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Aquaculture Renewal Application

Licence/Lease No: 1041

Licence/lease holder:

Applicant: Kelly Cove Salmon Contact Person: Jennifer Hewitt

Nova Scotia Registry of Joint Stocks Number: _____

Revenue Canada Business Number: [redacted]

Telephone No. (Work): _____ (Home): _____ (Cell): [redacted]

Fax No.: _____ E-mail: Jennifer.Hewitt@cookeaqua.com

Mailing Address: 432 York Street Unit B

Bridgewater, NS Postal Code: B4V 0B4

Civic Address: _____

_____ Postal Code: _____

Application Materials

A complete application includes the following:

- Renewal fee (payable to Minister of Finance) according to Section 77 of the Aquaculture Licence and Lease Regulations for Nova Scotia made under Section 64, Chapter 25 of the Acts of 1996, *the Fisheries and Coastal Resources Act*
- Application Form
- Development Plan according to application
- Copy of up-to-date Shareholder's Register which sets out the shareholdings of the company (if applicable)

Public Notice and Disclosure

As part of the process for deciding on an aquaculture application, the Nova Scotia Department of Fisheries and Aquaculture ("Fisheries and Aquaculture") will disclose application information to other government bodies, including, if applicable, the Nova Scotia Aquaculture Review Board for use at an adjudicative hearing relating to the application.

Submit completed applications to: **Nova Scotia Department of Fisheries and Aquaculture, Aquaculture Division**
1575 Lake Road, Shelburne, NS B0T 1W0
E-mail: aquaculture@novascotia.ca

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In accordance with departmental policy, which seeks to promote public involvement in the process for deciding on aquaculture applications, Fisheries and Aquaculture may disclose application information – not including, however, personal or business confidential information – on the departmental website.

Privacy Statement

The personal and business confidential information collected as part of an aquaculture application will only be used or disclosed by Fisheries and Aquaculture for the purpose of deciding on the application.

All application information collected is subject to the Freedom of Information and Protection of Privacy Act ("FOIPOP") and will only be used or disclosed in accordance with FOIPOP.

By signing and submitting this form, I acknowledge that I have read, understand, and accept the above statements regarding the collection, use, and disclosure of the information provided on this form.

Signature of Applicant

[redacted]

Date

Dec 5/25

Signature of Nova Scotia Department of Fisheries and Aquaculture Designate

[redacted]

Date

December 5, 2025

NS10410 Annapolis – Licence Renewal

Finfish Marine Aquaculture Development Plan for Site #1041 Annapolis
County of Annapolis
Province of Nova Scotia

Revised
March 10, 2026

Prepared for:
Kelly Cove Salmon Ltd.
P.O. Box 33
Bridgewater, NS
B4V 2W6

Prepared by:
Sweeney International Marine Corp.
46 Milltown Blvd.
St. Stephen, NB
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EP EMPLOYER

New Brunswick Newfoundland Nova Scotia

SIMCorp File #SW2025-086

Sweeney International Marine Corp.
SIMCorp Environmental Sciences Lab
46 Milltown Blvd.
St. Stephen, NB
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[redacted]

March 10, 2026

SIMCorp File # SW2025-086

Jennifer Hewitt
Kelly Cove Salmon Ltd.
P.O. Box 33
Bridgewater, NS
B4V 2W6

Dear Ms. Hewitt:

Reference: **Application for licence renewal of aquaculture site #1041, Annapolis, Nova Scotia**

Please find enclosed the supporting materials for the above-mentioned application for a renewal of licence for the Annapolis marine aquaculture site #1041, in Annapolis Basin, NS.

If you have any questions or comments on the above-noted report, please do not hesitate to contact our office at 506.467.9014.

[redacted]
Senior Marine Environmental Biologist
Sweeney International Marine Corp.
tdaggett@simcorp.ca

cc: [redacted] (KCS)
(SIMCorp)

LIST OF SELECTED ACCRONYMS

KCS	– Kelly Cove Salmon Ltd.
SIMCorp	– Sweeney International Marine Corp.
CAI	– Cooke Aquaculture Inc.
DFO	– Department of Fisheries and Oceans Canada
EMP	– Environmental Monitoring Program
FCR	– Feed Conversion Ratio
FMP	– Farm Management Plan
GMG	– GMG Fish Services Ltd.
HDPE	– High-density polyethylene
NSDFA	– Nova Scotia Department of Fisheries and Aquaculture

PROJECT TEAM AND CONTACT INFORMATION

The project team, their qualifications, and roles with respect to the preparation of this report are summarized as follows:

Team Member	Affiliation	Role	Qualification
[redacted]	KCS	Corporate Support	Global Chief Sustainability Officer
Jennifer Hewitt	KCS	Corporate Support	Compliance Manager
[redacted]	KCS	Corporate Support	Production Manager NS
[redacted]	KCS	Survey Plan Preparation	P Eng
[redacted]	SIMCorp	Senior Marine Environmental Biologist, Atlantic Region	MSc
[redacted]	SIMCorp	Corporate Support	Chief of Operations

CONTACT INFORMATION

Proponent:

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Project Management:

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TABLE OF CONTENTS

PAGE

LIST OF TABLES

LIST OF FIGURES

APPENDICES

FACTORS TO BE CONSIDERED IN DECISIONS RELATED TO MARINE AQUACULTURE SITES

Section 1.0 OPTIMUM USE OF MARINE RESOURCES

Marine aquaculture site #1041, called Annapolis, is in Annapolis Basin, Annapolis County, Nova Scotia (Fig. 1). Kelly Cove Salmon Ltd. (KCS), the Atlantic Canadian farming division of Cooke Aquaculture Inc. (CAI), has had possession of the Annapolis site since 2006.

