

**PLACENTIA BAY ATLANTIC SALMON AQUACULTURE PROJECT  
ENVIRONMENTAL EFFECTS MONITORING PLAN (EEMP):  
FISH, SEA TURTLES, MARINE MAMMALS, AND SEABIRDS**



**GRIEG NL**

October 2019



**Placentia Bay Atlantic Salmon Aquaculture Project  
Environmental Effects Monitoring Plan:**

**Fish, Sea Turtles, Marine Mammals, and Seabirds**

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## **1.0 Introduction**

As part of the environmental assessment (EA) process for the proposed Placentia Bay Atlantic Salmon Aquaculture Project, Grieg NL was required to prepare and submit Environmental Effects Monitoring Plans (EEMP) subsequent to the completion of the Environmental Impact Statement (EIS) but prior to initiation of Project construction (see Section 7.4 in EIS Guidelines, Department of Municipal Affairs and Environment [DMAE] 2018). Additionally, the release of the Placentia Bay Atlantic Salmon Aquaculture Project from further environmental assessment by DMAE on 5 September 2018 was subject to Grieg NL meeting a series of terms and conditions including eight components requiring an EEMP. The EEMP for Fish, Sea Turtles, Marine Mammals, and Seabirds is presented in this document. This EEMP is designed to monitor and document marine wildlife, with emphasis on species at risk, in the immediate vicinity of the sea cage sites and during routine vessel transits between the sea cage sites and crew change and resupply sites.

Grieg NL is committed to implementation of this EEMP as an essential component of its Placentia Bay Atlantic Salmon Aquaculture Project. The organization of this document closely follows the requirements outlined in Section 7.4 of the EIS Guidelines (DMAE 2018). The EEMP will be reviewed on an annual basis and updated as-needed throughout the Project life.

## **2.0 Objectives and Scheduling of Monitoring**

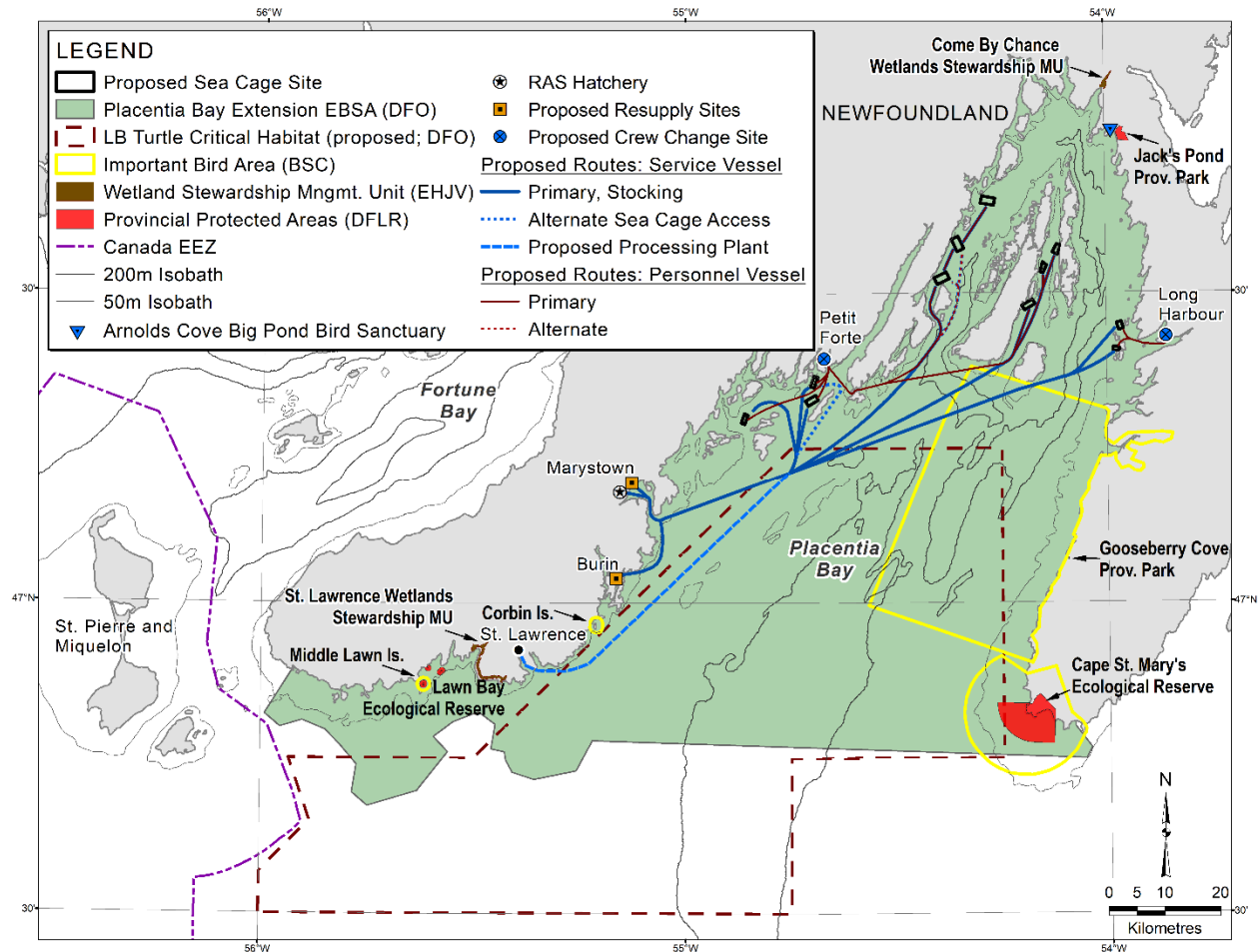
There are two primary components of the EEMP for ‘Fish, Sea Turtles, Marine Mammals, and Seabirds’:

1. Monitoring of marine wildlife at the Grieg NL sea cage sites and established transit routes for the purposes of implementing mitigation measures.
2. Collection of systematic and/or opportunistic data on marine species to provide information on the occurrence, distribution and relative abundance of animals at the Grieg NL sea cage sites and established transit routes.

The overall objectives of this EEMP are to allow verification of predictions made in the EIS as well as determine the efficacy of mitigation measures designed to minimize project effects on marine wildlife. Monitoring for marine wildlife, including species at risk, will generally be conducted on a daily basis (weather permitting). Detailed monitoring schedules and potential response actions specific to marine wildlife are described in detail in later sections.

