

Joanne

**Joanne Sweeney**

Project EAC Chair  
Environmental Assessment Division  
Tel. (709) 729-2822

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**From:** Sweeney, Joanne  
**Sent:** Friday, May 11, 2018 10:21 AM  
**To:** Colbourne, Douglas Bruce <[s2dbc@mun.ca](mailto:s2dbc@mun.ca)>  
**Subject:** RE: seeking guidance re sea-ice

Thanks so much Dr. Colbourne.

I anticipate that the proponent may be ready to submit the EIS late next week. Once received by the Environmental Assessment Division, the document will be posted on the government web site and will be subject to a 50-day government and public review, so there'll be ample time for you to have a look at sections that describe the potential effects of sea ice.

I look forward to corresponding with you in the near future.

Regards,

Joanne

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**From:** Colbourne, Douglas Bruce [[s2dbc@mun.ca](mailto:s2dbc@mun.ca)]  
**Sent:** May 11, 2018 10:03 AM  
**To:** Sweeney, Joanne  
**Subject:** RE: seeking guidance re sea-ice

Joanne,

I am OK to do the review. I will be out of province for the week of May 28-June 1 so hopefully that would not interfere with your timing.

You can feel free to give my email to the proponent.

Regards, Bruce Colbourne

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**From:** Sweeney, Joanne [<mailto:joannesweeney@gov.nl.ca>]  
**Sent:** May-10-18 2:55 PM  
**To:** 'bruce.colbourne@mun.ca'  
**Subject:** seeking guidance re sea-ice

Hi Dr. Colbourne,

I'm Joanne Sweeney with the provincial Department of Municipal Affairs and Environment. I'm chairing an environmental assessment committee (EAC) that's reviewing a proposed aquaculture project in Placentia Bay. The proponent is currently preparing an environmental impact statement (EIS) for the project, which must include a component study that evaluates the proposed Aqualine-Midgard sea-cage design and predicts the potential effects of sea ice on the sea cages in the study area.

I'm looking for someone with a background in sea ice to review the section of the component study that will describe the potential sea-ice effects, and to provide guidance to the EAC as to the validity/completeness of the information. My colleague and a member of the EAC, Dorothea Hanchar, in consultation with Brian Veitch, provided your name as a potential reviewer. Would you consider reviewing this section of the document (which I anticipate will be 1-2 pages)?

My understanding from the proponent is that the EIS will be submitted to EA Division within the next 2-3 weeks. Should the

proponent have any questions regarding the potential effects of sea ice on sea cages in Placentia Bay, could I provide your email address for consultation?

Please call me at 729-2822 if you'd like to discuss. I anticipate receiving the EIS from the proponent within the next couple of weeks.

Regards,

Joanne

***Joanne Sweeney***

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**From:** EA Project Comments  
**Sent:** Thursday, June 21, 2018 2:42 PM  
**To:** Hanchar, Dorothea; Ficzero, Vicki; Angelopoulos, John; 'Hendry, Christopher (Christopher.Hendry@dfo-mpo.gc.ca)'; 'carole.grant@dfo-mpo.gc.ca'; Adams, Blair; kawaja, jonathan; Whelan, Dr. Daryl S; 'Ginn, Melissa (Melissa.Ginn@tc.gc.ca)'; 'Pulchan, Jerry [St. John's] (Jerry.Pulchan@EC.GC.CA)'; 'Denning, Allison (HC/SC) (allison.denning@canada.ca)'  
**Cc:** Squires, Susan  
**Subject:** FW: seeking guidance re sea-ice  
**Attachments:** B Colbourne Comments on Greig EIS regarding Ice.pdf

Please see the attached EIS review comments from Dr. Bruce Colbourne, MUN Prof, regarding ice. Feel free to provide me with your response to these comments.

*Joanne*

*Tel. (709) 729-2822*

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**From:** Colbourne, Douglas Bruce <s2dbc@mun.ca>  
**Sent:** Thursday, June 21, 2018 11:25 AM  
**To:** EA Project Comments <EAProjectComments@gov.nl.ca>  
**Cc:** Squires, Susan <SusanSquires@gov.nl.ca>  
**Subject:** RE: seeking guidance re sea-ice

Dear Joanne,

Attached are my comments on the EIS and Cage Study pertaining to the ice issues. If you need any clarification or have questions, feel free to give me a call or email.

Regards, Bruce Colbourne

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## **Comments on Environmental Impact Statement of the Placentia Bay Atlantic Salmon Aquaculture Project - specifically related to Ice**

The following comments are offered on the Environmental Impact Statement of the Placentia Bay Atlantic Salmon Aquaculture Project prepared for Grieg NL and dated May 2018 (EIS), but the comments are limited to sections of the EIS describing the ice environment and ice effects and the Appendix III Aqualine Midgard Sea Cage Study. I have relied on the information presented in the EIS with reference to source data and other information to confirm some information.

My understanding is that the purpose of the EIS is to identify potential impacts of the proposed development on the environment and that the main impact that might arise from ice effects is the escape of fish arising from ice-induced damage to the containment system. The EIS does identify the likelihood and type of sea ice occurrence for the proposed cage sites but it does not explicitly link ice effects to possible cage failures. Nor does the EIS present plans to deal with or mitigate the effects of ice occurrence.

