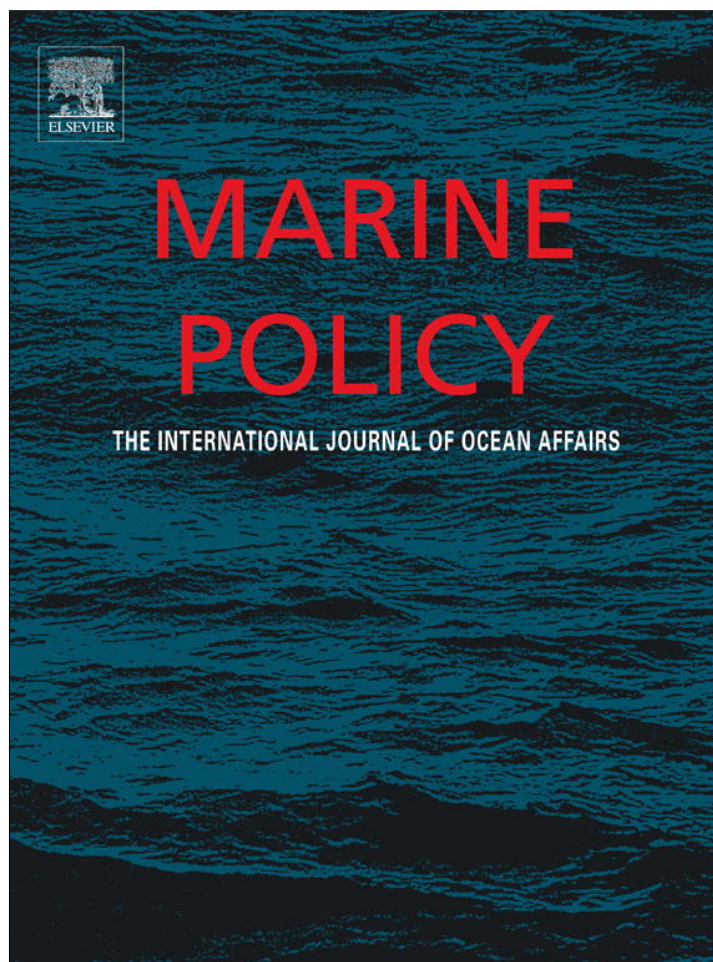


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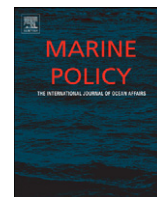
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Strategic environmental assessment opportunities and risks for Arctic offshore energy planning and development

Bram Noble^{a,*}, Skye Ketilson^b, Alec Aitken^a, Greg Poelzer^c^a Department of Geography and Planning, University of Saskatchewan, Canada^b School of Environment and Sustainability, University of Saskatchewan, Canada^c Department of Political Studies, University of Saskatchewan, Canada

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ABSTRACT

Canada's Arctic environment is rich in hydrocarbon resources. As international attention turns to the Arctic to meet global energy demands there is increased recognition of the need to advance upstream impact assessment and decision-making to plan for energy development. There have been several applications of strategic environmental assessment (SEA) over the past decade in the international offshore energy sector; however, SEA remains underdeveloped offshore in comparison to project-based environmental impact assessment and uncharted territory in Canada's Arctic. This paper examines stakeholder perceptions of the opportunities and risks of advancing SEA for offshore energy planning and development in Canada's Beaufort Sea. Results indicate a number of perceived opportunities for SEA, including improved regulatory efficiency, better regional baselines and planning practices, an opportunity to assess cumulative effects, more meaningful project-based assessment, and greater certainty for industry stakeholders. At the same time there are a number of perceived risks, including foregoing anticipated development opportunities, the loss of flexibility in decision making, adding another layer of bureaucracy, and the added uncertainties of a novel approach. The implications of these findings for advancing SEA in the offshore energy sector are discussed.