## **3.0 Monitoring Design/Methodology**

As described in the Grieg NL EIS (LGL 2018), there are many species of marine mammals, marine fish, sea turtles, and birds as well as numerous biologically sensitive areas within and adjacent to Placentia Bay (Figure 3.1). Some of these marine species are considered at risk (see Appendix A for a listing). Systematic data on marine wildlife will be collected in support of mitigation measures designed to minimize the risk and/or effects of vessel strikes, entanglement, bird strandings, estranged/lost aquaculture gear, and (potential) use of therapeutants. Systematic and/or opportunistic data on marine wildlife will be collected to provide information on the occurrence, distribution and relative abundance of



**Figure 3.1. Location of Grieg NL sea cage sites and planned transit routes relative to biologically sensitive areas for marine wildlife in Placentia Bay, Newfoundland.**

animals at the Grieg NL sea cage sites and established transit routes. Project personnel will receive training on the identification of marine wildlife species as well as data collection procedures.

### 3.1 Monitoring in Support of Mitigation Measures

As discussed in the Grieg NL EIS and Marine Operations Environmental Protection Plan (EPP), there are several mitigation measures designed to minimize the risk of Project activities on marine wildlife and vice versa. An appropriate monitoring design and protocols are essential for proper implementation of mitigation measures and is a priority for the marine wildlife EEMP. Monitoring methodology for vessel strikes, entanglement, bird strandings, estranged gear, and therapeutic effects are discussed below.

#### 3.1.1 Potential Vessel Strikes

As described in Sections 7.3.3.2 and 7.3.4.2 of the EIS, there is some limited potential for Project vessels to strike and injure and/or cause mortality of marine mammals and sea turtles. However, this potential is greatly reduced because Project vessels (other than the smaller crew change boats and work boats) will minimize speed to <10 knots and will travel at constant speed and course when possible. Vessel crews



(captain and/or mates) will maintain a watch for marine mammals and sea turtles (as well as other potential hazards) ahead of the vessel at all times when transiting. Incidental sightings of marine mammals and sea turtles (as well as large pelagic fish, i.e., tunas and sharks) will be recorded on data sheets and required evasive actions (i.e., change in course, reduction in speed) to minimize the likelihood of striking or close approach to marine fauna will be documented.

### **3.1.2 Entanglement in Sea Cage Equipment**

As described in Section 2.5.2.2 of the EIS, it is possible that marine mammals, sea turtles, river otters, wild fish, and birds may become entangled in the sea cage nets, including the bird net (in the case of birds), and in the case of some animals in the associated mooring and buoy lines. Grieg NL personnel will monitor both the above-surface and below-surface components of the active sea cages on a daily basis (weather permitting). The above-surface and near surface components of the sea cage system will be monitored visually by Grieg personnel on site. The sea cage net will be monitored for entanglements via underwater video cameras, software and sensors which will primarily be used to monitor salmon satiation and activity. During monitoring of salmon feeding events (i.e., 8–12 hours per day), Grieg NL personnel (located on site in the barge or remotely via video feeds) will also view the sea cage for entanglements (and any breaches in the netting). Monitoring effort will be recorded.

If a bird becomes entangled, Grieg NL will follow established procedures to release the bird (which will be developed in consultation with Environment and Climate Change Canada-Canadian Wildlife Service, ECCC-CWS). Grieg NL will have a Migratory Bird Handling Permit (issued by CWS; see below) in place and will follow reporting requirements. Any entanglement of marine mammals, river otters, wild fish, and sea turtles will be reported immediately by phone to the Marine Mammal Coordinator, Fisheries and Oceans Canada (DFO) NL Region. The Marine Mammal Coordinator will coordinate a response with Tangly Whales (i.e., the Whale Release and Strandings Group). Grieg NL will provide access and support (as required) to Tangly Whales to respond to the incident. In extreme circumstances, if all methods have failed to release an animal and it is posing a serious threat to the integrity of the nets (or the safety of personnel), lethal measures may be considered. Before such actions are taken, DFO will be consulted. Any entanglements will be carefully documented and reported to DFO.

### **3.1.3 Bird Strandings on Project Vessels**

As reviewed in Section 7.3.2.2 of the EIS, birds may be attracted and potentially strand on Project vessels including the stationary barge at each active sea cage site as well as attending crew change boats, supply and service vessels. The Leach's Storm-petrel is particularly vulnerable to stranding on vessels in the Newfoundland offshore. To minimize the potential for attraction, lighting on Project vessels will be minimized to the extent that it is safe and practical to do so. Each barge will be systematically and thoroughly searched for stranded birds each morning by trained vessel crew (see Section 3.3). Any stranded birds will be handled and released as per established ECCC-CWS protocols. Required information on each stranding will be recorded in the prescribed ECCC-CWS datasheet as per Permit requirements<sup>1</sup>. Other Project vessels will be searched for stranded birds in the morning prior to use and upon return to port. Any stranded birds will be handled and released as per ECCC-CWS protocols and

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<sup>1</sup> Grieg NL will have a Migratory Bird Handling Permit (issued by ECCC-CWS) in place.

required data will be recorded. It is anticipated that bird strandings data will be required by ECCC-CWS on an annual basis. Grieg NL will comply with all reporting requirements.

### **3.1.4 Estranged Sea Cage Equipment**

There is a remote possibility that gear including netting, lines, and structural elements of a sea cage may become estranged and lost (i.e., during an extreme weather event). While much of the gear would likely remain in place, entangled in the various mooring lines, some gear might break free to drift and create both a navigation hazard and a source for entanglement with other (e.g., fishing) gear present in the region. This potential type of accident is considered in Grieg NL's Emergency Response Plan. Of direct relevance to this EEMP, is the possibility that estranged sea cage equipment may pose an entanglement risk to marine wildlife.

To minimize the risk of estranged and lost gear, routine inspection schedules will identify issues of equipment that may be wearing or broken and can be repaired or replaced before becoming lost or estranged. If extreme weather is approaching, these issues will be addressed immediately (i.e., any identified loose equipment will be secured immediately). Should gear become lost, Grieg NL will undertake routine surveillance of shoreline, particularly after storms to retrieve lost gear. Lost/estranged gear will be reported to DFO's Conservation and Protection office in Marystown. [Likewise, any loss of equipment will be reported to DFLR and retrieved as per the standard terms and conditions/requirements of the Crown Lands Lease, and Code of Containment (i.e., where it impacts containment of farmed fish)]. In addition, Grieg NL will conduct monthly inspections and clean-up of shorelines of Project debris (as required) within 1 km of an active sea cage site. Gear inspections and surveillance for any lost gear will be documented.

