report are problematic and in NCC's view may have led to determinations about the absence of adverse effects that were not well-founded. A recent DFO CSAS report on the review of certain parts of the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador highlighted a number of problems with relying on the NL RA as a source, and also mentioned problems with relying on past EIS documents and EA Reports. Relying heavily on sources such as these creates risks of self-confirming bias and of drawing conclusions based on out-dated or sparse studies.

- **Fish and Fish Habitat.** Insufficient information and/or uncertainty about the potential environmental effects of the Project on the Labrador population of Atlantic salmon have led to a questionable determination on adverse impacts. The Draft EA Reports indicate the need for further research (and for proponents to support such research), but then proceed to determine that adverse impacts will be unlikely. Without adequate baseline information on migration, habitat and seasonal sensitivities of Atlantic salmon in the project areas and larger regional area, it becomes extremely difficult to measure the type and magnitude of impacts that the projects are having on Atlantic salmon. Thus, it is preferable to wait for new study results rather than rely on limited and/or outdated published research in order

[2] See e.g., BP, Newfoundland Orphan Basin Exploration Drilling Program, Environmental Impact Statement, September 2018, Chapter 3, Consultation and Engagement, https://iaac-aeic.gc.ca/050/documents/p80147/125905E.pdf, p. 3.6.

to make determinations about the adverse impacts of exploratory drilling on salmon. The most recent stock status update for Atlantic salmon,[3] for example, indicates concerning trends for the Labrador sub-population (as well as other sub-populations) and states that: "marine survival continues to be the major factor limiting the abundance of Atlantic Salmon in the NL Region."[4] Hence, a precautionary approach is essential when evaluation potential effects of oil and gas exploration drilling projects, particularly when environmental effects that can reach back to Indigenous communities, culture, well-being and fundamental rights. Also, the lack of proper baseline information renders the evaluation of effectiveness for mitigation measures nearly impossible, thus there can be no assurances that planned mitigation measures in relation to Atlantic salmon might work. It is hard to see how research findings that arise *after* decisions have been made to go ahead with exploration projects can serve as mitigation for effects of those projects if effects are already happening.

- **Migratory Birds.** Insufficient information is presented in the Draft EA Reports on the potential impacts to key species of migratory birds harvested by NunatuKavut members as important and culturally significant country foods such as Thick-billed murres and Common eiders. The absence of proper baseline data makes it very difficult to assess any effects of the projects on migratory birds if the projects go ahead, and likewise makes it difficult if not impossible to evaluate whether mitigation measures are effective. NCC understands that the Canadian Wildlife Service has been working on research looking at the density of thick-billed murres (and other migratory birds) in the NL RA Study Area, which encompasses the area of the three projects at issue here. Research cited by the NL RA Committee indicated that approximately one-third of Eastern Canada's population of thick-billed murres overwinter in the waters off Eastern Newfoundland.

- **Commercial Fisheries**. While certain impacts of routine operations on commercial fishing might be mitigated by some of the "Potential Conditions", NCC is concerned about the potential magnitude and seriousness of oil spills for reasons explained below in the section on "Effects of Accidents and Malfunctions". On the issue of Fisheries Liaison Officers, why does the Agency not presume a need for such officers, rather than recommend a "procedure for determining the need" for such officers? Also, insufficient attention is paid to potential effects of seismic testing on commercial fishing.

- **Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples.** NCC disagrees with the conclusion in the Draft EA Reports that it is unlikely that Indigenous peoples fishing or harvesting for food, social or ceremonial purposes would come in contact with any project components or realize any adverse impacts in their traditional territories from project operations This view ignores the links between different elements of the environment and NCC communities, particularly as it relates to Atlantic salmon. Again, insufficient research currently exists on the migratory movements and behavior of Atlantic salmon, including the Labrador sub-population, at various stages of its life cycle to justify this conclusion.

- **Effects of Accidents and Malfunctions.** NCC is concerned that the Draft EA Reports do not address the need for proponents to detect, monitor and mitigate methane releases below and above the water

[3] DFO. 2020. 2019 Stock Status Update for Atlantic Salmon in Newfoundland and Labrador. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/045, https://dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2020/2020_045-eng.pdf.
[4] Ibid. p. 5.

given that a substantial body of research exists to suggest that methane emissions from drilling rigs and platforms during routine operations is a serious concern. This is particularly pertinent considering Canada's new regulations for controlling methane emissions from offshore (as well as onshore) oil and gas installations.[5] NCC has included references on methane-related issues in an **Annex** to these comments. With respect to major oil spills, NCC is concerned that dispersant-treated oil and burn residue may potentially result in sedimentation that could cause risks to sensitive marine organisms in the marine refuge and ESBA areas. NCC is also concerned by the long response time for blowouts due to the 12-13 days needed to mobilize a capping stack from Norway and the period up to 120 days for relief drilling to be completed if that strategy is necessary. NCC is also concerned that the proponents have not studied potential impacts of deoxygenation in ocean waters following a blowout and the interaction of those impacts with increasingly warmer ocean temperatures due to climate change.

- **Effects of the Environment on the Project.** There is insufficient consideration of how climate change can impact the Project's effects on the environment. While the Draft EA Reports do discuss the fact that climate change could affect storms and conditions at sea (which could increase risks of accidents and spills) climate change can affect the Project and thus its impact in other ways as well. Climbing ocean temperatures, increases in ocean acidity and ocean deoxygenation can influence the effects of a discharge, spill, etc. or other impacts to living things via interaction and synergistic effects, and these are not considered in the analysis of effects of the environment on the projects in the Draft EA Reports.

- **Cumulative Environmental Effects.** The Agency's strong reliance on the NL Regional Assessment findings for its information and determinations on the potential cumulative impacts of each of the three projects has led to inaccurate and insufficient determinations in the Draft EA Reports. Among other problems, the NL RA's analysis of cumulative effects largely ignores the interaction between oil and gas exploration and the impact of climate change on already stressed salmon populations. Also, the NL RA's work on cumulative effects relies heavily on a flawed predictive analysis that appears to undercount the number of wells planned for the NL RA Study Area, which includes within it the project areas for the BHP Canada, Central Ridge and West Flemish Pass.

- **Potential Adverse Impacts of the Project on Potential or Established Aboriginal or Treaty Rights.** The Agency's determination of "low/negligible impact" of routine project operations on the potential or established Aboriginal or treaty rights of Indigenous groups who harvest salmon under FSC licences is premature and not well-founded because it relies heavily on the conclusions the Agency has drawn about the migratory movements and behavior of salmon that the Agency itself has said are uncertain and in need of further study. Concerning potential effects from a major oil spill, the Agency's acknowledgement that there "could be more serious effects" and "therefore potential impacts on the potential or established Aboriginal or treaty rights of Indigenous groups", is premature and not well-founded because it does not factor in 1) the stressed state of key salmon sub-populations, including the Labrador sub-population, shown in the most recent stock assessment, nor 2) the fact that if smolt from the Labrador sub-population were passing through the area of the projects (especially the BHP Canada Orphan Basin project and West Flemish Pass project) at the time of a spill, the impacts would

[5] *Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector*, SOR/2018-66, https://laws-lois.justice.gc.ca/PDF/SOR-2018-66.pdf. The regulations, which came into effect January 1, 2020, apply to both onshore and offshore oil and gas facilities that extract, process and/or transport hydrocarbon gas. Part 2 of the regulations cover offshore facilities.

likely be catastrophic, with likely serious adverse impacts to Aboriginal or Treaty rights connected to FSC salmon harvest by NunatuKavut communities.

V. KEY CONCERNS RELATING TO THE POTENTIAL CONDITIONS

- **Condition 2.4.2** Time period for Indigenous groups to prepare views should be increased to a minimum of 30 days. As presently written, this condition provides Indigenous groups who are consulted on a matter as the result of a requirement in one of the Potential Conditions a minimum of **15 days** to prepare their views and information. NCC strongly believes that the period should be increased to at least 30 days. Difficulties arise when Indigenous groups are given insufficient time to study a file and prepare their views, and a **30-day** response time is the minimum reasonable time period in this context.

- **Conditions 2.6.1, 2.6.3 and 3.13 (BHP Canada), 3.12 (Central Ridge and West Flemish Pass)** Proponents should be required to provide up-to-date, complete baseline information for all valued components. NCC is very concerned that, as currently written, these conditions, which are concerned with verifying the accuracy of predictions about environmental effects and determining the effectiveness of measures to mitigate those effects presume that the proponent has sufficient and up-to-date baseline data against which effects of the project may be compared. NCC's review of the EIS documents for all three projects did not reveal the existence of sufficient and up-to-date baseline data for all valued components (e.g., the EIS for each project indicate that no fieldwork was undertaken for purposes of preparing the EIS reports). Much of the information on the "existing biological environment" for valued components, such as Atlantic salmon, is based on the results of studies published more than 10 years ago. In light of these shortcomings, NCC recommends that the Agency revise this condition to require that proponents provide complete, accurate and up-to-date baseline information. Only good quality baseline information can provide a useful standard against which to measure actual environmental effects at specific sites.

- **Condition 2.14** Indigenous groups should be notified in writing about changes to Designated Project and potential new adverse effects. As currently written, this condition requires notification only to the C-NLOPB and the Agency. NCC strongly recommends that Indigenous groups be notified as well.

- **Conditions 3.14.2 (BHP Canada), 3.13.2 (Central Ridge and West Flemish Pass) and 4.5.2 (all three**) Updating Indigenous groups on research program progress in relation to Atlantic salmon and migratory birds is important and appreciated, but annual updates are insufficient. In light of the high-level of importance ascribed to salmon and migratory birds by NCC and other Indigenous groups, it is preferable that NCC be updated as soon as practicable after new findings become available. Furthermore, what is of interest to NCC is the substantive results of any new research findings on salmon and migratory birds -- not how, or to what extent, the Proponent "contributed to" them (referring to the that term in the condition).

- **Condition 5.2** Indigenous group engagement on well and wellhead abandonment is appreciated but **30-day** minimum period for Indigenous group input is insufficient. NCC recommends raising the minimum period to **60 days**. It is also strongly suggested that this condition be modified to require that the plan include monitoring for methane leaks at the abandoned well or wellhead. Methane leaks at abandoned wells are not infrequent, according to academic research, and thus methane monitoring is

essential even where companies "take care" to avoid the risk of leaks.

- **Condition 6.7** Indigenous group comment on spill response plans is appreciated but requires funding. While NCC appreciates the condition requiring Proponents to prepare a Spill Response Plan and provide a draft to Indigenous groups for comment, it is must be noted that funding of Indigenous group participation is necessary in order to render this condition effective and meaningful.