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1. Introduction

Environmental issues are defining a new agenda for offshore energy research and development. There is increasing recognition of the need to address the environmental implications of energy development early in the planning process, before irreversible decisions are taken and energy projects become a reality, at the strategic tier of policies and plans [1–3]. This higher-order environmental assessment, known as strategic environmental assessment (SEA), has gained considerable momentum in recent years and is now adopted in approximately 60 countries globally [4]. However, research on, and experience with, SEA in the offshore energy sector remains limited in comparison to traditional project-based environmental impact assessment (EIA), and the role of SEA offshore is neither well established nor understood [2,5]. This is the case in Canada's Arctic, where there is no system of SEA offshore for energy planning, exploration and development.

Canada's Arctic is rich in hydrocarbon resources and there is a renewed interest in Arctic energy development. Development in the high Arctic Islands and channels may be in the more distant future but plans for energy development in the Beaufort

Sea-Mackenzie Delta Basin of Canada's western Arctic are advancing. Between 2008 and 2010, for example, Imperial Oil Ltd., British Petroleum, Chevron, and Exxon Mobil all purchased offshore exploration leases in the Canadian Beaufort Sea, and the federal government continues to sell offshore exploration licenses for Arctic energy exploration.

As international attention turns to the Arctic offshore to meet global energy demands, there is increased recognition of the need to advance a more strategic approach to impact assessment and decision-making to plan for offshore energy development prior to making decisions about individual energy project proposals [1,2,6]. However, notwithstanding the contributions of SEA offshore internationally [2], SEA remains uncharted territory in Canada's Arctic. In Canada's Arctic both industry and government remain skeptical about SEA offshore, noting its unproven benefits [7]. This is disconcerting in that major energy resource development is looming in Canada's western Arctic, and there is a recognized need for an improved environmental assessment process; yet there is little understanding of the perceived benefits or risks of SEA.

This paper examines the perceived opportunities and risks of SEA to offshore hydrocarbon exploration and development in Canada's western Arctic. Although focused on Canada's Beaufort Sea, results emerging and the implications for advancing SEA in the offshore hydrocarbon sector are broadly applicable internationally.

* Correspondence to: Department of Geography and Planning, 117 Science, Place, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 5C8. Tel.: +1 306 666 61899.

E-mail address: b.noble@usask.ca (B. Noble).

2. Strategic environmental assessment

Environmental impact assessment has been subject to much criticism for its focus on individual project actions, its reactionary approach to impacts, and inadequate consideration of regional and cumulative effects [8–10]. The limitations of EIA in marine environments have also been noted [2,10]. In their review of the effectiveness of EIA for dredging and ocean disposal in Korea, Lee et al. [11] report that notwithstanding the inter-relatedness of the marine environment EIA applications remain focused exclusively on the local, proposed undertaking. The World Wildlife Fund [5] report a limited scope of EIAs conducted for the Baku–Tbilisi–Ceyhan pipeline project, from the Caspian Sea to the Turkish Mediterranean coast, and Sakhalin II, a system of offshore oil and gas platforms and pipelines off Russia's Pacific coast, in comparison to the network of infrastructure and impacts associated with the undertakings. Budd [12] identified similar concerns offshore of Great Britain, noting the lack of consideration of alternative locations for offshore development, so as to avoid sensitive marine areas; and under Norway's former offshore EIA regulatory system Kinn [3] noted the limited scope of EIA for oil and gas projects, focused on the specific development field and not on cumulative impacts to the offshore region.

Emerging out of the constraints of project-based approaches to planning for, and assessing the impacts of development actions, SEA is a tool for integrating environmental considerations at the earliest possible stages of decision-making [4]. As a higher order environmental assessment process, SEA occurs before irreversible development decisions are made, at the level of regional policies, plans and programs, when alternative futures and options for development and conservation are still open. In principle, the benefits of early environmental thinking should cascade downward resulting in more informed, efficient, and focused project-level assessments and decisions [13]. SEA thus ensures the consideration of environmental issues at the outset of the decision-making process and can detect potential environmental impacts at an early stage, before the projects are designed [14].