### **3.1.5 Use of Therapeutants**

As described in Section 2.5.2.2 of the EIS and Grieg NL's Fish Health Management Plan, the use of therapeutants to minimize sea lice is considered a last resort relative to a suite of other mitigation measures (e.g., cleaner fish, sea lice skirt, sub-feeder, functional feed). With regard to antibiotic use, fish populations do not receive antibiotics in the absence of disease, but medications can be used to minimize, and to some extent mitigate, disease events that veterinarians recognize seasonally or can arise following a stressor.

Although Grieg NL will attempt to avoid the use of drugs and pesticides, the use of any drugs or pesticides by Grieg NL will be regulated and require approval. The *Aquaculture Activities Regulations* (AAR) (Section 3) authorizes only deposits of (a) drugs whose sale is permitted or otherwise authorized, or whose importation is not prohibited under the *Food and Drug Act* (FDA) and; (b) pest control products that are registered, or whose use is authorized under the *Pest Control Products Act* (PCPA). In addition, conditions in Sections 4 through 14 of the AAR must be met. To be authorized, the deposit of a substance during treatment must be in compliance with other laws, including the federal FDA and PCPA. If the substance is a drug, its sale must be in compliance with the federal FDA and if it is a prescription drug under the FDA, the drug must be prescribed by a veterinarian. If the substance is a pest control product (pesticide), its use must be in compliance with the PCPA. In addition to adhering to Sections 3–14, as per Annex 10 of the AAR (DFO 2018), Grieg NL will notify the Regional Aquaculture Management Office (RAMO) 72 hours in advance of therapeutant use and will monitor for moribund and deceased wild fish

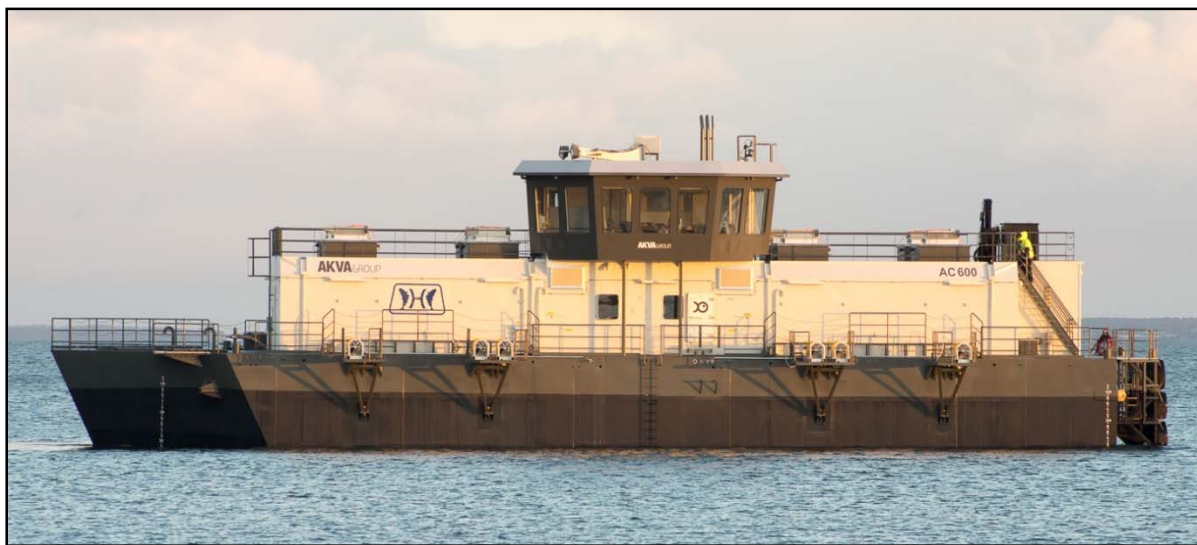
outside of the sea cage(s) for a period of 96 hours after therapeutic use. Monitoring effort and any observations of potentially affected wild fish will be recorded and reported as per AAR requirements in Annex 1 (DFO 2018).

### **3.2 Collection of Systematic and Opportunistic Data on Marine Wildlife**

The consistent presence of Project vessels at and transiting to/from active sea cage sites provides an opportunity to collect data on marine wildlife including species at risk throughout the year and across years. These data will provide information on the distribution and abundance of marine wildlife as well as biodiversity in the area. It may also afford an opportunity to examine trends in marine wildlife occurrence across years. However, it should be recognized that effort to collect data on marine wildlife will have to be balanced with the requirements of Grieg NL personnel to conduct their primary job duties, i.e., the construction, operation, maintenance and eventual decommissioning of sea cage sites.

#### **3.2.1 Systematic Observations**

Trained Grieg NL personnel will conduct periodic, systematic watches for marine mammals and sea turtles (as well as potential sightings of large fish, e.g., shark, tuna) from the primary feed/accommodation barge (Figure 3.2) located at each active sea cage site. It is anticipated that three surveys (each nominally 15 minutes in duration) will be conducted on a daily basis—in the early morning, mid-day, and early evening. Systematic surveys will be conducted when adequate survey conditions permit (i.e., visibility >1 km and Beaufort Wind Force  $\leq 4$ ).



**Figure 3.2. An example of a feed/accommodation barge.**

Marine wildlife observations will be recorded onto a data sheet and later entered into an electronic database (e.g., Microsoft Excel). Monitoring effort, sightings details (including position—latitude and longitude, distance and bearing from vessel), and environmental conditions will be recorded. Grieg NL will explore the possible use of recording data directly into a handheld tablet device or computer with dedicated software. The device will automatically record Global Positioning System (GPS) location, date/time and facilitate data entry via pre-filled menus.

### **3.2.2 Opportunistic Sightings**

Trained Grieg NL personnel on Project vessels will collect data on marine wildlife sightings (i.e., marine mammals, sea turtles, river otters, and large fish) on an opportunistic basis. This includes opportunistic sightings detected from barges at sea cage sites and crew change vessels. Grieg NL will also encourage third-party vessel providers (i.e., supply, feed, dead hold, well boat, service vessels) to record and report incidental sightings of marine wildlife. Incidental sightings will be recorded on data sheets. As a minimum, opportunistic marine wildlife sightings will be provided to DFO on an annual basis.