- **New condition strongly recommended on methane monitoring and mitigation.** Adding a condition requiring proponents of the three projects to undertake and report on actions to prevent, detect, monitor and mitigate methane is consistent with Canada's heightened interest in controlling methane emissions in the oil and gas industry. As Canada confronts the climate crisis, adding requirements such as these should be viewed as a serious responsibility for the Agency in relation to this and all offshore oil and gas projects.

VI. SPECIFIC COMMENTS ON THE DRAFT EA REPORTS

Problems with sources relied upon

With respect, NCC finds that certain findings and conclusions in the EA Reports are not solidly determined or well-founded and this is largely due to the fact that some of the information sources relied upon by the Agency are flawed in various ways (e.g., incomplete, outdated or inaccurate). In particular, NCC is concerned with the Agency's reliance on the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador and associated GIS Decision-Support Tool and previous EA reports and EIS documents from other projects.[6]

With respect to the NL RA, reliance on the information in the GIS and in the Committee's final report is problematic due to the quality of the information gathered as well as the use of the information in the Committee's analysis regional impacts of oil and gas drilling projects in the NL RA Study Area. While NCC found quality issues during its review of the Committee's Draft Report, as well as literature reviews compiled by the Committee for certain GIS modules, the Canadian Science Advisory Secretariat (CSAS) at DFO also identified some very serious issues in its September 2020 review of select NL RA Modules. The CSAS report states:

> DFO Science was asked to verify the accuracy and completeness of the draft RA modules that were submitted for review, with a focus on the regional scale of the RA Study Area. The review determined that there were multiple mischaracterizations and/or omissions of available research from the referenced literature. Reported baseline information was incomplete and outdated for most sections of the draft modules reviewed. **This adversely impacts the reliability and credibility of the draft modules reviewed to a significant extent, and, as a consequence, could affect the appropriateness of the conclusions and/or recommendations in the RA. In its current form, and until the problems identified in this report are addressed, these RA modules are not considered reliable sources of information for decision-making processes from a scientific perspective.**[7] (*Bold type in original text*)

[6] In the Draft EA Reports, the Agency refers to the NL RA and previous EA reports as some of the sources upon which it relies for purposes of the environmental assessment of the projects. See e.g., Draft EA Report, BHP Canada, p.p. 2-3.

[7] *Canadian Science Advisory Secretariat Newfoundland and Labrador Region Science Response* 2020/033 (September 2020), pp. 3-4, https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2020/2020_033-eng.pdf.

Another reason that relying on the information in the NL RA as a source for the EA Reports is that it can lead to circular, self-confirming analyses that are of questionable quality because the NL RA relied substantially on findings from previous EA reports. The practice of placing too much reliance on information and analyses in previous EA reports is questionable because it tends to presume that the information in previous EA reports – and the EIS information they analyze – is correct and up to date. This is not ideal practice, since updated information from more recent research studies can obviously reveal findings that may differ and reflect greater sophistication or precision than previous findings. The Canadian Science Advisory Secretariat highlighted problems with relying upon previous EAs and EIS documents as sources in its review of NL RA modules:

> The RA uses several Environmental Assessments and Environment Impact Statements as sources which should not be used as supporting material due to reasons outlined in the CSAS scientific peer review process. It should be noted that many of these EIS's have been peer-reviewed under Canadian Science Advisory Secretariat (CSAS) processes which concluded that they were poor sources for decision-making purposes (e.g., Draft Eastern Newfoundland SEA Report - DFO 2014).[8]

Relying on the analysis in the NL RA is even less well-advised given that it did not involve a thorough assessment and evaluation of the risks associated with exploratory drilling. The NL RA specifically indicated that "Assigning risk was beyond the timing and resources of the Committee."[9]

In sum, NCC finds that on certain topics, such as potential impacts on Atlantic salmon and migratory birds, the Agency has arrived at conclusions of no significant adverse impacts on the basis of information that does not justify such conclusions due to reliance on information in the project Environmental Impact Statements and other documents that is incomplete, inconclusive and out of date. Determinations on the extent and nature of the impacts of exploratory offshore drilling projects are premature, at best, and inaccurate, at worst, when all the relevant facts are not yet gathered. Specific points on this critique, as well as other issues of importance to the environmental assessment of the three projects are presented below according to the valued component category referred to in the Draft EA Reports.

Fish and Fish Habitat (primarily concerning Atlantic salmon)

The NCC holds a Food Social and ceremonial (FSC) licence on the Southern Coast of Labrador from Fish Cove Point to Cape Charles for salmon, trout, Arctic char, Atlantic cod, rock cod, herring, scallop, whelk, smelt and seal. The NCC also holds a FSC on parts of the tidal waters of Upper Lake Melville, for salmon, trout and Arctic char. The Draft EA Reports make a number of references to the importance of Atlantic salmon to Indigenous groups, and recognize that impacts on access to the salmon resource can mean impacts on potential or established Aboriginal or treaty rights. While acknowledgement of the importance of salmon to Indigenous peoples and their rights is encouraging, there are serious issues with respect to Atlantic salmon that are not fully addressed, or addressed at all, in the report. As a result, the Agency's conclusions about potential adverse impacts on salmon does not seem well-founded.

First and foremost is the issue of data and information gaps and how they are treated in the Draft EA Reports, particularly as concerns determinations of environmental effects. To its credit, the Agency acknowledges uncertainties and information gaps with respect to Atlantic salmon migration, overwintering

[8] *Canadian Science Advisory Secretariat Newfoundland and Labrador Region Science Response* 2020/033 (September 2020), p. 9, https://www.dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2020/2020_033-eng.pdf.

[9] NL RA Draft Report, p. 117.

areas and presence in the Project area. For example, the Draft EA Report for the BHP Canada project states: "The Agency notes that DFO reviewed available information and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of Atlantic Salmon.[10]

Similarly, NL RA Committee acknowledged this uncertainty, stating: "while there is some information available on the spatial and temporal distribution of Atlantic salmon at sea, the resolution of this information is low and much of the information currently available is quite dated."[11] The Committee also stated: "Atlantic salmon are of great important to Indigenous groups and that there is a current lack of completed and up-to-date knowledge about their presence, distribution and timing in the marine environment of the Study Area."[12]

While uncertainty obviously exists, some existing information about salmon migration patterns points to the fact that young salmon leaving natal rivers on the coast of southern Labrador often follow the flow of currents heading south, en route to feeding and overwintering grounds. In so doing, they pass rather directly through offshore development areas in the Orphan Basin and West Flemish Pass, as shown in **Figure 1**, below. Information on smolt movements are referred to in the BHP Canada EIS and West Flemish EIS, along with a map, reproduced on the right side of Figure 1.

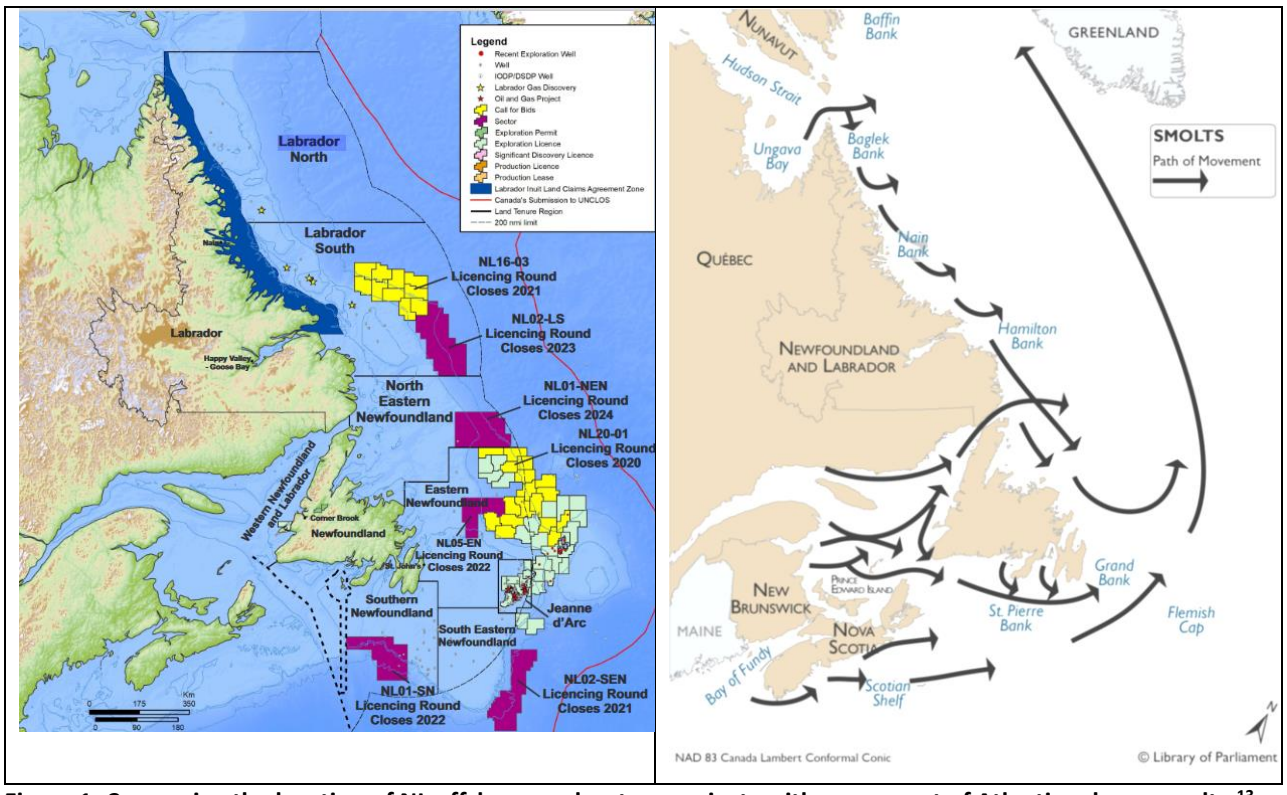

Figure 1: Comparing the location of NL offshore exploratory projects with movement of Atlantic salmon smolts.[13]

[10] Draft EA Report, BHP Canada, p. 16.

[11] Regional Assessment Committee for the Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador, *Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of NL - Final Report*, February 2020, p. 84, https://iaac-aeic.gc.ca/050/documents/p80156/134068E.pdf.

[12] RA Committee, DRAFT, Preliminary Recommendations, p. 2.