Competing interests for marine resources, including increasing pressures and potential risks associated with offshore hydrocarbon activities [15,16], have resulted in a recognized need for a more comprehensive and regional approach to impact assessment, especially in the context of offshore energy planning and development [2,3,5]. Offshore hydrocarbon projects operate in a large network of infrastructure and the risks to marine environments are high on a global scale [17]. There has been some progress in advancing SEA offshore internationally. Fidler and Noble [2] report on SEA experiences offshore of Norway, the United Kingdom and Atlantic Canada but note the limited influence on SEA on marine resource planning and hydrocarbon development. Even in countries such as Canada that have already in place directive-based SEA requirements, SEA offshore has yet to advance to same extent as EIA. The WWF [5], for example, report that large hydrocarbon programmes continue to unfold offshore without adequate strategic thinking. Part of the challenge is that SEA in the offshore sector has received only limited attention. As a result, although the need for SEA is well argued [13,18,19], the opportunities and risks associated with SEA offshore are unclear and linkages between SEA and other forms of planning and impact assessment remain elusive. Practical experiences with SEA in the offshore energy sector are relatively limited.

3. Methods

3.1. Beaufort sea study area

The focus of this study is the Inuvialuit Settlement Region (ISR) of Canada's Beaufort Sea (Fig. 1). The ISR is a result of the 1984

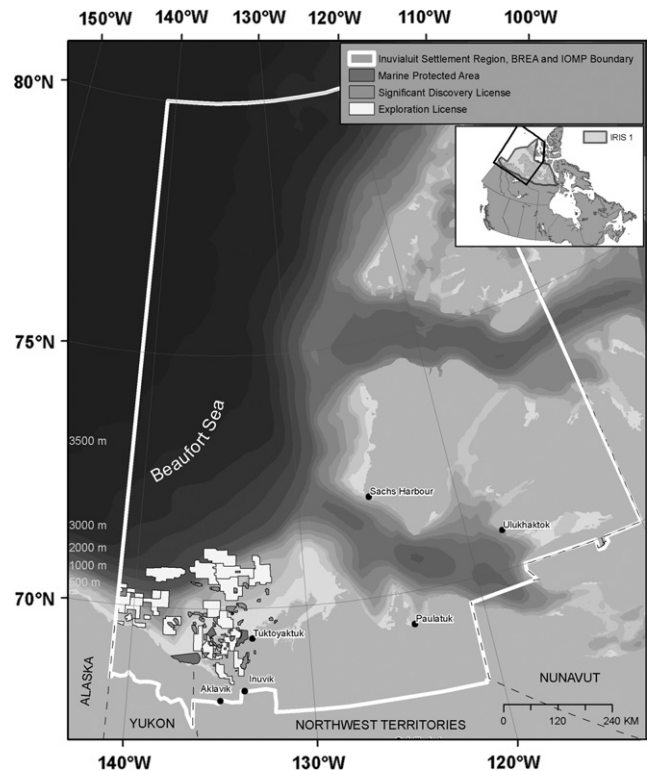


Fig. 1. Inuvialuit settlement region of the Beaufort Sea in Canada's western Arctic. Source: Map produced by Michael St. Louis, University of Saskatchewan.

Inuvialuit Final Agreement (IFA), a negotiated land claims agreement between the Inuvialuit of Canada's Northwest Territories and the Government of Canada. The IFA applies to the whole of the ISR, including both land and water. Terrestrial and marine resources in the ISR are managed under a co-management structure, consisting of numerous boards that represent the Inuvialuit communities and the government of Canada. There are approximately 11,500 people residing in the ISR, of which 73% are Inuvialuit, First Nations, or Métis [20]. Fishing and hunting provide sustenance and have been part of local culture for centuries [21]. The Beaufort Sea region is the only Arctic area designated for integrated management under the legislative framework of Canada's Oceans Act. The Beaufort Sea 'large ocean management area' covers an extensive area (1.1 million km²) of northwestern Canada and encompasses the marine portion of the ISR. Within this region is the Tarrim Niriyutait Marine Protected Area, consisting of three sub-areas at the edge of the Mackenzie River Delta, created to conserve and protect the habitats of beluga whales, anadromous fishes and seabirds [15]. Recent surveys of the marine fauna inhabiting the continental shelf of the eastern Beaufort Sea and Amundsen Gulf have identified an ecologically and biologically significant area, characterized by high benthic productivity, situated along the western margin of the Cape Bathurst Polynya [22,23]. This marine habitat is believed to provide an important food resource for migratory populations of gray whales, walrus and eider ducks [22].