The licence for marine aquaculture site #1041 will expire in May 2026. KCS would like to maintain the lease for #1041 and, therefore, is making application for a licence renewal. KCS has not yet farmed on lease #1041, due to the extreme tidal currents that run through the site. KCS engineers continue to work on appropriate infrastructure design for this location. However, tentative plans are to install a 3 x 4 grid with 100-m cages.

The general area of site #1041 appears on Canadian Hydrographic Service (CHS) Nautical chart #4396 (Annapolis Basin) and National Topographic Systems Map Sector 021A (Annapolis Royal, Nova Scotia). The coordinates of the corners of the lease area are presented in Table 1. At present, there is no aquaculture gear on site.

Site #1041 is north-northeast of Digby, in Annapolis Basin. The Annapolis Basin provides many different resources for humans and animals. Fishing, especially lobster and scallops, are important activities contributing to the economic wellbeing of the communities in Digby and Annapolis Counties. In addition, Annapolis Basin is considered significant habitat for migratory and aquatic birds. The area offers a variety of tourist-related activities, including whale and bird watching, hiking, and boating.

The Annapolis marine aquaculture site is within the range of the Nova Scotia Southern Upland and Inner Bay of Fundy designated units of Atlantic salmon. Both designated units have experienced drastic declines in population over recent decades. The closest river with a remnant population of salmon is the Bear River, located ~ 4.2 km from the Annapolis marine farm. In stewardship of the nearshore environment, and recognizing potential risks to wild salmon in Nova Scotia, KCS has adopted many measures, best-practices, and state-of-the-art technologies known to greatly reduce potential impacts to wild salmon. KCS is constantly improving aquaculture practices with new and proven technologies. KCS routinely provides updated training and refreshes the knowledge of their operators in the leading best practices. Cage integrity is addressed with state-of-the-art, engineered netting and anchoring materials, extensive computational modelling of real and potential farm environments, regular and frequent failure testing, and replacement of critical components and materials. All smolt stocked into marine farms can be tracked back to the operator via DNA as per the enhanced regulations in NS. KCS and its parent company, Cooke Aquaculture Inc., are committed to salmon conservation, as evidenced by their involvement as founding members of the Fundy Salmon Recovery Project, which is working toward restoration of Inner Bay of Fundy salmon populations.

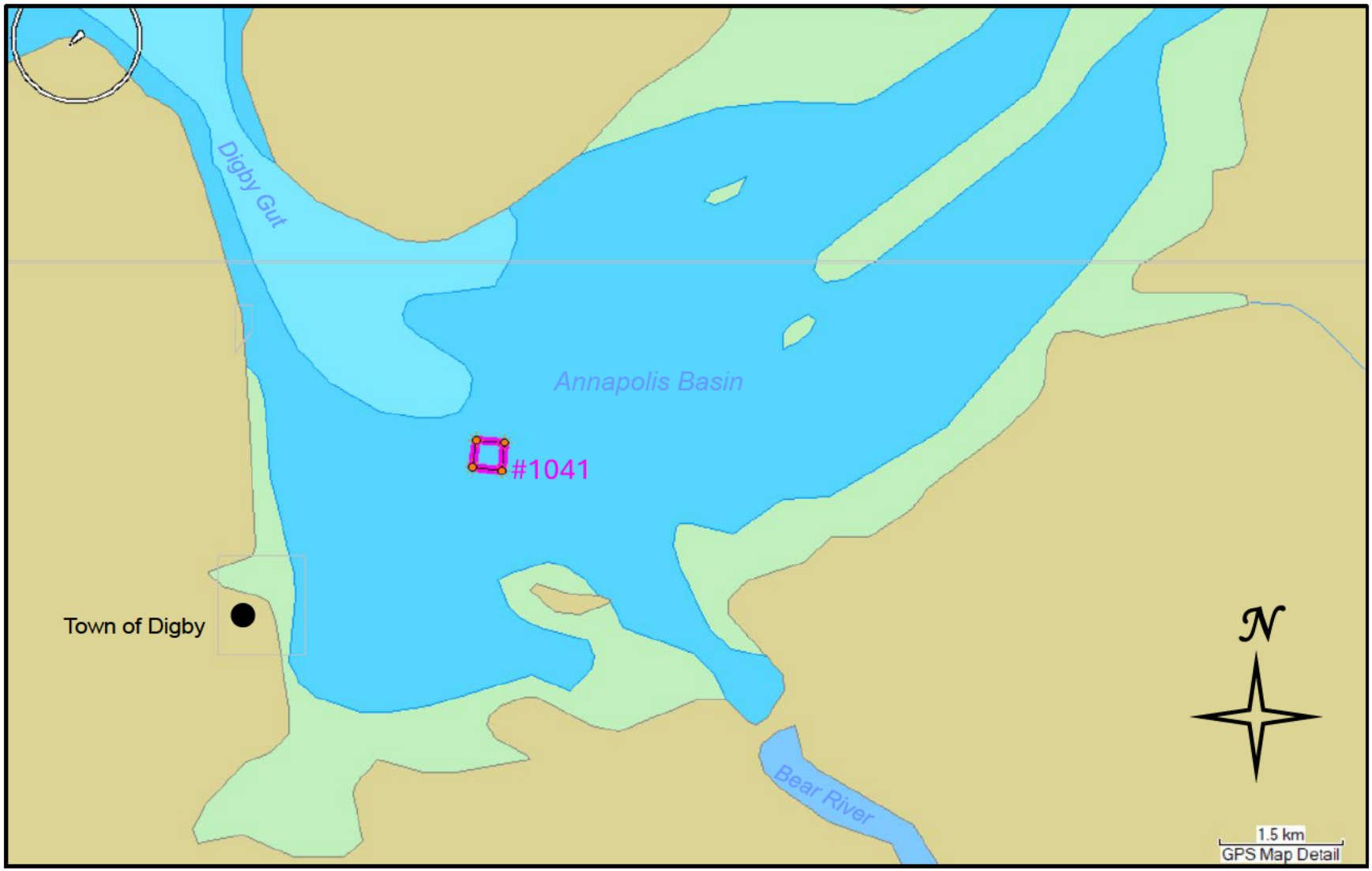
Aquaculture in Annapolis Basin has been able to successfully co-exist with other resources, providing increased employment and industry diversity. KCS is Cooke Aquaculture's farming division, and Cooke employs approximately 300 people in Nova Scotia through its various divisions. Extensive benthic and water-quality monitoring programs are in place at KCS' operational sites. KCS uses numerous operational measures to ensure wildlife interaction is as minimal and neutral as possible.