[13] The map on the left in Figure 1 is from https://www.gov.nl.ca/iet/files/publications-energy-callsforbids.pdf, and the map on the right appears in the EIS documents of the West Flemish Pass and BHP Canada projects. For West Flemish Pass, see Chevron Canada

As noted in the EIS for the BHP Canada Project:

> Atlantic salmon smolt are generally considered to be energy-deficient with low energy reserves for somatic growth upon leaving their natal river and during the early marine phase (Jonsson and Jonsson 2005). Post-smolt are therefore likely distributed according to prevailing surface currents either close to shore or in open waters and that strong currents act as transportation vectors that facilitate migration to marine feeding areas (Jonsson et al. 1993) to reduce energy needs. Therefore, the migration routes of post-smolt may be determined by general ocean currents near its confluence with the ocean (Figure 6-23).[14]

As the ocean waters warm due to climate change, NCC is concerned that salmon migration patterns could be affected by water temperature changes. As noted by BHP Canada, "changes in environmental conditions can spatially alter typical distributions and migration routes as well as marine survival" (references omitted).[15] To its credit, the BHP Canada has also acknowledged the existence of "evidence of possible climate-induced salmon prey population changes that may be actively changing salmon distributions within the North Atlantic Ocean over time" (references omitted).[16]

There is no question that the need for up-to-date, pertinent information from which determinations about effects of the Project can be made is essential. Unfortunately, however, the proponents of the BHP Canada, Central Ridge and Flemish Pass exploratory drilling projects – and subsequently the Agency in its environmental assessment analysis – have leaned heavily on Atlantic salmon information derived from dated research. More recent research is needed, especially research that captures the health and behaviour of salmon as in the increasingly warmer waters of the Northwest Atlantic.

The most recent Government of Canada assessment of Atlantic salmon stocks underscores the need for additional research on Atlantic salmon health and migration patterns before conclusions are drawn about potential impacts to salmon of proposed exploratory drilling projects. The need to apply the precautionary approach with respect to potential Project impacts on salmon is strikingly evident in light of the information in the 2019 Stock Status Update by the DFO Canadian Science Advisory Secretariat (CSAS) on Atlantic salmon stocks in NL,[17] which indicates that: "Overall, multiple stock indicators show negative trends for Atlantic Salmon in NL. DFO Science remains concerned about the status of these stocks."[18]

The situation is somber with respect to the Labrador salmon population. Four rivers in Labrador were monitored for the 2019 stock status update, with three of them located in southern Labrador near NunatuKavut coastal communities. Of the three rivers in NunatuKavut territory, two were in the "Critical Zone" for health of the salmon population, while the third was in the "Cautious Zone".

Additionally, the stock status report states that, "Of the 16 assessed rivers for which there is information on returns over the previous three generations, total returns in 2019 were lower on all four rivers in

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Limited, EIS, Ch. 6, "Existing Biological Environment", page 6-68, https://iaac-aeic.gc.ca/050/documents/p80161/133877E.pdf. For BHP Canada, see BHP Canada, EIS, Ch. 6, "Existing Biological Environment", page 6-51, https://iaac-aeic.gc.ca/050/documents/p80174/134089E.pdf.

[14] BHP Canada, EIS, Ch. 6, "Existing Biological Environment", page 6-71, https://iaac-aeic.gc.ca/050/documents/p80174/134089E.pdf. Please note that "Figure 6-23" in the quoted passage refers to a 2-map image, in which one of the maps was the smolt pathways map reproduced in Figure 1 of these comments.

[15] Ibid. page 6-74.

[16] Ibid. page 6-71.

[17] DFO. 2020. 2019 Stock Status Update for Atlantic Salmon in Newfoundland and Labrador. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/045, https://dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2020/2020_045-eng.pdf.

[18] Ibid. p. 5.

Labrador and on seven of 12 rivers in Newfoundland."[19] For the three rivers in NunatuKavut, total returns of large and small salmon (combined) declined 76% (Paradise River), 11% (Muddy Bay Brook) and 47% (Sand Hill River) over three generations.[20]

The CSAS 2019 update report also states that: "marine survival continues to be the major factor limiting the abundance of Atlantic Salmon in the NL Region."[21] Hence, a serious precautionary approach is essential when considering the potential effects of oil and gas exploration drilling projects such as those reviewed in the three EA Reports.

The research relied upon by the proponents in their Environmental Impact Statements do not sufficiently cover the Labrador population of Atlantic salmon, and this is a point that NCC feels the Agency should discuss in its EA reports. The lack of baseline and other information in the EIS documents and thus in the Draft EA Reports is highly unfortunate because 1) this is the salmon population of greatest significance for NunatuKavut Community members and 2) it has already been recognized that there is a fair amount of uncertainty around migration patterns of Atlantic salmon. Given the important role that salmon plays in our culture and communities and the fact that it is still uncertain the extent to which this population migrates through the Project Area, NCC believes that additional research on the migratory behaviour of the Labrador salmon population should be obtained prior to commencement of exploratory drilling programs.

Without adequate baseline information on migration, habitat and seasonal sensitivities of Atlantic salmon in the project areas and larger regional area, it becomes extremely difficult to measure the type and magnitude of impacts that the projects are having on Atlantic salmon. Thus, while the Draft EA Reports recommends certain mitigation measures for fish and fish habitat in relation to discharges of drilling muds and other substances, measuring the impacts of those mitigation measures on real fish in the area becomes near to impossible in the absence of good baseline data.

This leaves NCC, and likely other Indigenous groups for whom Atlantic salmon is a keystone species of great cultural significance, in a difficult predicament in relation to the exploratory drilling projects in the region, because it seems that determinations about potential project impacts on Atlantic salmon are being made on the basis of old and incomplete research findings.

Research and mitigation. As a result of uncertainties about migratory patterns and other baseline information about Atlantic salmon in the marine environment offshore Newfoundland and Labrador, the Draft EA Reports indicate that the proponents "would be required to support research on the presence and distribution of Atlantic Salmon in Eastern Canadian offshore areas".[22] While NCC applauds the Agency's recognition of the need for additional research on Atlantic salmon and encouragement of such research, as well requiring proponents to become better informed, the reality is that this research will not assist in evaluating the potential impacts on salmon of the three exploration drilling projects at issue in the current exercise. It is difficult to see how findings from new research can possibly be used to inform decisions relating to potential impacts of the projects under study in the three environmental assessments. Rather, it would appear that the research envisioned would provide information only in time for decisions about future offshore oil and gas exploration projects.

[19] Ibid.
[20] Ibid. Table 2, p. 25.
[21] Ibid. p. 5.
[22] See e.g., Draft EA Report, BHP Canada, p. 17.

In sum, research itself does not truly constitute mitigation of a project's impacts. Research findings that arise after decisions have been made to go ahead with specific exploration projects cannot generally function as mitigation measures for those projects unless the research findings lead to specific actions by proponents that, in turn, mitigate any harms or adverse impacts to the environment. An example of this would be where new research shows severe negative impacts on salmon and a decision is made to cut short an exploration drilling program. We find that scenario, however, extremely difficult to imagine.

Additionally, the lack of proper baseline information on this species in relation to the projects and greater regional area renders the evaluation of effectiveness for mitigation measures nearly impossible. In the end, that leaves NCC with essentially no assurances that planned mitigation measures in relation to Atlantic salmon might work, and without such assurances, the promise of mitigation is empty.

In light of the points above, NCC does not believe Agency is warranted in its conclusion that "the Project is not likely to cause significant adverse environmental effects on fish and fish habitat".[23] Given the obvious data gaps and uncertainties, particularly in relation to Atlantic salmon, NCC does not understand on what basis the Agency can come to this conclusion, and implores it to reconsider this conclusion and wait until more research findings become available.

NCC finds that the treatment of the issue of Atlantic salmon in the Draft RA Reports does not represent a precautionary approach. This is concerning because a precautionary approach is precisely what is called for when projects may involve potential environmental effects that can reach back to Indigenous communities, culture, well-being and fundamental rights.

Migratory Birds

The harvesting of seabirds such thick-billed murres and sea ducks such as common eiders provides an important source of country food for those living in NunatuKavut communities, while at the same time connecting our people to the traditions of the past and providing important social and cultural benefits. Should migratory birds such as these be negatively affected by the Project, our communities could feel the impacts. Again, the concern is not only about potential decreases in the number of birds available for harvest (NCC puts a strict limit on the harvest of Common Eiders), but also the health of the birds and the cultural significance of bird hunts to our communities

In our view, the Draft EA Reports do not prevent sufficient information about the potential impacts of the Project on thick-billed murres and eiders, although we recognize this may be due to insufficient coverage of these species in the proponents' documentary information. To the best of our knowledge, the proponents did not conduct field work on these or other marine and migratory birds prior to preparing the Environmental Impact Statements for the three projects, or otherwise establish current and complete baseline information. **The absence of proper baseline data makes it very difficult to assess any effects of the projects on migratory birds if the projects go ahead, and likewise makes it difficult if not impossible to evaluate whether mitigation measures are effective**.

NCC is of the view that thick-billed murres and common eiders should, in fact, have been more closely studied by the proponents and analyzed by IAAC in the Draft EA Reports. It should be noted that the NL RA Final Report of the Newfoundland Regional Assessment Committee mentions that approximately one-third

[23] See e.g., Draft EA Report, BHP Canada, p. 19.

of Eastern Canada's population of thick-billed murres overwinter in the waters off Eastern Newfoundland.[24] The Committee report also mentions that common eiders have been observed in the NL RA Study Area.[25] The NL RA Study Area includes the three projects evaluated in the current exercise. The NL RA report also mentions that the Canadian Wildlife Service (CWS) is working to produce density models for thick-billed murres (as well as three other species) that would cover most of the NL RA study area.[26] Given the importance of turrs and eiders as a resource of cultural importance, NCC believes that knowledge gaps about the migration patterns of these birds between the three exploratory drilling project areas and coastal Labrador should be filled before conclusions are drawn about the potential impacts of exploratory drilling projects.

Additionally, NCC notes that the impacts on migratory birds more generally, such as those due to stranding on offshore infrastructure and supply vessels, do not seem to lend themselves to generalization to knowledge on murres and eiders due to the presence of uncertainty in the research. If the projects go ahead, NCC would want to be notified of all dead or injured thick-billed murres or common eiders found on or around exploration drilling platforms and supply vessels associated with each of the three projects.