The economy of the ISR depends largely on non-renewable resources, including oil and gas. The Beaufort Sea is rich in hydrocarbons. The ISR itself is estimated to contain 40×10^7 l of potential oil and 680×10^{12} l of potential natural gas [24]. The Beaufort Sea and Mackenzie Delta have been subject to cycles of energy exploration and development for decades, primarily in coastal and near-shore regions. In 2007, however, due to increasing global oil prices and federal political efforts to build Canada's energy economy, exploration licenses were let in the deep

offshore. The current approach to planning for and assessing the impacts of offshore exploration and development in the Beaufort Sea is project-based EIA. Current federal legislation in the ISR for offshore energy exempts much exploratory work from comprehensive EIA, and requires only screening-level reviews. As a result of the potential for increased hydrocarbon activity in the Beaufort, recognized limitations of project-based EIA to effectively plan for and assess the impacts of offshore development, and the mounting pressure from both industry and federal government for a more efficient, informed, and streamlined approach [10,25,26], there is increasing awareness of the need for a broader regional and strategic environmental assessment process [1,5,7,27]. However, notwithstanding recent investments in regional environmental studies in the Beaufort (see www.beaufortea.ca), there has been limited investigation of the opportunities and risks associated with advancing a more formal system of SEA for offshore marine planning and energy sector assessment.

3.2. Data collection and analysis

There are four stakeholder groups involved in offshore hydrocarbon activity in the ISR: the ISR community co-management boards and agencies, government regulators, industry, and environmental non-government organizations (ENGOs). Potential interviewees were identified from these four groups based on their experience and knowledge of the study area, including its regulatory process. An initial list of participants was identified with help from key informants from the Canadian Association of Petroleum Producers, the Canadian Environmental Assessment Agency and the Inuvialuit Regional Corporation. A total of 60 potential participants were contacted, from which 28 interviews were conducted: federal and territorial governments ($n=10$), industry ($n=4$), environmental non-government organizations ($n=2$); ISR community co-management boards and agencies ($n=12$). Interviews in the ISR with community boards and agencies, and with environmental non-government organizations, were conducted in person. Interviews with industry and regulators were conducted largely via telephone. All interviews were recorded, transcribed and thematically coded and analyzed using NVivo © software for qualitative analysis. Higher-level concepts were first grouped into themes of shared properties, thus allowing a reduction and combination of data, followed by a more detailed coding within themes.

4. Results

Analysis of the interviews resulted in the identification of a number of opportunities and risks to advancing SEA offshore in Canada's Beaufort Sea. Participants identified seven opportunities presented by SEA, and four perceived risks. These are listed in Table 1 and presented in the sections that follow.

4.1. Improved regulatory decision making

First, there was consensus amongst participants that SEA could lead to improved regulatory decisions. Two areas of improvement were noted. First, that SEA could provide regulators with a better understanding of the risks of issuing licenses in certain offshore areas, a better understanding of stakeholder perspectives, and thus more confidence in their decisions. Second, and most frequently noted, was that SEA could provide regulators with information needed to support decisions that prevented an offshore development from proceeding, if necessary. As explained by one Inuvialuit participant, "regulators want the ability to say no, so they need some type of support." Industry, ENGO and

Table 1
Stakeholder-identified opportunities and risks of SEA in the Beaufort Sea.

Perceived opportunities	Perceived risks
Improved regulatory decision making	Foregoing anticipated development opportunities
Identifying data gaps and baseline conditions	Loss of flexibility in decision making
Managing cumulative effects	Adding an additional layer of bureaucracy
More meaningful project-based EA	Added uncertainties of a novel approach
Added certainty for industry stakeholders	
Improved local engagement	
Coordinated offshore planning	

Inuvialuit participants all identified opportunities for SEA to support regulatory decisions for "no development zones" prior to license issuance, pointing to SEA experiences offshore Atlantic Canada, UK and Norway as examples. Federal regulators saw additional opportunities, emphasizing that unlike the current process an SEA framework examines not only the footprint of a project but "the greater footprint of multiple projects in the region." This was perceived as a means to avoid potential legal challenges, explaining that "we can maybe get some hint or evidence that a project is going to lead to a certain pattern of development...or impacts" so as to have the evidence needed to reject an application for development, if necessary.