Trained personnel will also record observations of the following marine wildlife activity:

- Large aggregations of gregarious bird species like cormorants and gulls that may roost on sea cage infrastructure (e.g., sea cage collars).
- Major instances of piscivorous diving birds actively feeding around sea cage sites (e.g., northern gannets).
- Presence of, and predator strikes of the sea cage net from large, solitary fish (e.g., shark, tuna) or gregarious species working together (e.g., tuna, seals, river otters) in an effort to access sea cage fish.
- Bird attraction to lighting at the barge and/or sea cages at night (including weather conditions).

The collection of these data may assist Grieg NL with documenting potential bird and marine wildlife attraction to the sea cage sites. These data can help with the development of an adaptive management approach to deter wildlife interactions with the sea cages.

### **3.2.3 Species at Risk**

Grieg NL personnel will record sightings of all species at risk observed at the sea cage sites and during transit to the sea cage sites. Appendix A provides a listing (as of October 2019) of species at risk that may occur in Placentia Bay. Data will be submitted to DFO (marine mammals, sea turtles, and fish) and ECCC-CWS (birds) as appropriate. Information on the species at risk sightings will be recorded on systematic or opportunistic sighting forms as appropriate. In addition, and where possible, photos will be acquired of the species at risk. The species at risk list will be reviewed and updated on an annual basis or more frequently if required.

If a North Atlantic right whale (considered critically endangered; Endangered on Schedule 1 of the *Species at Risk Act* [SARA]) is sighted, DFO will be contacted immediately and provided with details of the sightings (time, location, heading and activity of whale).

### **3.2.4 DFO's Monitoring Program for Non-Native/Aquatic Invasive Species**

Grieg NL will assist DFO's monitoring program for Non-Native/Aquatic Invasive Species and regularly examine cages and mooring equipment for Aquatic Invasive Species occurrence. This includes reporting any incidence of vase and golden star tunicates as well as green crab.

### 3.3 Training of Project Personnel

Project personnel will receive training from experienced biologist(s) on the identification of the various marine mammal, large fish (i.e., shark/tuna), sea turtle, river otter, invasive species, and bird species that are expected to occur in Placentia Bay. Emphasis will be placed on species at risk. Marine personnel will also be trained in data recording procedures, reporting requirements, and appropriate response actions (e.g., bird strandings and marine wildlife entanglement). Training will be provided to Grieg NL marine personnel.

### 4.0 Frequency, Duration and Geographic Extent of Monitoring

The frequency, duration, and geographic extent of marine wildlife monitoring are summarized in Table 4.1. Figure 3.1 shows the locations of the sea cage sites as well as the crew change and resupply routes where monitoring will occur.

**Table 4.1. Summary of frequency, duration, and geographic extent of marine wildlife monitoring.**

| Marine Wildlife Monitoring Type        | Frequency <sup>a</sup>      | Duration             | Geographic Extent   |
|--|-----------------------------|----------------------|---|
| A. In Support of Mitigation            |                             |                      |   |
| Potential Vessel Strikes               | Each Project Vessel Transit | Life of Project      | Vessel transit routes between sea cage, crew change, and resupply sites |
| Entanglement in Sea Cage               | Daily                       | Operations Phase     | Active sea cages in each BMA  |
| Bird Strandings                        | Daily                       | Life of Project      | All Project vessels   |
| Estranged Sea Cage Equipment           | Monthly <sup>b</sup>        | Operations Phase     | Area around sea cage and adjacent shoreline (within 1 km)               |
| Therapeutant Use <sup>c</sup>          | Daily <sup>d</sup>          | Operations Phase     | Area around sea cage where therapeutant used                            |
| B. Systematic/Oppportunistic           |                             |                      |   |
| Sea Cage Sites: Systematic             | Daily                       | Operations Phase     | Visible area  |
| Opportunistic                          | When Sighted                | Life of Project      | Variable  |
| C. Species at Risk                     |                             |                      |   |
| Systematic Monitoring                  | <i>See A. and B.</i>        | <i>See A. and B.</i> | <i>See A. and B.</i>  |
| Opportunistic Sightings                | When Sighted                | Life of Project      | <i>See A. and B.</i>  |
| D. Non-Native/Aquatic Invasive Species |                             |                      |   |
|  | Daily                       | Operations Phase     | Active sea cages in each BMA  |

<sup>a</sup> The frequency of monitoring is weather dependent.

<sup>b</sup> In the unlikely event of estranged/lost sea cage equipment, monitoring will occur more frequently.

<sup>c</sup> Grieg NL will only use therapeutants as a last resort and as per the AAR.

<sup>d</sup> As per Annex 10 of the AAR (DFO 2018), Grieg NL will monitor for moribund and deceased wild fish outside of the sea cage(s) for a period of 96 hours after therapeutant use.

### 5.0 Reporting and Response Mechanisms

Reporting, and in some cases data submission, procedures for each of Grieg NL's marine wildlife monitoring components are provided below. For monitoring components which are designed to support mitigation measures, response mechanisms are also included as appropriate. An adaptive management approach will be employed to monitor and mitigate potential wildlife interactions with marine project activities. Available data will also be used to verify EIS predictions as appropriate.

## **5.1 Monitoring in Support of Mitigation Measures**

Reporting and response mechanisms for vessel strikes, entanglement, bird strandings, and therapeutic effects on wild fish are discussed below.

### **5.1.1 Potential Vessel Strikes**

Incidental sightings of marine mammals and sea turtles (as well as large pelagic fish, i.e., tunas and sharks) and any required evasive actions (i.e., change in course, reduction in speed) to minimize the likelihood of striking or close approach to marine fauna will be recorded on data sheets. These data will be submitted to DFO on an annual basis.

In the unlikely event that a marine mammal or sea turtle is struck by a project vessel the following reporting will occur:

- DFO will be contacted immediately through their 24-hour emergency contact number (1-888-895-3003) and appropriate steps will be taken to document the event.
- Additionally, any marine mammal or sea turtle accidentally struck (i.e., vessel strike) or any dead carcass will be reported immediately to the Canadian Coast Guard (CCG) on Very High Frequency (VHF) Channel 16.
- Details of the vessel strike will be documented including the information in the “Marine Mammal Interaction Form” available at <http://www.dfo-mpo.gc.ca/species-especies/mammals-mammiferes/report-rapport/observer-observateur-eng.asp>. This form and accompanying imagery (photos and/or video) will be submitted to DFO.