The following report and associated documents have been prepared and/or compiled by Sweeney International Marine Corp. (SIMCorp) for KCS in support of a licence renewal of #1041. SIMCorp is assisting KCS in this application through the preparation of this report and other supporting roles. All correspondence should be copied to SIMCorp.

Table 1. Approximate Coordinates of Lease #1041 in Annapolis Basin

APPROXIMATE SITE CO-ORDINATES (NAD 83)		
Corner	**Latitude**	**Longitude**
1	44º 38' 50.64"	-65º 43' 18.18"
2	44º 38' 49.32"	-65º 43' 02.22"
3	44º 38' 38.52"	-65º 43' 03.48"
4	44º 38' 39.90"	-65º 43' 19.86"
Approximate Site Center	44º 38' 44.57"	-65º 43' 11.04"

Figure 1. Location of Annapolis #1041 in Annapolis Basin



Section 2.0 The Contribution of the Proposed Operation to Community and Provincial Economic Development

2.1 Production Plan

KCS has yet to stock the Annapolis (#1041) site. However, a grid layout of 3x4 is envisioned. The grow out period would be planned for 22 months or less (Table 2). The expected fallow period is 3 months (Table 3). Dates for introductions and harvests will be determined after engineering is completed.

Table 2. 2024 Production Cycle

Species and Strain	Stock Source (hatchery)	Number of Cages and Type	Cage Size (m)	Rearing & Predator Net Depth (m)		Total Number of Fish Introduced	Mean Weight of Fish Introduced (g)	Length of Grow-out Period	Maximum Stocking Density (kg/m^3)*	Maximum Biomass (kg)**	Total Amount of Feed (kg)**	Average Harvest Weight (kg)
Atlantic Salmon, SAGA strain	undetermined	12	100	Predator	9	300,000	150	< 22 months	19	1,560,000	1,818,000	5.5
		HDPE		Rearing	8							

Table 3. Harvest Plan Details

End Date	Date of Re-entry	Expected Fallow Period
To be determined	To be determined	3 months

* Biomass will be stocked evenly among cages.
** Projected maximum values for production cycle is assuming a mortality of 10% and an FCR of 1.4:1.

2.2 Infrastructure

All active finfish farms in Nova Scotia are required to have a Farm Management Plan (FMP), which is approved by NSDFA. The plan covers fish-health management, containment management, farm operations, and environmental monitoring. Annapolis is an existing, approved site but is not currently developed for operations and therefore does not yet have an approved FMP.

The containment management is an essential part of a marine finfish farm. The cages at Annapolis will be engineered to minimize wildlife interactions with farmed fish. Above-water bird rings and netting will be installed to discourage bird encounters. Underwater predator netting during winter months drastically reduces incidents of predation.

GMG is the fish-services division of CAI and a sister company to KCS. GMG provides the moorings for installation, and the specifications will be determined by modelling of the oceanographic conditions encountered at this location. CAI engineering staff will determine all the infrastructure components are adequate as per NSDFA regulations. The cages and moorings will be modeled using guidance from the following engineering standards:

- NS 9415:2009 – “Marine fish farms: Requirements for site survey, risk analyses, design, dimensioning, production, installation and operation”
- “Marine Scotland: A Technical Standard for Scottish Finfish Aquaculture”
- ISO16488 – “International Standard: Marine fish farms – open net cage – design and operation”
- API RP 2SK – “Design and Analysis of Stationkeeping Systems for Floating Structures”
- DNV-OS-E301 – “Position Mooring”

Each area of the grid will be designed to withstand different maximum loads based on the criteria listed above. The cage components such as the handrail, float pipes, bird stands, and weight rings will be made of HDPE.

Multiple KCS vessels will be used to service the site, depending on the required task. Vessels include feeding boats, skiffs, and maintenance barges. While in use, the vessels will be tied to the cages, otherwise they will be moored to the wharf or in service at other locations. Home port for site #1041 will be in Digby at the government wharf.

2.3 Services and Suppliers

KCS is a vertically integrated company, with 14 hatcheries, 126 farm sites, 235 transport trucks, 7 processing facilities, and 288 vessels in Atlantic Canada. Despite this vertical integration, KCS uses local suppliers whenever possible, employing the services of 1269 local suppliers such as divers, mechanics, boat repair facilities, hardware providers, welders, heavy-equipment operators, crane operators, marine supplies, fuel distribution companies, environmental consultants, electricians, boat brokers, boat builders, engine suppliers, hotels, restaurants, and ferries, with $231 million spent annually on goods and services. Figure 2 illustrates the location of CAI's suppliers in Atlantic Canada, including Nova Scotia.