4.2. Identifying data gaps and baseline conditions

Many participants addressed the science foundations of SEA, specifically data collection and baseline development. Government participants in particular identified the opportunity for regional baseline assessments to provide clarity to stakeholders about the quality of existing science on which to base decisions about licensing and development. The Inuvialuit similarly noted that identifying regional baselines and data gaps would be beneficial in assessing individual project applications. Industry participants spoke of the long history of data collection in the Beaufort Sea, referencing dozens of studies and scientific initiatives dating back to the early 1970s, but noted that data and baseline conditions were still an area of significant uncertainty due to continuously changing biological and seafloor conditions. "Have we collected enough baseline data, is it the right data...and how much data is needed to make a judgment on an environmental assessment" were reported as questions that, notwithstanding decades of data collection, remain unanswered. An industry participant went on to explain that SEA has the potential to resolve these challenges; a regulator could then "make some informed decisions on what the impact of a drilling program could be."

4.3. Managing cumulative effects

Related to the above was the notion of assessing and managing cumulative effects to the marine environment. Challenges to assessing cumulative effects under the current project-based EIA regulatory framework were raised by more than half of study participants. Participants from government and ENGOs in particular noted the opportunity for SEA "to better evaluate cumulative effects" and "to better evaluate regional effects." Participants reported that marine environmental impacts, such as the cumulative stress to marine mammals, are often the result of the impacts of several projects and are typically not detected within the footprint of any individual project assessment. A government participant explained that it is challenging to satisfy cumulative

effects analysis under a project-based approach, and that SEA would provide an opportunity to assess cumulative change beyond the scope of current regulations. Industry agreed, noting that under SEA “you could consider cumulative effects, or really multiple projects going on at the same time, or same time frame...getting a sense of sort of how various pieces interconnect.”

4.4. More meaningful project-based EIA

All participants identified opportunities for SEA to provide for a more meaningful assessment of individual projects. Many identified an opportunity to narrow the scope of project EIA by addressing common regional issues upfront. For example, a government participant noted that the driver of EIA in the Beaufort Sea is currently an individual project proposal; SEA would provide the opportunity to “take a step back from this proposal” and see “what are its merits, what are alternatives.” Other participants noted improved efficiencies in that common issues important to all projects could be off-ramped and addressed collectively through SEA. Industry echoed this notion, with one participant explaining that SEA provides a regional context and project proponents could “fill in with their individual project information.... eliminating the redundancy in the applications and in the information being collected.” This was said to result in “shortening your timelines for review,” because the focus and intent of an EIA would be clearer and industry would not be expected to address broader planning issues that are not within the purview of EIA. Under an SEA umbrella, explained another industry participant, “you are asking companies to focus on issues of concern, thus ensuring cost efficiencies and allowing individual project EIAs to play a more meaningful role”. As explained by an ENGO participant, SEA could provide a desired future scenario for the Beaufort region, creating the context by which individual project EIAs could be used to make decisions about whether a particular project contributes to the objectives for the region under that desired scenario. Simply put, explained an Inuvialuit participant, “you won’t be able to judge an individual proposal unless you could put it into the perspective of the regional framework.”

4.5. Added certainty for industry stakeholders

Nearly all participants identified SEA as a means to provide greater certainty to industry investors in the Beaufort Region. First, SEA was viewed as a means to determine whether development was appropriate for a given offshore region. For example, one federal regulator raised the case of seismic operations, explaining that for every individual seismic project the same issue is raised as to whether there should be oil and gas development in the North. The participant went on to explain that this issue should be addressed at the strategic level and not at the level of individual seismic operations. Inuvialuit participants agreed, adding that SEA would ensure that “everybody would know the rules and what is expected.” A closely related issue concerned thresholds for development. As explained by a government participant, “industry would like to know if at some point they [the regulators] are going to say ‘no more’...because they [industry] won’t spend money on something that they do not think they are going to be able to do.” Third, participants identified the potential for greater certainty at the operational level. When industry moves into the Beaufort Region they need to know, in advance, the obstacles and challenges in terms of regional plans, data availability, coordination of interests and consultation. According to industry, SEA would provide an opportunity to “know what the issue of concern is that I need to be focused on” in a project application. Finally, SEA was seen as providing, in advance project proposals, a better understanding of

whether a project would be deemed acceptable by social standards. As explained by an ENGO participant, SEA could help a project proponent secure a social license to operate in a particular offshore area, thus helping manage risk and minimize conflict when individual projects are proposed.