Lastly, NCC notes that the Draft EA Reports mention that it is possible to mitigate flaring, alternative formation testing technology should be considered, such as using drill pipe and/or wireline conveyed test assemblies or other new technologies.[27] In general, NCC supports the use of alternatives to flaring provided that there are not other types of negative impacts to migratory birds from these alternative methods. More information is needed on this topic. As well, NCC wishes to know whether these alternatives, like flaring, must be C-NLOPB, and if so, the justification for this procedure.

Special Areas

As the Draft EA Reports point out, oil and gas exploration activities are not – unfortunately, in our view – prohibited in certain special areas that overlap with exploration licences, including Ecologically and Biologically Significant Areas and Significant Benthic Areas and certain special areas where other effective area-based conservation measures are in place (e.g., the Northeast Newfoundland Slope Closure marine refuge).

NCC finds it difficult to square the fact that fishing has been excluded from some of these areas, while oil and gas exploration is allowed when the reason for the closure is to avoid activities on the seabed that might disturb sponges and corals, which in turn provide key habitat for fish and other sea life. It is clear from information provided by the proponents in the Environmental Impact Statements for the projects that risks do indeed exist and that exploratory oil and gas drilling may affect sponges and corals.

As the Reports state, some of the special areas could overlap with the zone of influence of drilling projects, and we note that many of the special areas discussed are home to murres – a migratory bird species particularly important to NCC.

In light of these issues, NCC finds unfortunate the conclusion drawn in the Draft EA Reports that there will likely be no adverse effects to special areas after mitigation measures are factored in.

[24] NL RA Final Report, p. 61.
[25] NL RA Final Report, pp. 59 and 61.
[26] NL RA Final Report, p. 86.
[27] E.g., Draft EA Report, BHP Canada, p. 28.

Commercial Fisheries

As both the proponent and Agency have observed, through its economic development corporation, Nunacor, NCC holds several communal commercial fisheries licences for groundfish other species, and some of these licences are in the NAFO Divisions 3L, which overlap with Exploration Licences for the BHP Canada and West Flemish Pass projects, while others are in Divisions 3K, 3L, 3M, 3N and 3O, which overlap with Exploration Licences for the Central Ridge project. As such, NCC is understandably concerned about potential Project effects on these fishery zones, as well as potential effects on adjacent zones, like NAFO Division 2J in which NCC hold both snow crab and groundfish communal commercial licences. This is particularly true given that, according to the Draft EA Reports, access to fishing areas could be restricted during exploration drilling when safety exclusion zones around the exploration drilling rigs are established.

Apart from impacts upon commercial fisheries from routine exploratory drilling operations, NCC has concerns about impacts from oil spills. While certain impacts of routine operations on commercial fishing may possibly be mitigated by some of the "Potential Conditions" proposed by the Agency, NCC remains concerned about the potential magnitude and seriousness of oil spills for reasons explained below in the section on "Effects of Accidents and Malfunctions".

NCC has specific concerns on the issue of Fisheries Liaison Officers. It appears that what is being proposed by the Agency is a "procedure for determining the need for a Fisheries Liaison officer"[28] who would be engaged during movement of drilling rigs and geophysical programs. This seems too tentative: why not *presume* the need for such an officer and focus efforts, instead, on developing a role description and selection criteria for such an officer?

NCC is also concerned that – apart from perhaps the involvement of a Fisheries Liaison officer during geophysical programs – little attention was paid in the Draft EA Reports to potential impacts of seismic testing on commercial fishing. NCC notes that Indigenous fishers in certain areas have voiced concerns about current seismic operations and any planned increases and lack of communication to fishers about planned seismic surveys. Seismic survey operations are also concerning because the immediate and lasting effect of percussive blasts from kilometres of towed streamers on fish and fish habitat remains unclear.

Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples

For reasons discussed above and below in these comments, NCC disagrees with the conclusion in the Draft EA Reports that "[i]t is unlikely that Indigenous peoples fishing or harvesting for food, social or ceremonial purposes would come in contact with any project components or realize any adverse impacts in their traditional territories from project operations."[29] Again, insufficient research currently exists on the migratory movements and behavior of Atlantic salmon, including the Labrador sub-population, at various stages of its life cycle to justify this conclusion. Similarly, NCC asserts that insufficient information currently exists to justify predictions such as this in the Draft EA Reports:

> The proponent would also be required to implement measures to mitigate effects to fish and fish habitat, marine mammals and sea turtles, and migratory birds (refer to Sections 4.1, 4.2 and 4.3) such that there would not be a perceptible change to the current use of traditionally valued species (e.g., Atlantic Salmon)

[28] Draft EA Report, BHP Canada, p. 129; Draft EA Report, West Flemish Pass, p. 128.

[29] See e.g., Draft EA Report, BHP Canada, p. 53.

> or a change in the health and socioeconomic conditions of Indigenous peoples as a result of project operations.[30]

As well, we understand the Agency chose to deal with the issue of commercial fisheries under a separate chapter in the report, but that should not negate the fact that the state of our communal commercial fisheries can clearly affect the socioeconomic conditions of NunatuKavut coastal communities, which are closely linked to those fisheries.

Effects of Accidents and Malfunctions

NCC is understandably concerned about the potential for spills, blowouts, leaks and other malfunctions at offshore oil and gas installations in general, and the same is true with respect to the three projects reviewed in the three Draft EA reports. One concern with the Agency's approach to evaluating accidents and malfunctions is that more attention should be paid to how the probabilities and impacts of spills and blowouts may differ depending upon the depth of the water that is home to a particular well. In NCC's research of academic articles on shallow and deep-water drilling, wells described as "shallow" were generally at water depths less than about 150m, whereas deep-water wells were anything deeper. Two of the three projects under review in this exercise – BHP Canada and Flemish Pass – have exploration licences (ELs) with depths entirely in the deep to very deep ranges,[31] while one – Central Ridge – has ELs ranging from shallow water to deep.[32] A recent article reflecting on the 10-year anniversary of the Deepwater Horizon incident states:

> **The probability of a serious accident, fatality, injury, explosion, or fire being reported grows by 8.5 percent with every additional 100 feet of depth at which an offshore platform operates**, an analysis of oil and gas production in the Gulf of Mexico from 1996 to 2010 found. That's regardless of the platform's age or quantity of fossil fuels produced.[33]

Projects like the BHP Canada Orphan Basin Project, with depths are more than twice the minimum and maximum depths of the Bay du Nord deep-water development project, must be carried out with the utmost care, and environmental assessments of such projects must similarly be carried out with careful attention to special environmental impacts that may arise with deep-water projects.

One type of environmental impact that varies with depth, but can also affect all oil and gas rigs and platforms, concerns methane, yet the three Draft EA reports make no mention of methane emissions except in relation to a question raised by an Indigenous group about potential methane leaks from abandoned wells.[34] (Please see our comments on Condition 5.2 in part VII, below, on why we believe that methane monitoring at abandoned wells should, in fact, be done). NCC has compiled a set of references to academic articles on methane releases during offshore oil and gas drilling, and presents them for IAAC's consideration in the **Annex** to these comments.[35]

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[30] Draft EA Report, BHP Canada, p. 53. See also Draft EA Report, Central Ridge, p. 48, and Draft EA Report West Flemish Pass, p. 51.

[31] West Flemish Pass, EL 1138: **400 – 2,200 m**. BHP Canada Project, EL 1157: **2,150 – 2,575 m** and EL 1158: **1,175 – 2,265 m**.

[32] Central Ridge, EL 1159: **90 – 930 m** and EL 1160: **40 – 1,020 m**.

[33] Justine Calma, "Offshore drilling has dug itself a deeper hole since Deepwater Horizon: Ten years after Deepwater Horizon, offshore drilling creeps farther away from shore", The Verge, Apr 20, 2020, https://www.theverge.com/2020/4/20/21228577/offshore-drilling-deepwater-horizon-10-year-anniversary.

[34] Draft EA Report, BHP Canada, pp. 144-145, Draft EA Report, West Flemish Pass, pp. 146-147, Draft EA Report, Central Ridge pp. 131-132.

[35] See Annex: "Methane leakage and releases from offshore oil and gas drilling – Selected research articles", compiled by Shelley

When methane is released to the atmosphere, it operates as a very powerful greenhouse gas, and when released in very deep water gets consumed by bacteria before it reaches the surface and releases to the atmosphere, but leaves behind an oxygen deficit in ocean water because the bacterial decomposition process requires oxygen. Large deep-ocean methane releases can co-occur with blowouts, as happened during **the Deepwater Horizon incident, which resulted in an estimated 1 million-ton deficit in dissolved oxygen attributed to bacterial consumption of escaped methane**.[36] Scientists have continued to study how methane leaks and natural seeps can result in deoxygenation[37] and since climate change is already causing some deoxygenation in our oceans, it is imperative that we not add to that serious problem through accidental subsea releases of methane.

When oil and gas drilling happens at shallow depths, methane can reach the surface and escape to the atmosphere. As mentioned above, rigs and platforms used in oil and gas exploration and development can also be sources of methane emissions. In a recent study, Princeton researchers found that offshore oil and gas rigs in the North Sea leak more than twice as much methane as they report to the British government, and they did this using measurements from fishing boats downwind of offshore rigs when they were in stand-by mode (e.g., no flaring or transfer of oil).[38] Researchers such as those at Princeton University have said that that controlling methane leaks around oil and gas wells – whether on land or at sea – offers a powerful way to combat climate change.[39] NCC believes that the proponent, particularly as a part of the gas and oil industry, has a responsibility to minimize methane releases of all kinds because, in the words of a Princeton University researcher, "the fastest way to reduce the effects of greenhouse gases significantly is by decreasing methane emissions".[40]

In January 2020, Canada put new regulations in place to control methane emissions from offshore (as well as onshore) oil and gas installations.[41] This further underscores the seriousness with which methane emissions from offshore oil and gas activities should be approached. Given that Canada is not on track to meet its target to cut methane emissions by 2025,[42] methane emissions to the atmosphere from oil and gas drilling must be taken seriously by proponents and regulators.

Despite the possibility of serious impacts such as these, the discussions of blowouts and other unplanned releases of oil or gas below the water in the Draft EA Reports do not discuss the risk that a large, sudden

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Kath for the NunatuKavut Community Council, December 2019, updated February 2020. Please note that the reference list covers methane releases to both the atmosphere, from shallow-water drilling, as well as methane leakage and releases to marine waters relevant to deep-water drilling. See pages 3 and 4 especially, for articles pertinent to the deep-water oil and gas project context.