Figure 2. Cooke Aquaculture Atlantic Canada Supplier Locations

2.4 Employment

KCS is Cooke Aquaculture's farming division, and Annapolis is an important component of KCS' success in Nova Scotia. Through its vertically integrated family of companies, Cooke Aquaculture employs more than 2300 people in Atlantic Canada, with ~ 300 people employed in Nova Scotia. KCS' positions include feed and maintenance technicians, fish-health and environmental-management professionals, technical support, boat captains, accounting, human resources, and various administrative positions. Most positions offered by KCS in Nova Scotia are full-time.

2.5 Other Economic Contributions to the Local Community and Province

Cooke's operations contribute to employment in service and supply industries, as listed in section **2.3 Services and Suppliers**, which includes contributions to the local economy in the town of Digby and throughout Nova Scotia. Services and suppliers are locally sourced whenever possible. In addition, KCS' feed division, Northeast Nutrition Inc., is based in Truro and their distribution company, AC Covert, is based in Dartmouth.

In 2024 alone, Cooke Aquaculture sponsored over 60 Nova Scotian organizations, charities, associations, and events throughout the province, with support mainly focused on the rural communities in which KCS operates.

2.6 Adverse Economic Impacts

KCS gained possess of aquaculture lease #1041 in 2006. KCS actively communicates with other local industries and permits local fishermen to use the lease area for fishing.

Section 3.0 Fisheries Activities in the Public Waters Surrounding the Proposed Aquacultural Operation

3.1 Impact on Fisheries Activities

NSDFA's Environmental Monitoring Program Framework for Marine Aquaculture in Nova Scotia – July 2021 (Nova Scotia Department of Fisheries and Aquaculture 2021a) outlines a series of principles and criteria to guide the management process and to determine levels of monitoring and mitigation strategies for each aquaculture site. The Standard Operating Procedures for the Environmental Monitoring of Marine Aquaculture in Nova Scotia – July 2021 (Nova Scotia Department of Fisheries and Aquaculture 2021b) describes the procedures that support the application of the framework.

The Environmental Monitoring Program Framework focuses on benthic marine habitat in the immediate vicinity of the aquaculture site. Although sediment sulfide concentration is the key indicator for assessing organic loading, which is one of the primary concerns regarding aquaculture impacts on the environment, fish, and fish habitat, a suite of sediment variables is used to validate sulfide data. In addition, benthic video collected at each monitoring station is required and used to evaluate a site's performance in the event sediment samples are unattainable.

KCS and their contractors adhere to the Environmental Monitoring Program Framework and Standard Operating Procedures established by NSDFA.

3.1.1 Commercial Fisheries

There are over 500 species of fish found in Atlantic Canada and most of them are present off the Atlantic coast of Nova Scotia. However, the number of commercially harvested finfish is much less than this and can be roughly grouped into two categories: 1) groundfish, which occur on or close to the seafloor, and 2) pelagic fish, which occur in the water column usually away from the seafloor. Various shellfish and seaweeds also support commercial fisheries. In 2023, the top five groundfish and pelagic species landed in Nova Scotia included herring, haddock, redfish spp., halibut, and hake (Fisheries and Oceans Canada 2025a).

The Annapolis (#1041) aquaculture site is in Maritimes statistical district 39. Active fisheries in the vicinity of site #1041 include a few species of groundfish (including cod and some flatfish) (Rozalska and Coffen-Smout 2020). The Annapolis aquaculture site is in Annapolis Basin, Annapolis County, within 1.4 km from low tide, where the harvesting of some shellfish is prohibited (Government of Canada 2024). However, other shellfish, such as scallops and lobsters, are captured (Rozalska and Coffen-Smout 2020).

KCS has successfully operated the nearby Victoria Beach lease since 2011 and there have been no known impacts between the salmon farm and commercial fisheries in the area. KCS has been operating in the same waters as commercial lobster fisherman (allowing traps to be set within the lease boundaries), ground & pelagic fisheries, and shellfish harvesters without any adverse impacts. Since 2002, KCS has been farming another site within Annapolis Basin, known as Rattling Beach.

3.1.2 Recreational Fisheries

Local angling associations, such as the Nova Scotia Association of Anglers and Hunters do not record landing numbers.

Tidal recreational fisheries in Nova Scotia include Atlantic sturgeon, eel, gaspereau, smelt, and striped bass. No licence is required for either of these species if fishing in tidal waters (Fisheries and Oceans Canada 2025b). Fishing for these species could occur in the vicinity of aquaculture lease #1041, but the lease does not block access to these recreational fisheries.

The Annapolis aquaculture site is within clam harvesting area 2: which includes the inland and tidal waters of Digby County, Annapolis County, and Kings County. Harvesting of shellfish is always prohibited within 125 m of a wharf or aquaculture operation, for example, finfish cages (Fisheries and Oceans 2022).

The recreational scallop fishery requires a licence from DFO. Licence conditions specify the season dates and minimum scallop size. The daily bag limit is 100 scallops (Fisheries and Oceans Canada 2025c). While scallops could be harvested by recreational divers if further than 125 m from the cages of the Annapolis lease, water currents would make the site unappealing as a recreational dive site for scallop fishing. The future presence of an aquaculture site at lease #1041 is not expected to impact recreational scallop fisheries.

Recreational licences for harvesting of marine worms are available on an open-entry basis from DFO. The Annapolis aquaculture site is in marine worm harvest area 2. Marine worm harvesting is conducted by hand or with hand-held tools on mud flats throughout Maritimes Region (Fisheries and Oceans Canada 2025c) and would not occur within lease #1041.