4.6. Improved local engagement

Industry often cited the opportunity for earlier consultation with local communities, explaining that the communities would have a better understanding of what is happening and have earlier input to the planning process. Inuvialuit added that early engagement through SEA would mean that industry would have to demonstrate how potential offshore development would benefit local communities and protect marine ecosystems, rather than simply consult on how the impacts of a specific project would be mitigated. It was also suggested that SEA could “make consultation with the communities much more focused...in a meaningful way.” For example, a participant from one of Inuvialuit co-management boards differentiated between *increased* community engagement and *better* engagement. The participant explained that “if you can provide that broad scale answer that could be applied to all projects, they [proponents] don’t need to keep repeating the same thing over and over again, which causes a lot of strain on the companies that have to come, but also on the communities, because they [communities] have to [also] come in and answer the same questions over and over and over again...and it is very frustrating”.

4.7. Coordinated offshore planning

There are three major offshore planning initiatives underway in the Beaufort Sea: the Integrated Ocean Management Plan, the Beaufort Regional Environmental Assessment, and the Integrated Regional Impact Studies. Each initiative is distinct in terms of its structure and purpose. Participants described the relationship between the initiatives as elusive, reporting several one-off studies under each of these initiatives but no coordinated effort to better inform planning practices for offshore exploration and development. With the exception of four government participants, SEA was viewed as a means to coordinate current planning and data collection initiatives and provide a regional vision for the Beaufort Sea. As one ENGO participant explained, “properly done...you can essentially establish a vision, economic, socio-cultural, and environmental, and you can lay down what your preferred vision for a landscape, or seascape is, and then you can track against that and monitor to see whether you are going where people want to go.” In this regard, added an Inuvialuit participant, a formal SEA process would help “hold people to the consultations that they have had...so that minds could not be changed as easily saying...this is what we have all agreed to.”

4.8. Foregoing anticipated development opportunities

Notwithstanding the perceived benefits of SEA, a concern raised by all participants groups was that SEA could result in foregoing, or at least significantly delaying, much anticipated offshore development. One industry participant expressed concern that SEA, as an *a priori* process, may provide a platform simply for special interest groups to stop development even before project-specific details are known. This would mean that prospective developers “would have the perception that there is a greater risk to their asset, and the planning of their asset.” Another industry participant agreed, noting that SEA could increase the risk to potential business opportunities, explaining that when considering future scenarios as part of the SEA process:

“How is such an approach going to affect existing rights, or future opportunities?” An ENGO participant sympathized, indicating that “if people think about future scenarios and realize the possible trade offs, risks coming from oil spills or accidents, or the implications for conservation... some options for industry could be foreclosed, either on how they drill or where they drill.” The Inuvialuit also expressed some reservations about SEA, but in a much different context. The concern here was that with potential development looming an SEA process may cause significant delay and result in local community socioeconomic expectations about the benefits of development not being met.

4.9. Loss of flexibility in decision making

There was also concern that SEA would lock industry stakeholders, including communities, into a long-term plan, reduce decision making flexibility and foreclose new offshore opportunities that might emerge. For industry, concerns ranged from restrictions on how and where development activities could unfold, and whether offshore areas not currently open for development could be reconsidered in the future. The Inuvialuit expressed similar concerns, explaining that “as soon as you put in something like a strategy, or you put in some sort of overarching mechanism, it’s going to be hard to circumvent it; there are always going to be issues that come up that are beyond our imagination.” The participant: “I don’t think Aboriginal people themselves feel comfortable locked into anything.” Another Inuvialuit participant, and co-management board member, noted that “there’s a little bit of hesitancy and unwillingness to do long term planning initiatives that tend to set quotas or set things in stone for development; when you do that, for example, this organization [the co-management board] then feels that their power has been taken away from them.”