[36] University of California - Santa Barbara. "Gulf oil spill: Methane gas concentrations in Gulf of Mexico quickly returned to near-normal levels, surprising researchers." ScienceDaily, 7 January 2011 www.sciencedaily.com/releases/2011/01/110106145436.htm. See also John D. Kessler et al. "A Persistent Oxygen Anomaly Reveals the Fate of Spilled Methane in the Deep Gulf of Mexico**."** *Science*, Jan 6, 2011 DOI: 10.1126/science.1199697.

[37] References to studies are provided in the Annex to these comments.

[38] Ibid.

[39] Ibid.

[40] Steven Schultz, "Q & A: Princeton U. researchers say controlling methane leads can 'pay off quickly' to lessen effects of climate change", State Impact Pennsylvania, Sept. 22, 2019, https://stateimpact.npr.org/pennsylvania/2019/09/22/qa-princeton-u-researchers-say-controlling-methane-leaks- can-pay-off-quickly-to-lessen-effects-of-climate-change/.

[41] *Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector*, SOR/2018-66, https://laws-lois.justice.gc.ca/PDF/SOR-2018-66.pdf. The regulations, which came into effect January 1, 2020, apply to both onshore and offshore oil and gas facilities that extract, process and/or transport hydrocarbon gas. Part 2 of the regulations cover offshore facilities.

[42] Mia Robson, "Canada not on pace to meet target to cut methane emissions by 2025", The Canadian Press, September 4, 2020, https://www.cbc.ca/news/politics/canada-short-methane-emissions-target-1.5713439.

release of hydrocarbons into the water column from a blowout or spill could pose to oxygen levels in the water, nor do they discuss detection, monitoring and mitigation from the rigs and platforms to be used for exploratory drilling. This may well be due to the fact that the proponents did not, as far as we can see, address these potentially serious issues in their Environmental Impact Statements. NCC asks the Agency to take a precautionary approach and require proponents to plan for a careful study of deoxygenation, should a blowout or major underwater release occur, and also plan for how to detect, monitor and mitigate any methane releases from rigs and platforms used in exploratory oil and gas drilling. These plans and measures could be addressed for example, in the context of the proponents' spill response plans. We suggest new conditions relating to methane in part VII, below, "Specific Comments on Potential Conditions".

NCC has previously raised the issue of methane releases from offshore oil and gas exploratory and production drilling, in the context of the NL RA, as well as the review of the Draft EA for the Newfoundland Orphan Basin Exploration Drilling Project, and remains concerned with the lack of attention, both by proponents and by IAAC on the need to monitor methane releases from offshore drilling, both underwater and from the ocean surface and from drilling rigs and platforms (e.g., fugitive emissions). Again, it is clear from our research that a large body of knowledge currently exists on prevention, leak detection and mitigation of fugitive methane emissions and other methane releases in relation to offshore oil and gas platforms and rigs involved in exploration or production.

NCC is also concerned about the Draft EA Report conclusions with respect to oil spill response strategies, especially dispersants, in situ burning and capping stack/relief well drilling. Response strategies like the use of dispersants and in situ burning are of great concern given the fact that the project areas overlap with several Special Areas, such as the Northeast Newfoundland Slope Closure (marine refuge), and the Northeast Slope Ecologically and Biologically Significant Area (EBSA) and the UN Convention on Biological Diversity EBSAs for the Flemish Cap and Grand Bank slopes, among others.

With respect to the use of dispersants, NCC is concerned that dispersant-treated oil may potentially result in sedimentation that could cause risks to sensitive marine organisms in the marine refuge and ESBA areas. The question of harm to marine life from sedimentation of chemically dispersed oil is one that is under study,[43] but a precautionary approach to protect ocean life is in order. Unfortunately, the section on "Effects of Dispersants in the Draft EA Reports did not address directly the issue of effects of dispersants in relation to Special Areas. It really should have done so. Also, the discussion of dispersants and risks in the "Agency Analysis and Conclusion" section was thinner than expected given the fact that the subject of dispersants was given its own sub-section in the section on "Effects of Accidents and Malfunctions".

Concerning in situ burning, the Draft EA does not appear to address the negative environmental impacts that can arise from that method, and this is unfortunate, given that in situ burns can create their own problems because after the oil is burned, the tarry residues can be sufficiently dense that they sink in seawater, which can then cause problems for living things on the slopes or sea bed. Sinking of burn residue

[43] See e.g., Gong, Y. et al, "A review of oil, dispersed oil and sediment interactions in the aquatic environment: Influence on the fate, transport and remediation of oil spills." Marine Pollution Bulletin. Vol 79 (2014). https://www.sciencedirect.com/science/article/abs/pii/S0025326X13007571?via%3Dihub; Jacketti, M., Beegle-Krause, Cj & Englehardt, J. "A review on the sinking mechanisms for oil and successful response technologies." Marine Pollution Bulletin. Vol. 160 (2020), https://www.sciencedirect.com/science/article/abs/pii/S0025326X13007571?via%3Dihub; Khelifa, A. et al, "Effects of chemical dispersant on oil sedimentation due to oil-SPM flocculation: Experiments with the NIST standard reference material 1941B." International Oil Spill Conference Proceedings. (2008). 627-632. https://www.researchgate.net/publication/256925673_Effects_of_chemical_dispersant_on_oil_sedimentation_due_to_oil-SPM_flocculation_Experiments_with_the_NIST_standard_reference_material_1941B.

following in situ burns has been discussed by the American Petroleum Institute,[44] among others.

With respect to plans to utilize a capping stack and/or relief well drilling in the case of a blowout, NCC is perplexed that the Agency was satisfied with the information presented by proponents in relation to the proposed approach to capping stack mobilization and deployment.[45] In particular, NCC is substantially concerned with the fact that, in the event of a blowout, a well-capping strategy will take a minimum of 12-13 days, due in part from the need to obtain the capping stack device in Norway, and a response strategy involving the drilling of relief wells could take up to 120 days. It goes without saying that enormous amounts of oil would be released into the ocean over those timeframes. Like certain other concerned parties, we wish to know what efforts, if any, are being made to ensure that a capping stack is purchased, perhaps cooperatively by the many companies operating in the offshore area east of Newfoundland, and kept somewhere in Atlantic Canada in case of a spill? That would obviously reduce the response time by many days.

NCC also finds the following statement in the Draft EA Reports concerning: "In the event of a spill, as required by the C-NLOPB, the proponent may be required to monitor the adverse environmental effects of the spill."[46] (Our emphasis). It seems reasonable to think that this requirement would be obligatory rather than optional. Or is this an artifact of C-NLOPB policy?

Effects of the Environment on the Project

NCC is encouraged to see the Agency, in the Draft EA Reports, acknowledge that "climate change may lead to changes in predicted weather and marine patterns, including changes to the frequency and severity of extreme weather events."[47] This point was raised by Indigenous groups during engagement sessions. Climate change may also, however, create other changes in the environment that could interact with and affect the Project and its impacts. For example, a truly fulsome understanding of how climate change may affect the Project would include possible interactions between the potential impacts of the Project, such as discharges of drilling muds, spills involving diesel, heavy fuel oil, crude and factors like warmer ocean temperatures, higher acidity, and deoxygenation. NCC has become aware of research suggesting that increased temperature generally increases the toxicity of hydrocarbons and other substances. In that light, we encourage the Agency to acknowledge and factor into the assessment of these projects how potential impacts may change over the life of the project as the climate change impacts increase.

Cumulative Environmental Effects

In the Draft EA Reports, the Agency appears to rely heavily on the NL Regional Assessment findings for its information and determinations concerning the potential cumulative impacts for each of the three projects. NCC finds this problematic for several reasons linked to its analysis of the NL RA's treatment of cumulative impacts. While we will not repeat our entire critique of the NL RA's handling of this topic, several key points must be mentioned again in these comments.

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[44] American Petroleum Institute, "In Situ Burning: A Decision Maker's Guide", API Technical Report 1256, October 2016, pages 33-34, https://www.oilspillprevention.org/~/media/Oil-Spill-Prevention/spillprevention/r-and-d/in-situ-burning/api-technical-report-1256-in-situ-burnin.pdf.

[45] E.g., Draft EA Report, BHP Canada, p. 133.

[46] E.g., Draft EA Report, BHP Canada, p. 137.

[47] IAAC, Draft EA Report, BHP Canada Exploration Drilling Project, pp. 141-142.

First, the NL RA approach to cumulative effects places an inordinate amount of emphasis on predicting future oil and gas activities in the NL RA Study Area, and while this is useful if done properly, the information does not assist the overall cumulative effects analysis because it is never tied back properly to the question of impacts on specific valued components.

Second, NL RA's treatment of cumulative effects neglected a critical source of interaction with new factors that must not be ignored: climate change. In the case of marine fish and fish habitats, for example, it is critical to evaluate the interaction between the new exploratory activity and migratory Atlantic salmon stressed whose habitats may be impacted by climate change (e.g., increased water temperatures). Research suggests that the petroleum leaks or spills may be more toxic in warmer waters, and this kind of research must be taken into account in the evaluation of potential interactions and cumulative effects of new exploratory drilling: a 2016 review of management strategies relating to environmental impacts of the deep-water oil and gas industry stated:

> At the most basic level, experimental work has shown that increased temperature generally increases the toxicity of petroleum hydrocarbons and other compounds [internal references omitted], which suggests that the ecological impacts that have been recorded to date may expand in magnitude and distance as climate change proceeds.[48]

Third, while Module 15 of the GIS for the NL RA was supposed to address cumulative effects of oil and gas exploration and development in the NL RA Study Area, the module contains only a document prepared by C-NLOPB (Dec. 2019) comprising a predictive study of potential exploration oil and Gas Activity 2020-2028 that seems to serve as the basis for three future scenarios, and the study itself does not represent an accurate or sufficient treatment of the expected cumulative effects of oil and gas drilling activities in the NL offshore region.

As we stated in our comments on the NL RA Draft Report, the predictive analysis undertaken for purposes of the Regional Assessment does not square with what the companies themselves indicated in their own EISs and other documents in terms of the number of wells anticipated. Specifically, we count approximately nine (9) exploratory drilling projects currently in various stages of environmental or impact assessment,[49] that – collectively – say they plan to drill a maximum of 144 wells. Instead, the Draft Report refers to three scenarios – minimum, medium and maximum – in which the maximum scenario would see 77 exploratory wells drilled across all exploratory projects. The Final NL RA Report does not explain how the maximum scenario could be 77 wells when the stated plans for the nine major exploratory projects already planned and under assessment would amount to 144 wells.[50] As such, NCC maintains that the Agency cannot reasonably rely upon the information in the NL Regional Assessment for information on potential cumulative impacts of the environmental assessments of the three Projects.