3.1.3 Aboriginal Fisheries

Mi'kmaq of Nova Scotia harvesters have aboriginal and treaty rights to fish and do not require provincial fishing licences or need to follow provincial seasons. Mi'kmaq of Nova Scotia harvesters do have to follow provincial regulations related to safety and measures necessary for conservation, such as species at risk (Nova Scotia Canada 2021a). In Digby and Annapolis Counties, herring, bluefin tuna, alewives/gaspereau, elvers, soft shell clam, sea scallop, lobster, Jonah crab and green crab were landed in 2020 - 2021. Gear used for all fisheries included rakes/tongs, angling, drag, gill/drift nets, traps, and electric harpoon (D. Eberhard, pers. comm.).

3.2 Impact on Fisheries Activities

Standard best management practices for rearing fish in a marine environment are followed at the site. These practices have controls in place to mitigate potential environmental effects on fish and fish habitat. The site must also have a selection of additional mitigation strategies to apply if an environmental compliance threshold is exceeded (refer to section **3.2.1 Environmental Impact Mitigation Strategies**).

3.2.1 Environmental Impact Mitigation Strategies

Mitigation strategies must be based on best management practices and a hazard analysis of environmental impacts. For the environmental-impact mitigation plan, hazards are identified for each operational process, and measures to control the hazard, in the form of procedures and policy, must be outlined. Operational aquaculture sites in Nova Scotia must have an FMP, which contains site-specific mitigation strategies which are reviewed annually and amended after every production cycle by NSDFA. For this site, there is no FMP; however, one would be developed prior to site development and stocking.

Net washing may contribute to benthic impacts if not done correctly and frequently. KCS nets are cleaned regularly during the warmer months to ensure that the amount of fouling remains minimal. KCS has invested in remotely operated net washing equipment to ensure the proper resources are available to wash the nets on a regular schedule. Nets are washed every two weeks from June to October, except for during periods of extreme tide. This schedule is based on monitoring of biofouling levels on nets. A similar schedule would be adopted for site #1041.

If poor environmental performance is determined through monitoring, mitigation must be implemented as stated in the Environmental Monitoring Program Framework. Furthermore, an updated mitigation plan to address the poor environmental performance must be added to the FMP and submitted to NSDFA. A healthy marine environment is vital to an aquaculture site's operation. If the marine environment is poor enough to affect fishing activities, it would also be detrimental to the site's production.

KCS provides detailed maps and diagrams of their sites when requested. These maps and diagrams show the location of all above-water and underwater infrastructure, thus informing fishing efforts. KCS reports harmful algal blooms to the province of Nova Scotia, potentially benefiting invertebrate fishing activities near their sites.

Section 4.0 Oceanographic and Biophysical Characteristics of the Public Waters

4.1 Oceanographic Environment

4.1.1 Wind

The Annapolis aquaculture site #1041 is in Annapolis Basin, east of Digby and north of Bear Island. The site is sheltered by the surrounding land, with the most significant wind direction from the east-northeast, to which the site is exposed to a 15-km fetch.

The closest weather station from which hourly wind-speed and direction data are available is the Brier Island station located on Brier Island at N44˚ 17’ 09.000” W66˚ 20’ 48.000” (Government of Canada 2021). Data collected between January 1, 2012 and December 31, 2021 were used to produce the wind-rose plot of Figure 3. Based on this data, the most common winds in the Brier Island area occur between 145º and 165º (coming from approximately the south-southeast). The strongest winds are from the west-northwest to the northwest. The most common wind-speed class is 7 to 11 knots (Fig. 4). Maximum wind speed and direction recorded at the Brier Island weather station is presented in Table 4.

Figure 3. Wind-rose Plot of Brier Island Weather Station Data Collected Between January 1, 2012 and December 31, 2021
Note: the bars on the plot indicate the direction the wind was coming from; Data sourced from Government of Canada (2021)