In the Technical Report (Section 5.3) prepared for this EEMP, Grieg NL will examine the frequency and nature of close encounters with marine mammals and sea turtles and associated evasive actions taken by Project vessels (as well as any vessel strikes) to verify EIS predictions and determine if mitigation measures require change. Any changes in mitigation measures will be discussed with DFO.

### **5.1.2 Entanglement in Sea Cage Equipment**

Monitoring effort for entanglements, both above- and below-surface sea cage components, will be recorded. Any entanglement of marine mammals, river otters, wild fish, and sea turtles will be reported immediately by phone to the Marine Mammal Coordinator, DFO NL Region. The Marine Mammal Coordinator will coordinate a response with Tangly Whales (i.e., the Whale Release and Strandings Group). Grieg NL will provide access and support (as required) to Tangly Whales to respond to the incident. Any entanglements will be carefully documented and reported to DFO.

If a bird becomes entangled, Grieg NL will follow established procedures to release the bird. Grieg NL will follow reporting requirements as stipulated in its Migratory Bird Handling Permit (which will be issued by CWS).

In the Technical Report (Section 5.3) prepared for this EEMP, Grieg NL will examine the frequency and nature of entanglements in sea cage equipment to determine if monitoring effort and mitigation measures require change. This will be done in consultation with DFO. Grieg NL will undertake more frequent

reviews of the adequacy of monitoring effort and mitigation measures for entanglements if necessary. Data will also be used to verify EIS predictions.

### **5.1.3 Bird Strandings on Project Vessels**

Required information on each bird stranding on Project vessels will be recorded in the prescribed ECCC-CWS datasheet as per the Migratory Bird Handling Permit requirements<sup>2</sup>. It is anticipated that bird strandings data will be required by ECCC-CWS on an annual basis. Grieg NL will comply with all reporting requirements.

In the Technical Report (Section 5.3) prepared for this EEMP, Grieg NL will examine the frequency and nature of bird strandings to determine if monitoring effort and mitigation measures require change. Grieg NL will undertake more frequent reviews of the adequacy of monitoring effort and mitigation measures for strandings if necessary and in consultation with ECCC-CWS. Data will also be used to verify EIS predictions.

### **5.1.4 Estranged Sea Cage Equipment**

As noted previously, of direct relevance to this EEMP, is the possibility that estranged/lost sea cage equipment may pose an entanglement risk to marine wildlife. Surveillance for any lost gear will be documented as will any interactions of lost gear with marine wildlife including any entanglements (see Section 5.1.2). Any loss of gear will be reported and described to the CCG and the DFO Conservation and Protection office in Marystown immediately upon discovery. Likewise, any loss of equipment will be reported to DFLR and retrieved as per the standard terms and conditions/requirements of the Crown Lands Lease, and Code of Containment (i.e., where it impacts containment of farmed fish)]. The Technical Report for this EEMP will include details of lost gear incidences.

### **5.1.5 Use of Therapeutants**

Monitoring effort for and observations of moribund and wild fish mortalities near sea cages during periods of therapeutant use will be recorded. This information will be provided to DFO (as per AAR Annex 10; DFO 2018) and also included in the Technical Report for this EEMP. In the unlikely event that moribund and wild fish mortalities are observed during periods of therapeutant use, Grieg NL will consult with DFO to determine the adequacy of monitoring and mitigation measures and to implement changes if necessary.

## **5.2 Collection of Systematic and Opportunistic Data on Marine Wildlife**

Data collected systematically and opportunistically on the occurrence of marine wildlife at the sea cage sites and during vessel transits will be provided to the appropriate regulatory agency in electronic format. In most cases, data will be provided on an annual basis; details are provided below.

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<sup>2</sup> Grieg NL will have a Migratory Bird Handling Permit (issued by ECCC-CWS) in place.

### **5.2.1 Birds**

Incidental sightings of birds recorded by Project personnel will be provided to ECCC-CWS on an annual basis. Data will be provided electronically (likely as an Excel file) and will also be summarized and included in the Technical Report (see Section 5.3).

### **5.2.2 Marine Mammals, Sea Turtles, and Marine Fish**

As outlined in Sections 3.1 and 3.2, trained Grieg NL personnel will collect both systematic and opportunistic data on marine mammals, sea turtles, and marine fish. Data will be provided to DFO electronically (likely as an Excel file) and will also be summarized and included in the Technical Report (see Section 5.3).

### **5.2.3 River Otters**

Trained Grieg NL personnel will record river otter observations made during systematic surveys as well as any otters sighted opportunistically. Data will be provided to Department of Fisheries and Land Resources (DFLR) electronically (likely as an Excel file) and will also be summarized and included in the Technical Report (see Section 5.3).

### **5.2.4 Species at Risk**

Grieg NL personnel will record sightings of species at risk observed at the sea cage sites and during transit to the sea cage sites. Data will be submitted to DFO (marine mammals, sea turtles, and fish) and ECCC-CWS (birds) as appropriate. Information on the species at risk sightings will be recorded on systematic or opportunistic sighting forms as appropriate. In addition, and where possible, photos will be acquired of the species at risk.

If a North Atlantic right whale is sighted, DFO will be contacted immediately (at 24-hour emergency contact number (1-888-895-3003) and via e-mail to Dr. Jack Lawson at DFO, John.Lawson@dfo-mpo.gc.ca) and provided with details of the sightings (time, location, heading and activity of whale).

### **5.2.5 DFO's Monitoring Program for Non-Native/Aquatic Invasive Species**

Grieg NL will report observations of Aquatic Invasive Species including any incidence of vase and golden star tunicates as well as green crab in their annual EEMP report. Also, the first instances of Aquatic Invasive Species will be reported to the Aquatic Invasive Species hotline (1-855-862-1815).

## **5.3 Technical Report**

An annual technical report will be prepared on or before 31 March which presents the findings of the Fish, Sea Turtles, Marine Mammals, and Seabirds EEMP as outlined in Sections 5.1 and 5.2. The report will also examine the data to verify effects predictions made in the EIS and the efficacy of mitigation measures.