4.10. Adding an additional layer of bureaucracy

Industry, Inuvialuit, and the minority of government participants expressed concern that although potentially beneficial SEA would simply become an additional layer of bureaucracy in an already complex regulatory environment; stakeholders would have to engage but with no real benefit. Part of the concern was the timing of SEA in the Beaufort Sea. A federal regulator explained that SEA may be no more than another layer in the regulatory process since offshore exploration leases have already been issued. As such, there was “no strategic question” regarding offshore development in the Beaufort Sea, “the decision had already been made.” Another participant from industry echoed this concern, and noted that “maybe that kind of a strategic assessment should have been done 35 years ago.” There was a common concern that SEA needed to occur before licensing, or the process would simply lengthen timelines for development.

4.11. Added uncertainties of a novel approach

Finally, an overarching concern was the novelty of SEA in Canada’s Arctic. An industry participant explained, “one of the downsides is the unknown...nobody, with the exception of Norway, no one has pulled these things off where everybody benefited in the way that they think they should.” The types of uncertainties raised were many and varied. Government, for example, typically raised uncertainties about the spatial scale of SEA offshore; whether it included the Beaufort Sea land fast coastal ice or offshore open water, and whether SEA offshore also extended to matters, such as indirect impacts, onshore (e.g., pipeline infrastructure connecting offshore operations to onshore facilities). For industry, uncertainty over timelines was a concern.

Industry reported that strategic initiatives do not always line-up with regulatory timeframes. Exploration licenses are issued with a limited timeline that must be met by industry. There was uncertainty as to whether SEA would “stop the clock on exploration licenses” so as to ensure that industry could still meet its regulatory obligations under exploration license agreements. A participant from an Inuvialuit agency said that currently in the Beaufort Sea “it’s simply the hesitancy of not wanting to know what the real answer is” and by “doing things on a project by project basis, you never really get to that.”

5. Discussion

Results indicate a number of perceived opportunities for SEA, including improved regulatory efficiency, better regional baselines and planning practices, an opportunity to assess cumulative effects, more meaningful project-based assessment, and greater certainty for industry stakeholders. There were also a number of perceived risks, including potentially foregoing anticipated development opportunities, the loss of flexibility in decision making, adding another layer of bureaucracy, and the added uncertainties of a novel approach. Based on the results, there are a number of important policy and practice implications for SEA offshore in Canada’s western Arctic, many of which translate to other offshore areas.

First, an overarching theme was the opportunity to off-ramp regional issues from current project EIA to SEA; issues ranging from monitoring programs for cumulative effects to early consultation and engagement in offshore planning processes. This is consistent with recent reviews of SEA internationally [2,28]; suggesting that many of the issues currently addressed at the project level are beyond the scope and capacity of what EIA and supporting regulations are equipped to deal with. For example, whether exploration and development should be permitted in certain offshore areas or in the Beaufort Sea at all, or whether same-season relief wells should be a required practice, are broader regional and policy matters that demand a level of assessment beyond the reach and intent of EIAs for individual project applications. Harriman Gunn and Noble [13] argue that strategic assessments “go beyond the evaluation of site-specific, direct and indirect project impacts to include issues of broader regional, cumulative and higher-tiered policy, plan, and program (PPP) development significance.” In a region characterized by increasing concerns over the potential impacts of offshore development and greater demands for engagement in decision making processes, along with growing criticisms of “an increasingly cumbersome regulatory regime” that “will undermine the attractiveness” of Canada’s western Arctic for development [10], SEA provides a much needed opportunity to off-ramp broader environmental science, engagement and policy issues from the project to the strategic level. The result, arguably, will be better planning for offshore development and, at the same time, a much more efficient and effective project EIA and regulatory system.

Second, many of the SEA opportunities identified by study participants, such as improved baseline science and monitoring, understanding cumulative effects and early engagement, are issues that may be beyond the scope of sector-specific SEA for offshore hydrocarbon activities. Sector-based SEA focuses on the planning and development activities of particular industrial sectors, whereas SEA for multi-sector initiatives encompass the policies, plans and development programs associated with multiple sectors in a single region. International SEA experience offshore suggests that SEA administered strictly for petroleum licensing is inherently restrictive and challenges the delivery of effective SEA [2,29]. A more integrative, multi-sectoral approach

to SEA is required offshore, similar to the Norwegian system of integrated management planning, whereby regional policies guide the development of sector-specific planning initiatives that, in turn, establish the terms and conditions for project-specific actions [18]. In doing so, it is possible to develop a superstructure for offshore planning and development, which provides the benefit of relieving specific resource sectors and project proponents from independently leading regional planning initiatives.