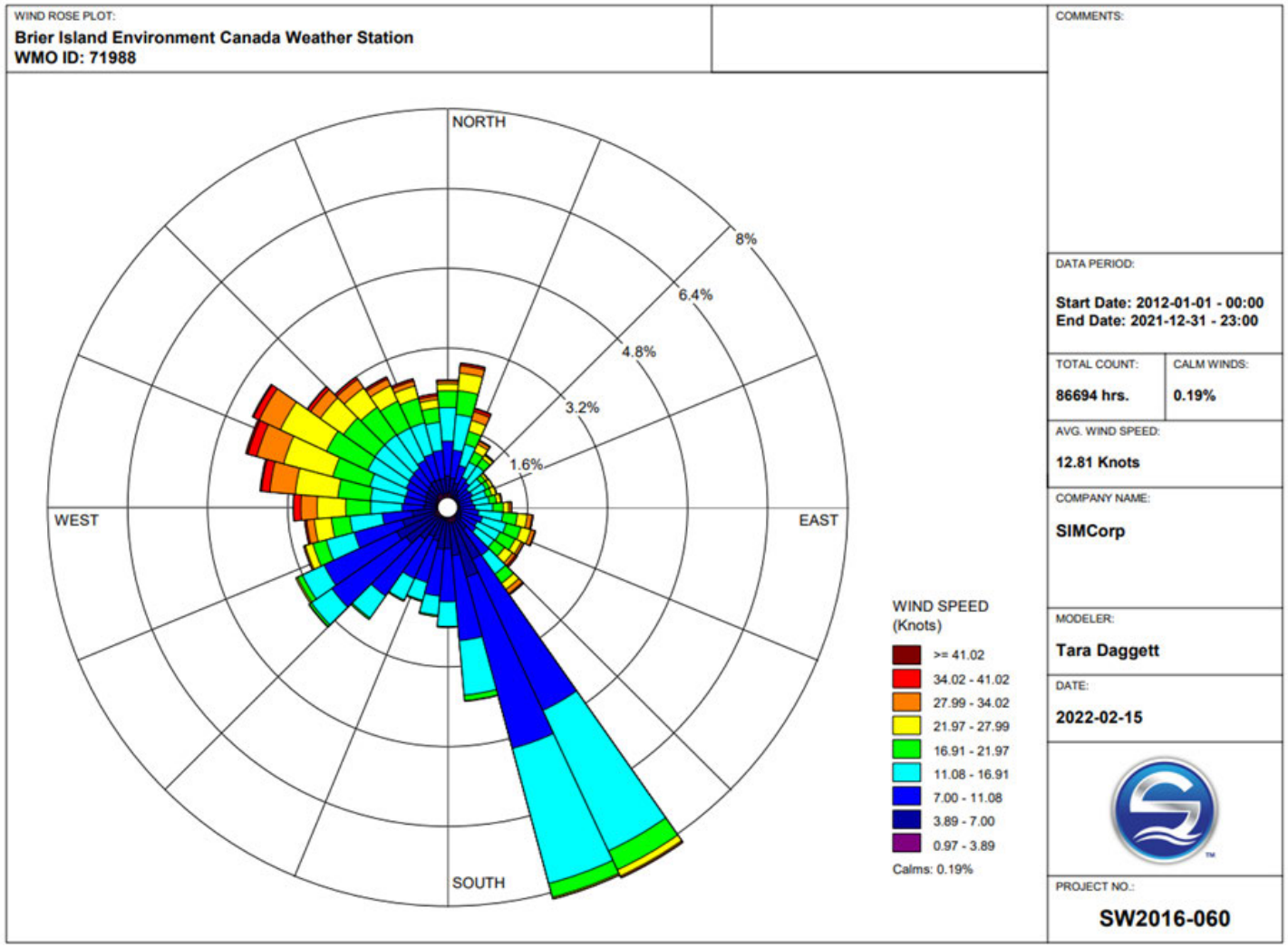


Figure 4. Frequency of Wind Speed Observed at the Brier Island Weather Station between January 1, 2012 and December 31, 2021
Data sourced from Government of Canada (2021)

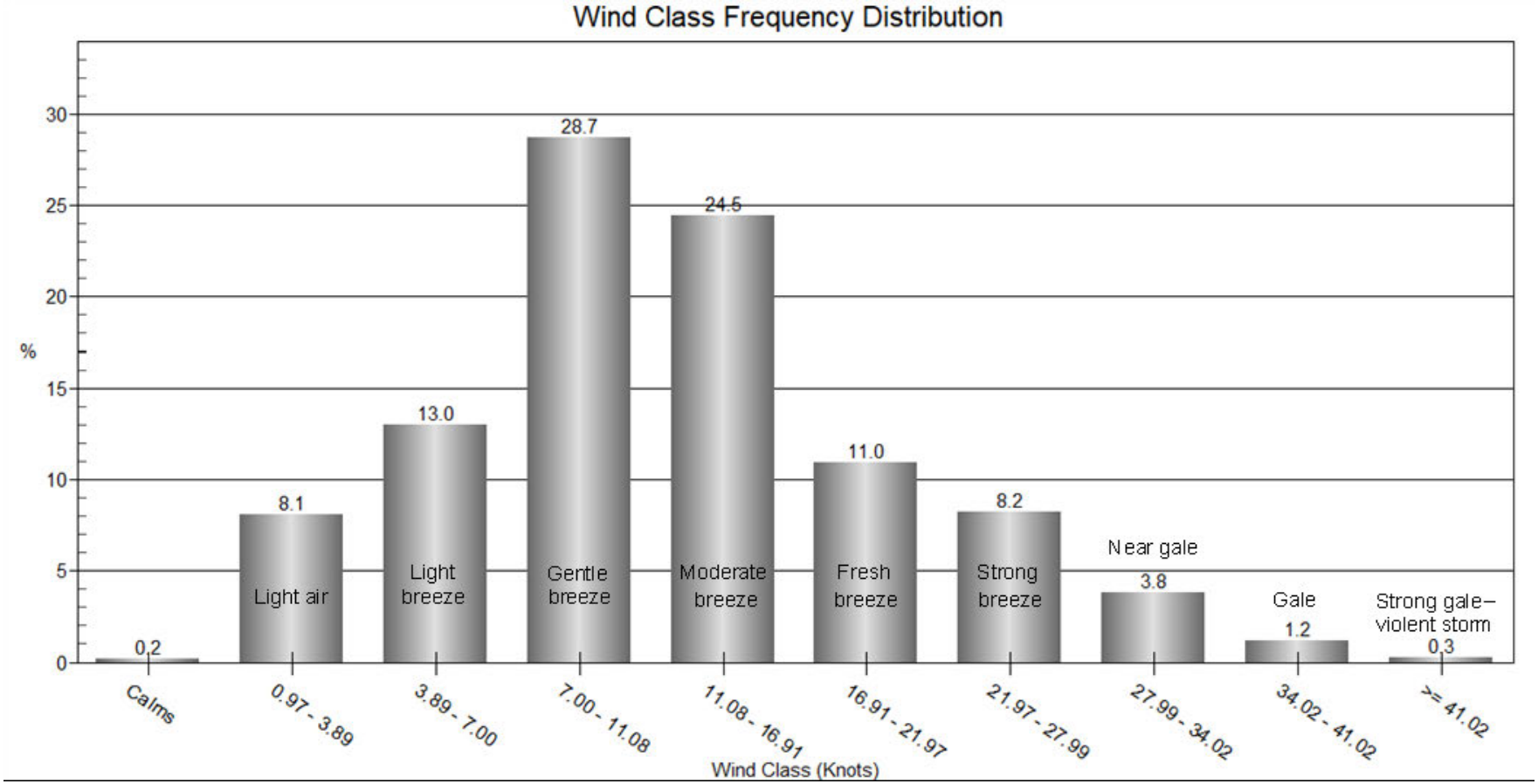


Table 4. Maximum Wind Speed and Direction Measured at the Brier Island Weather Station
Note: current to December 31, 2021(Government of Canada 2021)