## **6.0 Approach to Monitor Cumulative Effects**

The EIS Guidelines (DMAE 2018) require that each EEMP include methods for monitoring cumulative effects of the Grieg NL's Project with existing and future developments in the Project Area. As stated in the EIS, given the mitigation measures which will be implemented by Grieg NL and the general lack of spatial overlap amongst projects, the potential cumulative effects including those on marine wildlife were considered limited. It will be challenging to ascertain the cumulative effects, if any, on marine wildlife of the Project along with existing and future developments at the sea cage sites and transit routes. Visual monitoring for marine wildlife will be routinely conducted at all active Grieg NL sea cages and transit route sites during the life of the Project. Over time, these data may provide some indication of trends in marine wildlife occurrence, distribution and abundance relative to Grieg NL's activities along with other developments. Grieg NL will examine these potential inter-annual trends relative to its Project activities and other activities within and near its Project Area every five years. The findings will be presented in the Technical Report for this EEMP.

## **7.0 Procedures to Assess Effectiveness of Monitoring and Follow-up Programs, Mitigation Measures, and Recovery Programs**

As described throughout Section 5.0, data collected during the monitoring program for marine wildlife, including any mitigation actions taken, will be examined on an annual basis (or more frequently if necessary) to determine the efficacy of monitoring and mitigation measures. [Recovery programs for marine wildlife are not anticipated.] The appropriate regulatory agency (i.e., DFO, DFLR, and/or ECCC-CWS) will also be consulted and adaptive management steps will be undertaken if required. For example, if monitoring during crew change transits indicates the persistent presence of foraging whales during summer, Grieg NL, in consultation with DFO, would consider modifying the location of its transit route. Likewise, if seabirds were routinely stranding on Project barges, further changes may have to be made to change vessel lighting or increase monitoring effort for stranded birds; this would be done in consultation with ECCC-CWS.

## **8.0 Communication Plan to Describe the Results**

As per 'Condition c' in the Government of Newfoundland and Labrador's Project release letter, Grieg NL will include the results of the 'Fish, Sea Turtles, Marine Mammals, and Seabirds' monitoring program within its annual report on EEMPs. This report on EEMPs will be publicly available on the Grieg NL website.<sup>3</sup>

## **9.0 Literature Cited**

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2019. Available at:

<https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife.html> [Accessed 18 October 2019].

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<sup>3</sup> In addition, Grieg NL will publicly release all confirmed reports of disease and fish escapes within 24 hours and the use of chemotherapeutants (i.e., antibiotics, vaccinations, and anesthetics) and pesticides on an annual basis.

- DFO (Department of Fisheries and Oceans). 2019. Search aquatic species at risk. Fisheries and Oceans Canada, Ottawa, ON. Available at:  
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<http://www.assembly.nl.ca/Legislation/sr/Regulations/rc020057.htm> [Accessed 10 April 2019].
- LGL (Limited). 2018. Environmental Impact Statement of the Placentia Bay Atlantic Salmon Aquaculture Project. LGL Rep. FA0144. Rep. by LGL Limited, St. John's, NL, for Grieg NL, Marystown, NL. 528 p. + appendices.
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- SARA. 2002. Consolidated Government of Canada Bill C-5, S.C. 2002, c. 29. (Online). Available at:  
<http://laws.justice.gc.ca/eng/acts/S-15.3/index.html> [Accessed 10 April 2019].

## **Appendix A**

### **List of Species at Risk in Placentia Bay**

**Table A-1. SARA-, COSEWIC-, and ESA-listed marine species/populations and land birds that may occur in Placentia Bay.**

| Species  |                                     | SARA   |        |          | COSEWIC |      |          |      | ESA  |      |      |      |
|--|-------------------------------------|--------|--------|----------|---------|------|----------|------|------|------|------|------|
| Common Name  | Scientific Name                     | End.   | Thr.   | Sp. Con. | End.    | Thr. | Sp. Con. | Cnd. | End. | Thr. | Vul. | Cnd. |
| <b>Marine Fish</b>   |                                     |        |        |          |         |      |          |      |      |      |      |      |
| White Shark (Atlantic pop.)  | <i>Carcharodon carcharias</i>       | Sch. 1 |        |          | X       |      |          |      |      |      |      |      |
| Northern Wolffish  | <i>Anarhichas denticulatus</i>      |        | Sch. 1 |          |         | X    |          |      |      |      |      |      |
| Spotted Wolffish   | <i>A. minor</i>                     |        | Sch. 1 |          |         | X    |          |      |      |      |      |      |
| Atlantic Wolffish  | <i>A. lupus</i>                     |        |        | Sch. 1   |         |      | X        |      |      |      |      |      |
| Atlantic Cod (NL pop.)   | <i>Gadus morhua</i>                 |        |        |          | X       |      |          |      |      |      |      |      |
| Atlantic Cod (Laurentian North pop.)                               | <i>G. morhua</i>                    |        |        |          | X       |      |          |      |      |      |      |      |
| Porbeagle Shark  | <i>Lamna nasus</i>                  |        |        |          | X       |      |          |      |      |      |      |      |
| Shortfin Mako Shark (Atlantic pop.)                                | <i>Isurus oxyrinchus</i>            |        |        |          | X       |      |          |      |      |      |      |      |
| Atlantic Bluefin Tuna  | <i>Thunnus thynnus</i>              |        |        |          | X       |      |          |      |      |      |      |      |
| Cusk   | <i>Brosme brosme</i>                |        |        |          | X       |      |          |      |      |      |      |      |
| Deepwater Redfish (Gulf of St. Lawrence – Laurentian Channel pop.) | <i>Sebastes mentella</i>            |        |        |          | X       |      |          |      |      |      |      |      |
| Winter Skate (Eastern Scotian Shelf – Newfoundland pop.)           | <i>Leucoraja ocellata</i>           |        |        |          | X       |      |          |      |      |      |      |      |
| Roundnose Grenadier  | <i>Coryphaenoides rupestris</i>     |        |        |          | X       |      |          |      |      |      |      |      |
| Acadian Redfish (Atlantic pop.)                                    | <i>S. fasciatus</i>                 |        |        |          |         | X    |          |      |      |      |      |      |
| American Plaice (NL pop.)  | <i>Hippoglossoides platessoides</i> |        |        |          |         | X    |          |      |      |      |      |      |
| Deepwater Redfish (Northern pop.)                                  | <i>S. mentella</i>                  |        |        |          |         | X    |          |      |      |      |      |      |
| Lumpfish   | <i>Cyclopterus lumpus</i>           |        |        |          |         | X    |          |      |      |      |      |      |
| White Hake (Atlantic and Northern Gulf of St. Lawrence pop.)       | <i>Urophycis tenuis</i>             |        |        |          |         | X    |          |      |      |      |      |      |
| Basking Shark (Atlantic pop.)                                      | <i>Cetorhinus maximus</i>           |        |        |          |         |      | X        |      |      |      |      |      |
| Smooth Skate (Laurentian-Scotian pop.)                             | <i>Malacoraja senta</i>             |        |        |          |         |      | X        |      |      |      |      |      |
| Spiny Dogfish (Atlantic pop.)                                      | <i>Squalus acanthias</i>            |        |        |          |         |      | X        |      |      |      |      |      |
| Thorny Skate   | <i>Amblyraja radiata</i>            |        |        |          |         |      | X        |      |      |      |      |      |
| Atlantic Mackerel  | <i>Scomber scombrus</i>             |        |        |          |         |      |          | HP   |      |      |      |      |
| Alewife  | <i>Alosa pseudoharengus</i>         |        |        |          |         |      |          | MP   |      |      |      |      |
| American Shad  | <i>A. sapidissima</i>               |        |        |          |         |      |          | MP   |      |      |      |      |
| Pollock  | <i>Pollachius virens</i>            |        |        |          |         |      |          | MP   |      |      |      |      |
| Yellowtail Flounder  | <i>Limanda ferruginea</i>           |        |        |          |         |      |          | MP   |      |      |      |      |
| <b>Anadromous Fish<sup>a</sup></b>                                 |                                     |        |        |          |         |      |          |      |      |      |      |      |
| Atlantic Salmon (South Newfoundland pop.)                          | <i>Salmo salar</i>                  |        |        |          |         | X    |          |      |      |      |      |      |
| Atlantic Sturgeon (Maritimes pop.)                                 | <i>Acipenser oxyrinchus</i>         |        |        |          |         | X    |          |      |      |      |      |      |
| <b>Catadromous Fish<sup>b</sup></b>                                |                                     |        |        |          |         |      |          |      |      |      |      |      |
| American Eel   | <i>Anguilla rostrata</i>            |        |        |          |         | X    |          |      |      |      | X    |      |