Third, concerns over the need to maintain flexibility in offshore planning and development, combined with the desire to improve regulatory decision making without adding an additional layer of bureaucracy, suggests the need for a combined law and policy regime for SEA. Supporting legislation is necessary to ensure that specific SEA procedural obligations are followed; however, legislation is often inflexible and may not anticipate all needs for SEA application or provide sufficient flexibility to accommodate new knowledge concerning development and conservation opportunities [28]. Fidler and Noble [2], for example, describe the law-based approach in the UK offshore sector as restrictive and, notwithstanding a clearly defined requirement, lacking clarity and purpose at the level of individual project actions. On the other hand, a strictly policy-based approach, which is the current model of SEA in Canada under the federal Cabinet directive, has tended to result in ad hoc and inconsistent application [30] and does not provide sufficient authoritative guidance for legally specified project-level EIAs [28]. Notwithstanding the perceived benefits of SEA in Canada's western Arctic, and the proven benefits of SEA offshore internationally, the lack of a supporting policy and regulatory framework to ensure implementation remains a critical gap. A combined law- and policy-based approach may be best, where the core process and substantive requirements are set out in legislation with more flexible requirements, expectations and guidance provided through policy-based instruments [28].

Finally, an overarching challenge to advancing SEA in Canada's western Arctic, and in the offshore marine environment in general, is that basic understandings of what SEA is and what it should deliver are still far from consolidated [7,30,31]. This may help explain some of the contradictions between what participants identified as an opportunity of SEA, and at the same time a risk of SEA. For example, participants spoke of the need for and benefits of early application of SEA to influence development, but at the same time noted that important decisions about development, specifically license allocations, have already been made in the Beaufort Sea. Participants also identified opportunities for SEA to deliver better cumulative effects assessment and long-term planning, but expressed concerns about being locked-in to a pre-determined plan and potentially foregoing new development opportunities. SEA late in the decision process is less influential in setting strategic direction; however, SEA post-rights issuance or post-project approval can support regional monitoring and feedback for improved project performance, risk management, assessing the cumulative impacts of future development, and determining the need for policy or planning intervention to adjust the development trajectory [2]. Effective SEA offshore must be an on-going and adaptive process; it does not end once a specific licensing or project decision is made, and must be quite sensitive to changes in broader policy, environmental, social or economic conditions.

6. Conclusion

Constraints to the current project-based EIA process are widely acknowledged, but SEA remains uncharted territory in Canada's Arctic. This is disconcerting in that Canada's western Arctic is on the threshold of major offshore energy development. This paper set out

to examine stakeholder perceptions about SEA risks and opportunities in the offshore hydrocarbon sector, and to identify solutions and challenges to advancing a formalized system of SEA offshore. Current science-based initiatives in the Beaufort Sea do represent a modest step forward, but emphasis is exclusively on the collection of environmental baseline data rather than advancing a strategic planning and assessment framework as requested by the Inuvialuit to support decisions about future development [27]. There has also been a major step backwards in Canadian environmental assessment in general. On July 6, 2012 a new *Canadian Environmental Assessment Act* came into effect that eliminates most federal government involvement in EIA and significantly reduces the scope of federal assessment [25]. Assessments for small projects, which comprised the majority of all federal assessments, will now be exempt. Federal EIA will apply only to those major undertakings deemed likely to cause significant adverse environmental effects on matters of federal concern, and such reviews must be completed within two years [25]. In the absence of SEA, and with a much streamlined EIA system, many of the incremental impacts of development in Canada's western Arctic may go unchecked. As Canada prepares to take the Chair of Arctic Council for 2013–2015, and with non-Arctic nations like China with vested interests in accessing non-renewable resources in the circumpolar North, there is a need and opportunity to advance a more regionally-relevant and strategically-oriented environmental assessment framework to plan for and manage the impacts of Arctic energy development.

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