Date of Maximum Wind of the Year	Wind Speed (knots)	Wind Direction
November 13, 2021	46	ESE
May 9, 2020	44	W
September 7, 2019	46	N
January 4 & November 14, 2018	45	SE & W
February 13, 2017	49	N
February 16, 2016	50	SE
February 15, 2015	51	NNW
March 26, 2014	58	NNW
February 17, 2013	51	W
December 30, 2012	49	NW

4.1.2 Waves

The effect of waves generally diminishes with distance into the Bay of Fundy, with mean significant wave height being 1.0 to 1.6 m in the outer Bay of Fundy and Gulf of Maine, 0.5 to 1.0 m in the mid-Bay, and < 0.5 m in the upper Bay (Li et al. 2015). Maximum significant wave heights can reach 5 to 6 m in the outer Bay but are generally < 4 m in the mid-Bay and upper Bay (Li et al. 2015).

Wind and wave conditions for site #1040 in Annapolis Basin were described by Karimi and Steinke (2020). For site #1040, the largest waves are generated from the south and reach maximum heights of 0.9 m (10-year return) and 1.1 m (50-year return). Given the proximity of site #1041 to site #1040, similar wave conditions are expected.

4.1.3 Extreme Storm Events and Storm Surge

Nova Scotia is sometimes subject to extreme weather conditions. Wind and wave damage caused by storms and ice damage during extremely low temperatures are environmental hazards. Employing proper gear and using the most recent technologies for cage design and construction, as well as routine inspection and maintenance, will help prevent any unfavourable effects on the cage grid caused by weather and climate extremes. In New Brunswick, Nova Scotia, and Newfoundland, KCS has several high energy sites, which are exposed to strong winds and large waves. The grid and anchoring systems to be used on site #1041 in Annapolis Basin will be engineered to be successful at such high energy sites. The plastic, circular cages and grid components that will be employed by KCS will be engineered to withstand expected conditions at this location. During extreme weather conditions, personnel would not be working on the cage site. Once the extreme weather passed, crews would examine the cage system and fish stock for damage. If damage was sustained, repairs would be carried out as necessary. Any significant damage would be reported to NSDFA.

4.1.4 Currents

Collection of local current speed and direction data throughout the water column has not been completed for site #1041. However, current data was collected from September 8 to October 17, 2011 using a 300-kHz Acoustic Doppler Current Profiler (ADCP) deployed by SIMCorp at site #1040. The current meter was deployed in approximately 21 m of water, at coordinates N44° 40.117’ W65° 43.298’.

Throughout the water column, the most common flow was in a general western direction, with a categorical mode of 265 to 275 degrees (Table 5). The overall, average, current speed throughout the entire water column was 31.2 cm/s. Mean current speeds were 23.7 cm/s near bottom and 41.0 cm/s at the surface. The most frequently observed speed class, throughout the water column, was 24.0 - 32.0 cm/s, and current velocities below 35.0 cm/s represented 60.1% of the measurements. Current velocities below 7.0 cm/s were only observed 6.8% of the time whereas current velocities above 56.0 cm/s accounted for 8.8% of profiles recorded throughout the deployment. Current speeds above 60 cm/s occurred at each observable depth and were more common near the surface than at depth, with maximum velocities exceeding 100 cm/s within the uppermost 7 m of the water column. The higher energy conditions near the surface are likely the result of strong tides and the influence of the Annapolis River.

While the current data collected at site #1040 provides an estimate of the currents experienced at #1041, it is KCS’ understanding that the currents at #1041 are stronger than #1040.