| Species  |                                    | SARA       |        |          | COSEWIC |      |          |      | ESA  |      |      |      |
|--|------------------------------------|------------|--------|----------|---------|------|----------|------|------|------|------|------|
| Common Name  | Scientific Name                    | End.       | Thr.   | Sp. Con. | End.    | Thr. | Sp. Con. | Cnd. | End. | Thr. | Vul. | Cnd. |
| <b>Freshwater Fish</b>   |                                    |            |        |          |         |      |          |      |      |      |      |      |
| Banded Killifish (Newfoundland pop.)   | <i>Fundulus diaphanus</i>          |            |        | Sch. 1   |         |      | X        |      |      |      | X    |      |
| Mummichog  | <i>F. heteroclitus</i>             |            |        |          |         |      |          |      |      |      |      | X    |
| Arctic Char (landlocked)   | <i>Salvelinus alpinus</i>          |            |        |          |         |      |          | LP   |      |      |      |      |
| Lake Trout   | <i>S. namaycush</i>                |            |        |          |         |      |          | LP   |      |      |      |      |
| <b>Molluscs</b>  |                                    |            |        |          |         |      |          |      |      |      |      |      |
| Eastern Pearl Mussel   | <i>Margaritifera margaritifera</i> |            |        |          |         |      |          | LP   |      |      |      |      |
| <b>Marine Mammals</b>  |                                    |            |        |          |         |      |          |      |      |      |      |      |
| Blue Whale (Atlantic pop.)   | <i>Balaenoptera musculus</i>       | Sch. 1     |        |          | X       |      |          |      |      |      |      |      |
| North Atlantic Right Whale   | <i>Eubalaena glacialis</i>         | Sch. 1     |        |          | X       |      |          |      |      |      |      |      |
| Sei Whale (Atlantic pop.)  | <i>B. borealis</i>                 |            |        |          | X       |      |          |      |      |      |      |      |
| Northern Bottlenose Whale (1: Scotian Shelf pop./ 2: Davis Strait-Baffin Bay-Labrador Sea pop.°) | <i>Hyperoodon ampullatus</i>       | (1) Sch. 1 |        |          | (1) X   |      | (2) X    |      |      |      |      |      |
| Fin Whale (Atlantic pop.)  | <i>B. physalus</i>                 |            |        | Sch. 1   |         |      | X        |      |      |      |      |      |
| Sowerby's Beaked Whale   | <i>Mesoplodon bidens</i>           |            |        | Sch. 1   |         |      | X        |      |      |      |      |      |
| Harbour Porpoise (Northwest Atlantic pop.)   | <i>Phocoena phocoena</i>           |            | Sch. 2 |          |         |      | X        |      |      |      |      |      |
| Humpback Whale (Western North Atlantic pop.)   | <i>Megaptera novaeangliae</i>      |            |        | Sch. 3   |         |      |          |      |      |      |      |      |
| Killer Whale (Northwest Atlantic / Eastern Arctic pop. °)  | <i>Orcinus orca</i>                |            |        |          |         |      | X        |      |      |      |      |      |
| Cuvier's Beaked Whale  | <i>Ziphius cavirostris</i>         |            |        |          |         |      |          | HP   |      |      |      |      |
| Sperm Whale  | <i>Physeter macrocephalus</i>      |            |        |          |         |      |          | MP   |      |      |      |      |
| Hooded Seal  | <i>Cystophora cristata</i>         |            |        |          |         |      |          | MP   |      |      |      |      |
| Harp Seal  | <i>Pagophilus groenlandicus</i>    |            |        |          |         |      |          | LP   |      |      |      |      |
| <b>Sea Turtles</b>   |                                    |            |        |          |         |      |          |      |      |      |      |      |
| Leatherback Sea Turtle (Atlantic pop.)   | <i>Dermochelys coriacea</i>        | Sch. 1     |        |          | X       |      |          |      |      |      |      |      |
| Loggerhead Sea Turtle  | <i>Caretta caretta</i>             | Sch. 1     |        |          | X       |      |          |      |      |      |      |      |
| <b>Birds - Land</b>  |                                    |            |        |          |         |      |          |      |      |      |      |      |
| Bank Swallow   | <i>Riparia riparia</i>             |            | Sch. 1 |          |         | X    |          |      |      |      |      |      |
| Barn Swallow   | <i>Hirundo rustica</i>             |            | Sch. 1 |          |         | X    |          |      |      |      |      |      |
| Bobolink   | <i>Dolichonyx oryzivorus</i>       |            | Sch. 1 |          |         | X    |          |      |      |      | X    |      |
| Chimney Swift  | <i>Chaetura pelagica</i>           |            |        |          |         |      |          |      |      | X    |      |      |
| Common Nighthawk <sup>d</sup>  | <i>Chordeiles minor</i>            |            | Sch. 1 |          |         |      | X        |      |      | X    |      |      |
| Olive-sided Flycatcher <sup>d</sup>  | <i>Contopus cooperi</i>            |            | Sch. 1 |          |         |      | X        |      |      | X    |      |      |
| Red Crossbill  | <i>Loxia curvirostra perca</i>     |            | Sch. 1 |          |         | X    |          |      | X    |      |      |      |
| Peregrine Falcon <sup>d</sup>  | <i>Falco peregrinus anatum /</i>   |            |        | Sch. 1   |         |      |          |      |      |      | X    |      |