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[48] Cordes et al., "Environmental Impacts of the Deep-Water Oil and Gas Industry: A Review to Guide Management Strategies," Front. Environ. Sci., 16 September 2016, https://www.frontiersin.org/articles/10.3389/fenvs.2016.00058/full.

[49] BHP Canada Exploration Drilling Project (ELs 1157 & 1158); BP's Newfoundland Orphan Basin Exploration Drilling Project (ELs 1145, 1146, 1148, 1149); Chevron's West Flemish Pass Exploration Drilling Project (EL 1138); CNOOC International Flemish Pass Exploration Drilling Project (ELs 1144 & 1150); ExxonMobil Canada's Southeastern Newfoundland offshore Exploration Drilling Project (EL 1136); Husky Energy Exploration Drilling Project (ELs 1151, 1152 & 1155); Suncor's Tilt Cove Exploration Drilling Project (EL 1161); Exxon Mobil Canada's Eastern Newfoundland Offshore Exploration Drilling Project (ELs 1135 &1137); and Equinor's Flemish Pass Exploration Drilling Project (ELs 1139, 1140, 1141, 1142).

[50] Regional Assessment Committee for the Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador, *Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of NL - Final Report*, February 2020, p. 136 and 148, https://iaac-aeic.gc.ca/050/documents/p80156/134068E.pdf.

Potential Adverse Impacts of the Project on Potential or Established Aboriginal or Treaty Rights

In the Draft EA Reports, the Agency explicitly recognizes that NCC "holds food, social and ceremonial fishing licences for species that may migrate between the project area and the Labrador coast."[51] With respect to Atlantic salmon, the Agency has taken the view that the Project's routine activities would likely have limited effects on the species and thus have a "low/negligible impact" on the potential or established Aboriginal or treaty rights of Indigenous groups who harvest salmon under FSC licences. This determination appears to lean heavily on the idea that while some salmon may overwinter in the Jeanne d'Arc Basin/Flemish Pass region, and "…are likely to be present at some times of the year as they migrate to and from home rivers" (our emphasis), the Jeanne d'Arc Basin/Flemish Pass region is "not known to be a significant migration route or overwintering area".[52]

With respect, we find this view premature given that elsewhere in the Report, the Agency mentions the uncertainty that exists with respect to migration and overwintering patterns etc. of salmon and indicates that additional research is needed. NCC asserts that, particularly where Aboriginal or treaty rights are involved, it is inappropriate to make a determination of "low/negligible impact" before clear and complete information has been obtained. Again, we refer to the image of side-by-side maps in Figure 1 in these comments, showing that the path of smolts leaving rivers of southern coastal Labrador appears to intersect rather plainly with at least two of the three projects reviewed in this exercise: Orphan Basin (BHP Canada project) and Flemish Pass (West Flemish Pass project). NCC believes that gathering more information before undertaking exploratory drilling programs in these areas would be the preferred, prudent course of action for Atlantic salmon, particularly in light of recent information indicating decreased stocks and returns to natal rivers for the Labrador salmon sub-population, as we discussed above.

As contrasted with routine project operations, the Agency "acknowledges the potential consequences of an accidental spill on Indigenous fishers and Indigenous groups", and NCC supports the Draft EA Report finding that "the potential impacts from a spill event may decrease the quantity, quality and health of the fish harvested by Indigenous groups."[53] The Agency determines, however that since the probability of a blowout is very low, the potential effects just noted "would be unlikely to occur".[54]

NCC challenges this thinking for two reasons. First, just because something is unlikely to occur doesn't mean strong preventative action isn't in order: we don't buy fire insurance because we are sure that our house is going to burn down, but because it would be catastrophic if it did. Second, it appears from the text of the Draft EA Report[55] that the Agency is thinking primarily of the case where a spill reaches the coastline, which we agree is unlikely, but a spill squarely in the project area out at sea could be catastrophic for salmon in the case, for example, where smolt are transiting through the project area at the time of the spill. Furthermore, salmon populations that are already under stress, as seems to be the case for the Labrador population according to the most recent stock assessment discussed above, may be even more susceptible to harm from spill events at sea than they might be if stocks were strong.

Thus, for spill events, just as for impacts from routine project operations, NCC believes more research on migratory behavior of the Labrador population of Atlantic salmon should be completed prior to drilling

[51] E.g., Draft EA Report, BHP Canada, p. 80.
[52] Ibid. p. 83.
[53] Ibid.
[54] Ibid.
[55] Ibid.

program commencement. Where impacts on Aboriginal or treaty rights are at stake, which is the case when harvest of salmon is involved, making decisions about drilling program timing and location *after* clear and complete information is gathered seems entirely appropriate.

VII. SPECIFIC COMMENTS ON POTENTIAL CONDITIONS

Disclaimer: While NCC is pleased to provide comments on the Potential Conditions documents for the BHP Canada, Central Ridge and West Flemish Pass projects, NCC must preface its comments and questions on these three projects with the caveat that the comments, suggestions and recommendations herein should not be construed as tacit approval of either the concept or details of the project. That said, the comments in this section offer certain specific suggestions and recommendations that we believe could substantially improve certain conditions. As well, we have identified several conditions that may include errors and bring these to the Agency's attention for correction as appropriate.

Organization of these comments: NCC's comments on potential conditions are presented according to the numbered conditions in the "Potential Conditions" document for each of the three projects. Unless otherwise indicated, condition numbers referenced below are those common to all three projects. In some cases, numbers ascribed to the same or similar conditions are not common to all three projects (e.g., where a condition appearing for one project does not appear in the conditions list for another project, thus changing the numeration for one document). Where condition numbers are not identical, the specific project being referenced for that condition is identified.

1 Definitions

1.7 Clarification recommended: The term "Commercial fisher" (Section 1, Definitions) should ideally be clarified to include Indigenous fishers who hold communal commercial fishing licenses under the *Fisheries Act*. While this may be implied by virtue of the reference in the definition to the holder of a "commercial fishing license issued under the *Fisheries Act*", it would be helpful, in light of interpreting the use of this term throughout the Potential Conditions, to clarify this point.

1.12 Correction suggested: This paragraph mentions the "Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act twice in a row. While the second mention no doubt refers to the provincial act by this name, it is suggested that the words "Nova Scotia" be added to the end of the second mention and put in parentheses.

1.28 in BHP Canada conditions. Correction or explanation required. **This paragraph does not appear in either the West Flemish Pass or Central Ridge conditions.** Paragraph 1.28 in the BHP Canada conditions defines "effective area-based conservation measure", a term raised again in condition 3.8 in the BHP Canada list. Please see our comments on **Condition 3.8,** below, for why we suspect an oversight in relation to the omission of this paragraph in the West Flemish Pass and Central Ridge Conditions documents.

2 General Conditions

2.1 Precautionary manner language should be clarified/strengthened. NCC is pleased to see the requirements in this condition that the proponent consider its actions within the Project in a careful and

precautionary manner, promote sustainable development and include community and Indigenous traditional knowledge, among other things. This condition would be strengthened, however, by replacing the phrase "and precautionary manner" with the phrase "manner that respects the precautionary principle". The term "precautionary principle" is used in CEAA 2012, section 4(2). At its core, the precautionary principle is designed to be applied in the face of scientific uncertainty about environmental harm.[56] In everyday language, the precautionary principle stands for the idea that a lack of certainty about the threat of environmental harm "should not be used as an excuse for not taking action to avert that threat."[57] The addition of specific consequences for not fulfilling the requirements identified in 2.1 would also serve to strengthen this condition.

2.2 Condition could be clarified by simple wording change. As it currently reads, the meaning of condition 2.2 is somewhat unclear in relation to condition 1.9, which it references. We suggest using simpler wording, as follows: "The Proponent shall carry out the Designated Project as defined in 1.9 of this document". This exact wording is used in the conditions list for the Newfoundland Orphan Basin Exploration Drilling Project and is substantially clearer.

2.4.2 Time period for Indigenous groups to prepare views should be increased to a minimum of 30 days. As presently written, this condition provides Indigenous groups who are consulted on a matter as the result of a requirement in one of the Potential Conditions a minimum of 15 days to prepare their views and information. NCC strongly believes that the period should be increased to at least 30 days. Difficulties arise when Indigenous groups are given insufficient time to study a file and prepare their views. At any given point in time, they may be involved in engagement processes on multiple development projects and impact assessments, and with limited capacity to do so. A 30-day response time is the minimum reasonable time period in this context.

2.6.1 and **2.6.3** Proponent should be required to provide up-to-date, complete baseline information for all valued components. NCC is very concerned that, as currently written, these two conditions, which are concerned with verifying the accuracy of predictions about environmental effects and determining the effectiveness of measures to mitigate those effects presume that the proponent has sufficient and up-to-date baseline data against which effects of the project may be compared. Unfortunately, however, NCC's review of the EIS documents for all three projects did not reveal the existence of sufficient and up-to-date baseline data for all valued components. For example, none of the three EIS chapters on "Existing Biological Environment" (Chapter 6 in each EIS) indicates that field work was undertaken to establish baseline data. In fact, two of the project EIS' specifically mention that the information presented in the EIS was not informed by fieldwork. For example, the EIS for West Flemish Pass states simply: "No field work was conducted as part of this EIS." It then indicates that "this description of the existing environment relies on published research."[58]

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[56] International Union for the Conservation of Nature (Council document), "Guidelines For Applying the Precautionary Principle to Biodiversity Conservation and Natural Resource Management," 14-16 May 2007, https://www.iucn.org/sites/dev/files/import/downloads/ln250507_ppguidelines.pdf.

[57] Ibid.

[58] West Flemish Pass EIS, Chapter 6, p. 6-1. A similar statement is made in the BHP Canada EIS, Chapter 6, p. 6-1. The EIS for Central Ridge makes no specific statement on field work, but it is apparent that the EIS description of existing biological environment in Chapter 6 of that EIS relied only upon previously published studies, many of them over 10 and 20 years old.

Much of the information on the "existing biological environment" for valued components, such as Atlantic salmon, is based on the results of studies published more than 10 years ago, and in some cases much earlier. In light of these shortcomings, NCC recommends that the Agency revise this condition to require that proponents provide complete, accurate and up-to-date baseline information. Only good quality baseline information can provide a useful standard against which to measure actual environmental effects at specific sites.

2.6.4 Ensure that economic considerations are not paramount in relation to mitigation measures. NCC recommends eliminating the word "economically" in relation to mitigation measures. Otherwise, sorely needed protection against adverse environmental effects may take a backseat to economic concerns as a matter of course, which would be inappropriate from a sustainability point of view.