Placentia Bay is generally viewed as a relatively ice-free bay but historical data indicates that ice does occur in the bay and in the regions proposed for the fish farm cages. The assessment of ice data in the EIS is based on accepted Canadian Ice Service data. Placentia Bay presents challenges in interpretation because it is on the fringe of the sea ice extent and historical data is scattered. The annual probability of occurrence is something below 0.15 (or 15%). The EIS acknowledges the potential for ice but appears to rely on the relatively low probability of occurrence as the mitigating factor. The low probability of occurrence could be better interpreted in terms of return period. Although the probability of occurrence in any given year is below 0.15, over a period of many years, significant ice can be expected every eight to ten years based on the probability. Assuming the proposed operation will continue for a period longer than ten years, there will be years in which sea ice does occur at the cage sites. Furthermore it seems likely that topside spray icing, snow or freezing precipitation will occur on more frequent intervals.

When sea ice does occur, historical data indicates that concentrations can be up to full coverage and thicknesses are reported to range from 0.3 to 1.0 m. It is unlikely that fast ice, even in a particularly cold season, would exceed 0.4 to 0.5 m in thickness. It is expected that ice would be a combination of sea ice formed in place and possibly ice that drifted from other regions. Glacial Ice is also infrequently present with the probability of occurrence decreasing towards the head of the bay. These conditions would be sufficient to cause problems for any sea cage installation.

Although the EIS mentions sea ice, it does not mention snow or freezing spray. Both of these environmental effects are not part of the available environmental data set and would be hard to quantify but might be estimated through enquiries with local fishermen or the oil terminal operators.



There are a number of ways ice and snow might affect a fish farm installation:

- Accumulation of ice, snow or freezing spray on the above-water portions of the cage, leading to deformation of the above water structure or sinking of the flotation collar from the added weight.
- Formation of fast ice on the sea surface, leading to cage collars or mooring buoys becoming frozen in place. Subsequent movement of this fast ice may apply large forces to the cage collar and/or mooring system. Fast Ice may also prevent access to cage installations by service vessels, divers or ROVs.
- Impact from drifting pieces sea ice or glacial ice on the cage or mooring system.

Ice occurrence has a high potential for damage to cage and mooring structures. It is unrealistic that the proposed cage system (or any type of surface floating cage) could be engineered to withstand any significant ice load scenario. Thus ice has to be dealt with operationally by preventing ice loads from occurring. There are actions that can be taken to deal with ice. Examples would be:

- Relocating the system from an area where ice might form during the ice season.
- Submerging cages during periods of ice movement.
- Manually or mechanically removing accumulated spray ice, snow or freezing rain from above-water structures.
- Installing ice booms to prevent movement of frozen-in-place (fast) ice.
- Maintaining open water areas with bubblers.
- Deflecting or moving drift ice or bergs using service vessels or booms.

Not all of these approaches would be practical for the proposed cage systems but no ice mitigation measures are referenced in the EIS except; the Aqualine Midgard operating manual (Appendix III Aqualine Midgard Sea Cage Study) mentions that procedures for removing topside ice accumulations are required (Section 10.4), and the NL Code of Containment (Appendix V Aqualine Midgard Sea Cage Study) mentions Ice Booms.

The consequences of ice incursion are not explicitly dealt with in the EIS except in the general case of a cage failure leading to fish escapes. No strategies are presented to deal specifically with ice presence or incursion to prevent such a failure. There is mention of the cage technology as being particularly resistant to escapes but this cannot be extended to include the effects of significant sea ice.

The Aqualine Midgard Cage system is undoubtedly a well-engineered system and represents the current state of the art in aquaculture containment systems. The Aqualine Midgard Sea Cage Study is completely non-critical. No reference to ice mitigation is contained in the study.

In Section 2.3.3 of the EIS, it states that the proponent will follow the Norwegian Standard NS9415 and the Standard is provided in the Aqualine Midgard Sea Cage Study (Appendix II). The NS9415 Standard mentions ice in a number of sections including 5.5 *Determination of the Effects of Ice*, 6.5.5 *Environmental Loads*, 6.6 *Load Factors* and 7.14.2.7 *Requirements Regarding Operation of Main Components*. There is no specific reference to any of these sections in the Aqualine Midgard Sea Cage

Study or in the EIS, except general statements that the standard has been followed in the design of the system, or will be followed in the operation of the installations. It is not clear if the ice sections of the standard will be followed or if the relatively low probability of ice is interpreted to mean that ice is not a concern.

The operation of the Aqualine Midgard Sea Cage in other regions, such as Iceland, the Faroe Islands and the North Sea, is presented as comparable (or more severe) operating experience to Placentia Bay, but none of these locations have sea ice as a significant environmental factor. The thing that distinguishes Placentia Bay from previous operating experience for the proposed cage system is the presence, albeit infrequent, of sea ice.

The EIS has established the occurrence and characteristics of the sea ice that is likely to occur at the Placentia Bay sites at some times over the operational life of the proposed system. It would be beneficial to consider how these relatively infrequent, but highly consequential, ice events would be dealt with.

S.40(1)



Bruce Colbourne

June 21 2018