| Species                           |                                   | SARA   |      |          | COSEWIC |      |          |      | ESA  |      |      |      |
|-----------------------------------|-----------------------------------|--------|------|----------|---------|------|----------|------|------|------|------|------|
| Common Name                       | Scientific Name                   | End.   | Thr. | Sp. Con. | End.    | Thr. | Sp. Con. | Cnd. | End. | Thr. | Vul. | Cnd. |
|                                   | <i>tundrius</i>                   |        |      |          |         |      |          |      |      |      |      |      |
| Rusty Blackbird                   | <i>Euphagus carolinus</i>         |        |      | Sch. 1   |         |      | X        |      |      |      | X    |      |
| Short-eared Owl                   | <i>Asio flammeus</i>              |        |      | Sch. 1   |         |      | X        |      |      |      | X    |      |
| Evening Grosbeak                  | <i>Coccothraustes vespertinus</i> |        |      | Sch. 1   |         |      | X        |      |      |      |      |      |
| Gray-cheeked Thrush               | <i>Catharus minimus</i>           |        |      |          |         |      |          |      |      |      | X    |      |
| Newfoundland Gray-cheeked Thrush  | <i>C. minimus minimus</i>         |        |      |          |         |      |          | HP   |      | X    |      |      |
| Horned Lark                       | <i>Eremophila alpestris</i>       |        |      |          |         |      |          | HP   |      |      |      |      |
| Blackpoll Warbler                 | <i>Setophaga striata</i>          |        |      |          |         |      |          | MP   |      |      |      |      |
| Snowy Owl                         | <i>Nyctea scandiaca</i>           |        |      |          |         |      |          | MP   |      |      |      |      |
| American Kestrel                  | <i>F. sparverius</i>              |        |      |          |         |      |          | LP   |      |      |      |      |
| Pine Siskin                       | <i>Spinus pinus</i>               |        |      |          |         |      |          | LP   |      |      |      |      |
| <b>Birds - Aquatic</b>            |                                   |        |      |          |         |      |          |      |      |      |      |      |
| Eskimo Curlew <sup>e</sup>        | <i>Numenius borealis</i>          | Sch. 1 |      |          | X       |      |          |      | X    |      |      |      |
| Ivory Gull                        | <i>Pagophila eburnea</i>          | Sch. 1 |      |          | X       |      |          |      | X    |      |      |      |
| Piping Plover                     | <i>Charadrius melodus melodus</i> | Sch. 1 |      |          | X       |      |          |      | X    |      |      |      |
| Red Knot                          | <i>Calidris canutus rufa</i>      | Sch. 1 |      |          | X       |      |          |      | X    |      |      |      |
| Hudsonian Godwit                  | <i>Limosa haemastica</i>          |        |      |          |         | X    |          |      |      |      |      |      |
| Barrow's Goldeneye (Eastern pop.) | <i>Bucephala islandica</i>        |        |      | Sch. 1   |         |      | X        |      |      |      | X    |      |
| Harlequin Duck (Eastern pop.)     | <i>Histrionicus histrionicus</i>  |        |      | Sch. 1   |         |      | X        |      |      |      | X    |      |
| Red-necked Phalarope              | <i>Phalaropus lobatus</i>         |        |      | Sch. 1   |         |      | X        |      |      |      |      |      |
| Dunlin                            | <i>Calidris alpina</i>            |        |      |          |         |      |          |      | HP   |      |      |      |
| Pectoral Sandpiper                | <i>C. melanotos</i>               |        |      |          |         |      |          |      | HP   |      |      |      |
| Sanderling                        | <i>C. alba</i>                    |        |      |          |         |      |          |      | HP   |      |      |      |
| Semipalmated Sandpiper            | <i>C. pusilla</i>                 |        |      |          |         |      |          |      | HP   |      |      |      |
| Killdeer                          | <i>Charadrius vociferus</i>       |        |      |          |         |      |          |      | HP   |      |      |      |
| Whimbrel                          | <i>Numenius phaeopus</i>          |        |      |          |         |      |          |      | HP   |      |      |      |
| American Golden-plover            | <i>Pluvialis dominica</i>         |        |      |          |         |      |          |      | MP   |      |      |      |
| Arctic Tern                       | <i>Sterna paradisaea</i>          |        |      |          |         |      |          |      | MP   |      |      |      |
| Leach's Storm-petrel              | <i>Oceanodroma leucorhoa</i>      |        |      |          |         |      |          |      | LP   |      |      |      |

Source: COSEWIC website (2019); DFO (2019); NL ESA (2002); and SARA websites (2002, 2019); accessed October 2019.

Legend: "End." = Endangered; "Thr." = Threatened; "Sp. Con." = Special Concern; "Cnd." = Candidate Species; "Vul." = Vulnerable (equivalent to Special Concern); "Sch." = Schedule; "HP" = High Priority; "MP" = Mid Priority; "LP" = Low Priority; "pop." = population(s); "NL" = Newfoundland and Labrador.

<sup>a</sup> Anadromous fish inhabit marine waters and migrate to freshwater to spawn.

<sup>b</sup> Catadromous fish inhabit freshwater and migrate to marine waters to spawn.

<sup>c</sup> Currently under consideration for addition to Schedule 1 of SARA (SARA website 2019).

<sup>d</sup> Currently under consideration for status change under Schedule 1 of SARA (SARA website 2019).

<sup>e</sup> Although a portion of the southwards migration route of Eskimo Curlew traditionally included NL before the population collapsed in the late-1800s, Eskimo Curlew are thought to be extinct in the Study Area, with no confirmed breeding records in North America for over 100 years or confirmed sighting records since 1963 (COSEWIC 2009).