2.8.4 Expansion or sub-condition needed for transparency. If the Proponent determines that "modified or additional mitigations measures are required" in relation to follow-up programs, a description of those modified or additional mitigation measures should be made public on the internet and/or directly provided to Indigenous groups.

2.10 Correction or explanation required. Currently, the list of reports and summaries that this condition requires to be published on the internet does not include "the schedule outlining all activities required to carry out all phases of the Designated Project" described in condition 7.2. We presume this is an oversight, but in any case, NCC strongly recommends that the schedule mentioned in condition 7.2, which must be submitted to the C-NLOPB, also be added to the list of items contained in condition 2.10 that must be published on the internet.

2.14 Indigenous groups should also be notified of changes to Designated Project and potential new adverse effects. In the first line of the paragraph, NCC recommends adding "and Indigenous groups" after the words "…in writing…" in order to ensure that Indigenous groups are notified of the change to the Designated Project as early as possible. As well, NCC recommends modifying the second sentence to read as follows: "In notifying the Board, the Agency and Indigenous groups, the Proponent shall provide a description of the change(s) to the Designated Project, any potential adverse environmental effects predicted from those changes, and the proposed mitigation measures…". The underlined phrase in the suggested replacement sentence is, we believe, necessary to ensure that changes to the Designated Project are evaluated at the same level of scrutiny as the original project.

3.8 in BHP Canada Conditions. Correction or explanation required**. This paragraph does not appear in either the West Flemish Pass or Central Ridge conditions.** NCC sees no reason why the Potential Conditions for the Central Ridge and West Flemish Pass projects should not also be concerned with "effective area-based conservation measures." Was this perhaps an error? If not, what is the explanation for different treatment among the Potential Conditions lists for the three projects? Effective area-based conservation measures are discussed in both the Central Ridge and West Flemish Pass EIS documents.[59]

3.13 in BHP Canada Conditions, 3.12 in Central Ridge and West Flemish Pass Conditions. Proponent

[59] In the West Flemish Pass EIS, see e.g., p. 6-131. Although the Central Ridge EIS does not use the term "other effective area-based conservation measures" (OEABCM), it does discuss marine refuges, which are OEABCMs. See Central Ridge EIS, pp. 15 and 31.

should be required to provide up-to-date, complete baseline information for all valued components. For details, please see our comments under 2.6.1 and 2.6.3, above.

3.14 in BHP Canada Conditions, 3.13 in Central Ridge and West Flemish Pass Conditions. Clarification requested on significance of the term "contribute to" (vs "participate in") research programs. NCC is pleased to see a condition requiring the proponent to confirm "its intent to contribute to research pertaining to the presence of Atlantic salmon (*Salmo salar*) in the Eastern Canadian offshore areas…", but wishes to know why the term "contribute" is used here rather than the term "participate", which has been used in previous sets of conditions.[60] What does "contribute to" mean in the context of this condition?

3.14.2 in BHP Canada Conditions, 3.13.2 in Central Ridge and West Flemish Pass Conditions. Annual updates to Indigenous groups on research programs is insufficient. NCC finds insufficient the requirement that Indigenous groups be updated annually "on how the Proponent has contributed to these related research activities" (our emphasis). In light of the high-level of importance ascribed to salmon and migratory birds by NCC and other Indigenous groups, it is preferable that NCC be updated as soon as practicable after new findings become available. Furthermore, what is of interest to NCC is the substantive results of any new research findings on salmon and migratory birds -- not how, or to what extent, the Proponent "contributed to" them.

4.2.6 Independent, qualified migratory bird observers should be notified of planned flaring. This condition needs clarification in relation to roles as between the proponent and the C-NLOPB. Specifically, who makes the determination whether flaring would occur during a period of migratory bird vulnerability? In our opinion, neither the proponent nor the Board are the proper bodies to make that determination. Instead, NCC recommends that such determination be made by persons with the necessary expertise, such as Environment and Climate Change Canada's Canadian Wildlife Service, with input from Indigenous groups. Furthermore, the 30-day notification should be to independent, qualified migratory bird observers, and not just to the C-NLOPB.

4.5 Clarification requested on significance of the term "contribute to" (vs "participate in") research programs. With respect to the condition that Proponents confirm their "intent to contribute to research programs "pertaining to the mitigation measures to reduce the attraction of migratory birds" to offshore lighting, NCC wishes to know why the term "contribute" is used here rather than the term "participate", which has been used in previous sets of conditions.[61] What does "contribute to" signify in the context of this condition?

4.5.2 Annual updates to Indigenous groups on research programs is insufficient. As we stated in relation to new research findings on Atlantic salmon, annual notification of Indigenous groups about new findings is not frequent enough. An annual update is unreasonable given the importance of migratory birds to the people of NunatuKavut. Likewise, it is the results of the new research findings that are of interest to NCC – not how or to what extent the Proponent "contributed to" such research.

[60] E.g., Potential conditions under the Canadian Environmental Assessment Act, 2012 for the Newfoundland Orphan Basin Exploration Drilling Project, condition 3.13.

[61] E.g., Potential conditions under the Canadian Environmental Assessment Act, 2012 for the Newfoundland Orphan Basin Exploration Drilling Project, condition 3.13.

5.1.3 Timeframe needed for notifying Indigenous groups and commercial fishers (24 hours max). There is no timeframe indicated for notifying Indigenous groups and commercial fishers in the event of a spill or unplanned release. NCC strongly recommends that Indigenous groups be notified immediately and no later than within 24 hours of the spill or release incident.

5.2 Strongly recommend increasing period for Indigenous engagement from 30 to 60 days (min.) and improvements recommended to well abandonment approach. With respect to the period within which the Proponent must submit its plan to the C-NLOPB, 30 days is clearly insufficient where the process/method used for abandonment may interfere with Indigenous groups with fishing licences that overlap with the Designated Project Area and Indigenous group input on the plan is required. NCC recommends a minimum of 60 days for the Proponent to submit its plan to the C-NLOPB where Indigenous group input is required.

Also, for condition **5.2,** it is strongly suggested that the condition be modified to require that the plan include monitoring for methane leaks at the abandoned well or wellhead. While NCC is aware that the Proponent has indicated that it takes care to avoid areas particularly susceptible to methane leaks or seeps, research shows that methane leaks and seeps are a frequent concern at abandoned wellheads. Since offshore oil and gas drilling practices tend to be similar across various companies and projects, we presume that leaks are occurring despite company intentions to avoid them. Hence, methane monitoring at abandoned wells is essential even where companies "take care" to avoid the risk of leaks.

5.4 Clarify frequency for providing information on lost/damaged fishing gear to Indigenous groups. This condition is unclear/ambiguous with respect to the frequency with which information on lost or damaged fishing gear attributed to the Project would be provided to Indigenous groups. Specifically, is the condition saying that that it is the Proponent's annual report to the C-NLOPB on known incidents of lost or damaged gear that would be provided to Indigenous groups "upon request"? Or is it saying that information on these incidents could be provided to Indigenous groups at any time "upon request"? It is not presently clear from the wording. Whatever the case may be, NCC recommends that the annual report on lost or damaged fishing gear should be provided to potentially affected Indigenous groups as a matter or course (as opposed to "upon request"), and that information on incidents of lost or damaged gear be provided to Indigenous groups upon request.

New condition, "6.1.3", strongly recommended in relation to preventing methane leaks and releases

NCC recommends adding a condition after condition 6.1.2 that would help address a serious lacuna with respect to the important issue of methane emissions. Currently, there are no conditions imposed on the Proponents with respect to the prevention, detection, monitoring or mitigation of methane from the exploration drilling rigs to be used in any of the three projects. Methane reduction has been a key concern of research on offshore oil and gas drilling and is attracting increased attention by the industry and with good reason: it is among the most potent of greenhouse gases. Adding a condition requiring proponents of the three projects to undertake and report on actions to prevent, detect, monitor and mitigate methane is consistent with Canada's heightened interest in controlling methane emissions in the oil and gas industry.[62] As Canada confronts the climate crisis, adding requirements such as these should be viewed as a serious

[62] See e.g., *Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector*, SOR/2018-66, https://laws-lois.justice.gc.ca/PDF/SOR-2018-66.pdf. The regulations, which came into effect January 1, 2020, apply to both onshore and offshore oil and gas facilities that extract, process and/or transport hydrocarbon gas. Part 2 of the regulations cover offshore facilities.

responsibility for the Agency in relation to this and all offshore oil and gas projects.

6.7 Funding for Indigenous groups to comment on spill response plans needed to make this condition effective. While NCC appreciates the condition requiring Proponents to prepare a Spill Response Plan and provide a draft to Indigenous groups for comment, it is must be noted that funding of Indigenous group participation is necessary in order to render this condition effective and meaningful.

New condition, "6.10.5", strongly recommended re dissolved oxygen measurement following blowout. NCC recommends adding a condition after condition 6.10.4 that would require the proponent to measure methane released in connection with a blowout or other major subsea accident as well as oxygen levels in the vicinity of the accident, both immediately following the spill and at several points later in time. The purpose would be to check for deoxygenation, which could potentially affect living things near the accident site. Methodologies for measuring subsea reduction in oxygen when methane is consumed by bacteria have been in use at least since the well-known blowout at the Deepwater Horizon rig, where researchers studied the massive oxygen anomaly left behind after bacteria consumed most of the methane released during the blowout.

VIII. CONCLUSION

After careful review of both the Draft EA Reports on the BHP Canada, Central Ridge and West Flemish Pas Exploration Drilling Projects, as well as the Potential Conditions under *CEAA 2012* proposed for each project, NCC has identified a number of gaps and other issues in need of improvement, resolution and sometimes simple correction. NCC respectfully submits this input to IAAC for careful consideration prior to preparation of the final EA Reports for the Minister.

NCC thanks the Agency for the opportunity to participate in the review of these Projects and looks forward to continuing the conversation about offshore projects and their potential impacts on the people and communities of NunatuKavut.

APPENDIX

Methane leakage and releases from offshore oil and gas drilling – Selected research articles

Compiled by Shelley Kath for the NunatuKavut Community Council

December 2019 (updated February 2020)

Methane leakage from ocean drilling for oil and gas –management and mitigation strategies and info pertinent to both shallow and deep-water drilling activities

Bylin, C., U.S. Environmental Protection Agency; Schaffer, Z., ICF International; Goel, V., ICF International; Robinson, D., ICF International; do N. Campos, A., COPPE/UFRJ; Borensztein, F., Devon Energy do Brasil Ltda. (2010) **"Designing the Ideal Offshore Platform Methane Mitigation Strategy"** [SPE 126964], Paper presented at the SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production held in Rio de Janeiro, Brazil, 12–14 April 2010. https://www.epa.gov/natural-gas-star-program/designing-ideal-offshore-platform-methane-mitigation- strategy

Cordes, E. E. et al, (2016) **"Environmental Impacts of the Deep-Water Oil and Gas Industry: A Review to Guide Management Strategies"**, Front. Environ. Sci. 16 September 2016, https://doi.org/10.3389/fenvs.2016.00058.

Husdal, G., Osenbroch, L., Yetkinoglu, Ö., Østebrøt, A., (2016) **"Cold venting and fugitive emissions from Norwegian offshore oil and gas activities, Summary Report"**. Prepared for the Norwegian Environment Agency, 12 April 2016, https://www.miljodirektoratet.no/globalassets/publikasjoner/m515/m515.pdf.

Nara, H., Tanimoto, H., Tohjima, Y., Mukai, H., Nojiri, Y., & Machida, T., (2014) **"Emissions of methane from offshore oil and gas platforms in Southeast Asia",** Scientific Reports 4, 6503; DOI: 10.1038/srep06503 (2014) https://www.researchgate.net/publication/266325378_Emissions_of_methane_from_offshore_oil_and_gas_platforms_in_Southeast_Asia

Steinle, L. et al. (2015) **"Water column methanotrophy controlled by a rapid oceanographic switch"**, Nat. Geosci. 2015, 8, 378-383, https://www.researchgate.net/publication/275331424_Water_column_methanotrophy_controlled_by_a_rapid_oceanographic_switch

> *Note: While this article does not deal directly with oil and gas drilling, it discusses research on* the "large amounts" of methane stored in the subsurface of continental margins and, as such, is pertinent for any drilling activities that may disturb the seabed. It covers seabed methane at various depths and is relevant to drilling at both shallow and deep-water drilling.

Methane leakage to the atmosphere (relevant to "shallow-ocean" drilling)

Note: In general, the studies examining methane in "shallow-ocean" drilling contexts concern drilling operations at ocean depths of 150m or less.

Helmholtz Centre for Ocean Research Kiel (GEOMAR), (2017) **"Oil and gas wells as a strong source of greenhouse gases: New study demonstrates methane leaks around North Sea boreholes"**, Science Daily, 28 August 2017, https://www.sciencedaily.com/releases/2017/08/170828102707.htm.

> *Note: This short article by the Helmholtz Centre summarizes the Vielstädte, L. et al. study,* included below in this list.

Riddick, S. N. et al (2019) **"Methane emissions from oil and gas platforms in the North Sea"**, Atmos. Chem. Phys., 19, 9787–9796, https://doi.org/10.5194/acp-19-9787-2019. (This is the full published 2019 study from Princeton University referred to in the shorter, summary article by Sullivan, below).

> *Note: While this study concerned oil and gas drilling platforms in shallower contexts (the North* Sea), it is worth asking whether some of its results may also be pertinent to platforms operating in deep water, because the issue here is leakage from the platforms themselves. The platforms studied were not actively flaring gas: instead the pilot light on the top of the flare stack was burning gas. The researchers suggested that downwind measurements of methane from the platforms "could be associated with incomplete combustion of natural gas feeding the pilot light at the top of the platform, or it could be associated with gas being emitted at the working deck level." P. 9791.

Supplement to Riddick article. The supplement related to this article is available online at: https://doi.org/10.5194/acp-19-9787-2019-supplement.

Steinle, L. et al. (2016) **"Linked sediment and water-column methanotrophy at a man-made gas blowout in the North Sea: Implications for methane budgeting in seasonally stratified shallow seas"**, Limnol. Oceanogr. 2016, 61, 367-386, https://www.researchgate.net/publication/309740202_Linked_sediment_and_water-column_methanotrophy_at_a_man-made_gas_blowout_in_the_North_Sea_Implications_for_methane_budgeting_in_seasonally_stratified_shallow_seas.

Sullivan, J. (2019) Office of Engineering Communications, Princeton University, **"Offshore oil and gas rigs leak more greenhouse gas than expected",** Aug. 15, 2019, https://www.princeton.edu/news/2019/08/15/offshore-oil-and-gas-rigs-leak-more-greenhouse-gas- expected.

Vielstädte, L. et al. (2017) **"Shallow Gas Migration along Hydrocarbon Wells–An Unconsidered, Anthropogenic Source of Biogenic Methane in the North Sea"**, *Environ. Sci. Technol.* 2017, 51, 17, 10262-10268, https://pubs.acs.org/doi/full/10.1021/acs.est.7b02732.

Supporting information for the Vielstädte, L. et al. article: https://pubs.acs.org/doi/abs/10.1021/acs.est.7b02732

Zhang Y. and and Zhai W.-D. (2015) **"Shallow-ocean methane leakage and degassing to the atmosphere: Triggered by offshore oil-gas and methane hydrate explorations",** Front. Mar. Sci. 2: 34, https://doi.org/10.3389/fmars.2015.00034.

Methane leakage to marine waters (relevant to deepwater drilling)

Adcroft, A., Hallberg, R., Dunne, J.P., Samuels, B.L., Galt, J. A., Barker, C.H. & Payton, D., (2010), **"Simulations of underwater plumes of dissolved oil in the Gulf of Mexico"**, Geophysical Research Letters, Vol. 37, L18605, doi:10.1029/2010GL044689, 2010, https://www.researchgate.net/publication/228490277_Simulations_of_underwater_plumes_of_dissolved_oil_in_the_Gulf_of_Mexico.

Beegle-Krause, C.J., Daae, R.L., Skancke, J., Brakstad, O.G., Stefanakos, C., (2016), "**Deepwater Wells and the Subsurface Dissolved Oxygen Minimum: A Tale of Two Sides of the Atlantic Ocean"** (Environment Canada's Arctic and Marine Oil Pollution Conference, 2016), June 2016, https://www.researchgate.net/publication/306287722_Deepwater_Wells_and_the_Subsurface_Dissolved_Oxygen_Minimum_a_Tale_of_Two_Sides_of_the_Atlantic_Ocean

Camilli, R. et al. (2010), "Tracking hydrocarbon plume transport and biodegradation at Deepwater Horizon", Science 330, 201_204, https://www.researchgate.net/publication/45720938_Tracking_Hydrocarbon_Plume_Transport_and_Biodegradation_at_Deepwater_Horizon.

Crespo-Medina, M. et al. (2014), **"The rise and fall of methanotrophy following a deepwater oil-well blowout",** Nature Geosci. 7, 423_427 (2014), https://www.researchgate.net/publication/282778230_The_rise_and_fall_of_methanotrophy_following_a_deepwater_oil-well_blowout.

De Angelis, M. A., Lilley, M. d., Olson, E. J. & Baross, J. A. (1993), **"Methane oxidation in deep-sea hydrothermal plumes of the endeavour segment of the Juan de Fuca Ridge",** Deep-Sea Res. I 40, 1169_1186, https://www.sciencedirect.com/science/article/pii/096706379390132M.

Hazen, T. C., Dubinsky, E. A., DeSantis, T. Z., Andersen, G. L., Piceno, Y. M., Singh, N., Jansson, J. K., Probst, A., Borglin, S. E. & Fortney, J. L. (2010), "**Deep-sea oil plume enriches indigenous oil-degrading bacteria**", Science 330(6001), https://www.researchgate.net/publication/45827758_Deep-Sea_Oil_Plume_Enriches_Indigenous_Oil-Degrading_Bacteria.

Joye, S. B., MacDonald, I. R., Leifer, I. & Asper, V. (2011), **"Magnitude and oxidation potential of hydrocarbon gases released from the BP oil well blowout",** Nature Geosci. 4, 160_164, https://www.researchgate.net/publication/228994617_Magnitude_and_Oxidation_Potential_of_Hydrocarbon_Gases_Released_from_the_BP_Oil_Well_Blowout

Kessler, J. D., Valentine, D. L., Redmond, M. C., Du, M., Chan, E. W., Mendes, S. D., Quiroz, E. W., Villanueva, C. J., Shusta, S. S. & Werra, L. M. (2011). **"A persistent oxygen anomaly reveals the fate of spilled methane in the deep Gulf of Mexico",** *Science* 331(6015): 312-315, https://www.researchgate.net/publication/49734598_A_Persistent_Oxygen_Anomaly_Reveals_the_Fate_of_Spilled_Methane_in_the_Deep_Gulf_of_Mexico.

Redmond, M. C. and D. L. Valentine (2012), **"Natural gas and temperature structured a microbial community response to the Deepwater Horizon oil spill",** Proceedings of the National Academy of Sciences 109(50): 20292-20297, https://www.semanticscholar.org/paper/Natural-gas-and-temperature- structured-a-microbial-Redmond-Valentine/2f6bf32c07db27bd258702f6e4b5d0a0f26a1ce7

Rogener, M.K., Bracco, A., Hunter, K.S., Saxton, M.A., Joye, S.B., (2018), **"Long-term impact of the Deepwater Horizon oil well blowout on methane oxidation dynamics in the northern Gulf of Mexico"**, 7 December 2018, https://www.elementascience.org/articles/10.1525/elementa.332/.

University of California - Santa Barbara (2011) **"Gulf oil spill: Methane gas concentrations in Gulf of Mexico quickly returned to near-normal levels, surprising researchers",** Science Daily, 7 January 2011. www.sciencedaily.com/releases/2011/01/110106145436.htm.

Note: This research note explains the finding that, following the blowout of the Macondo well (Deepwater Horizon), researchers found that the released methane plumes had been replaced by residual methane-eating bacteria, and "a ***1 million ton deficit in dissolved oxygen*** *that we* attribute to respiration of methane by these bacteria." While this study did not look at the impacts of the oxygen reduction on the surrounding biota, it seems clear that effects of oxygen-reduction due to methane consumption following methane releases in deep water operations should be studied and taken into account in environmental assessments of deepwater drilling operations.

Valentine, D. L. et al. (2012) **"Dynamic autoinoculation and the microbial ecology of a deep water hydrocarbon irruption"**, Proc. Natl Acad. Sci. USA 109,20286_20291 (2012, https://www.semanticscholar.org/paper/Dynamic-autoinoculation-and-the-microbial-ecology-a-Valentine-Mezic/39353de139c606e36b00d6027a2218a8c11df2bc.