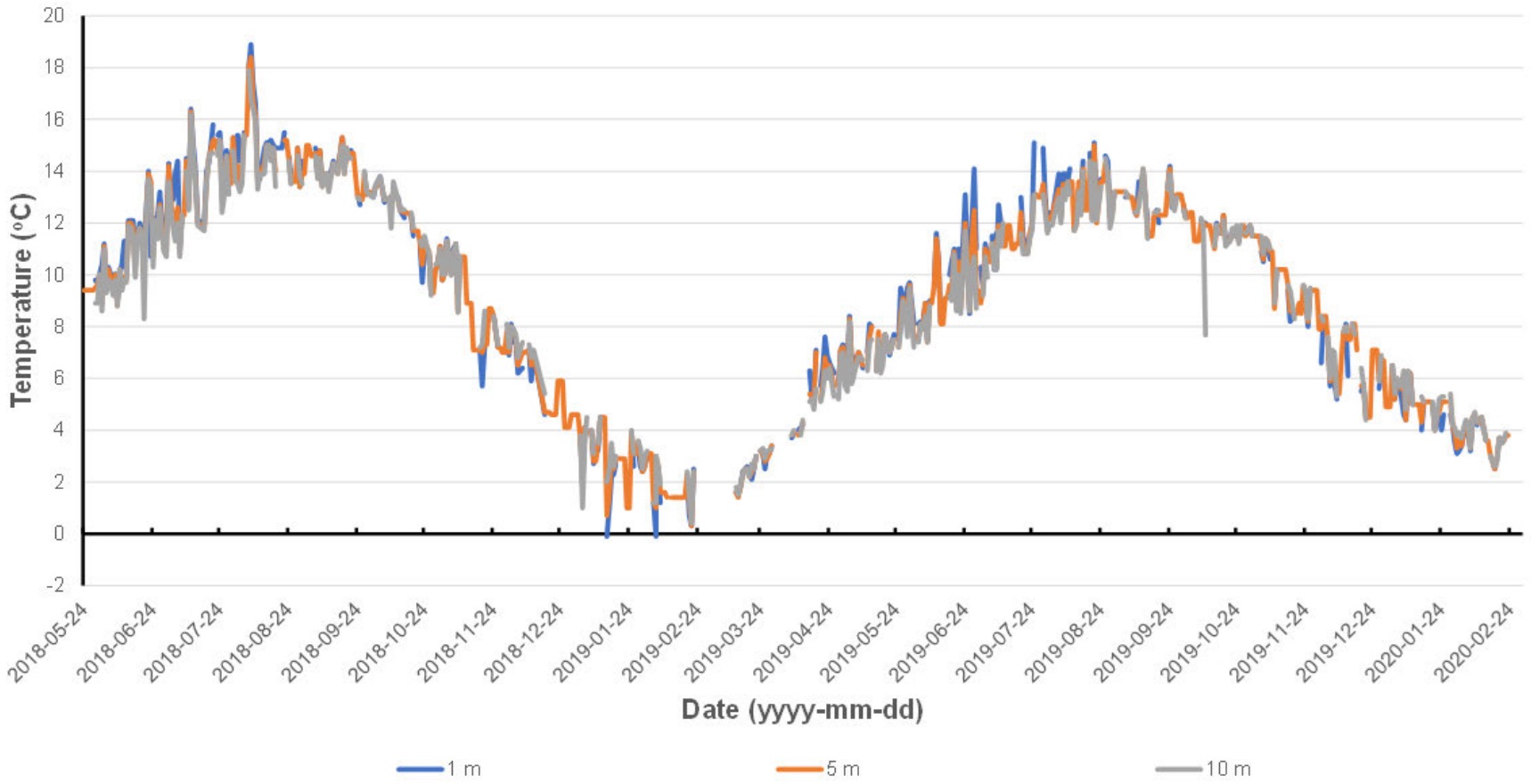
Table 5. Current Data Summary Statistics for Victoria Beach

Distance from Bottom (m)	Distance from Surface (m)	Speed Most Frequent (cm/s)	Speed Minimum (cm/s)	Speed Average (cm/s)	Speed Maximum (cm/s)	< 7.0 cm/s (%)	< 35.0 cm/s (%)	> 56.0 cm/s (%)	Direction Highest Frequency (°)
4	17	16.0 - 24.0	0.1	23.7	74.2	8.7	80.9	1.6	265-275
5	16	24.0 - 32.0	0.2	25.3	80.6	6.2	75.9	2.4	265-275
6	15	24.0 - 32.0	0.5	26.6	85.2	8.6	71.7	3.0	265-275
7	14	24.0 - 32.0	0.5	27.7	87.6	7.7	68.5	3.9	265-275
8	13	24.0 - 32.0	0.6	28.7	88.2	7.1	65.8	4.6	265-275
9	12	24.0 - 32.0	0.0	29.6	89.0	6.4	63.9	5.3	265-275
10	11	24.0 - 32.0	0.4	30.3	93.5	6.6	61.9	6.0	265-275
11	10	24.0 - 32.0	0.4	31.0	94.0	6.2	59.5	6.8	265-275
12	9	32.0 - 40.0	0.5	31.7	96.0	6.2	58.0	7.7	265-275
13	8	32.0 - 40.0	0.5	32.3	99.4	6.7	56.3	8.6	265-275
14	7	32.0 - 40.0	0.1	33.0	100.3	6.5	54.6	9.9	265-275
15	6	40.0 - 48.0	0.4	33.9	103.4	6.4	53.0	11.8	265-275
16	5	48.0 - 56.0	0.4	34.8	103.7	6.2	50.9	13.7	265-275
17	4	48.0 - 56.0	0.3	36.4	105.0	6.0	47.8	16.8	265-275
18	3	48.0 - 56.0	0.1	39.4	105.7	2.2	41.4	22.0	265-275
19	2	48.0 - 56.0	0.4	41.0	109.3	5.2	38.9	26.8	265-275
Depth Averaged		24.0 - 32.0	0.0	31.2	109.3	6.8	60.1	8.8	265-275

4.1.5 Temperature

Temperatures at the Victoria Beach aquaculture site were recorded and collected by KCS between the dates May 24, 2018 and February 23, 2020 (Fig. 5). Given the proximity of #1041 to #1040, temperatures are expected to be the same. The minimum water temperature experienced was approximately -0.1°C, which occurred on January 14 and February 5, 2019 at 1 m below the surface. The maximum temperature recorded was approximately 18.9°C on August 7, 2018 at 1 m deep. Water temperatures at 5 and 10 m deep remained above 0°C. Keizer et al. (1996) reported a similar temperature range for the Annapolis Basin, with a minimum value of -0.11°C and a maximum of 17.5°C. The existing, successful aquaculture site at Victoria Beach would indicate that the temperatures in this area are tolerable for Atlantic salmon.

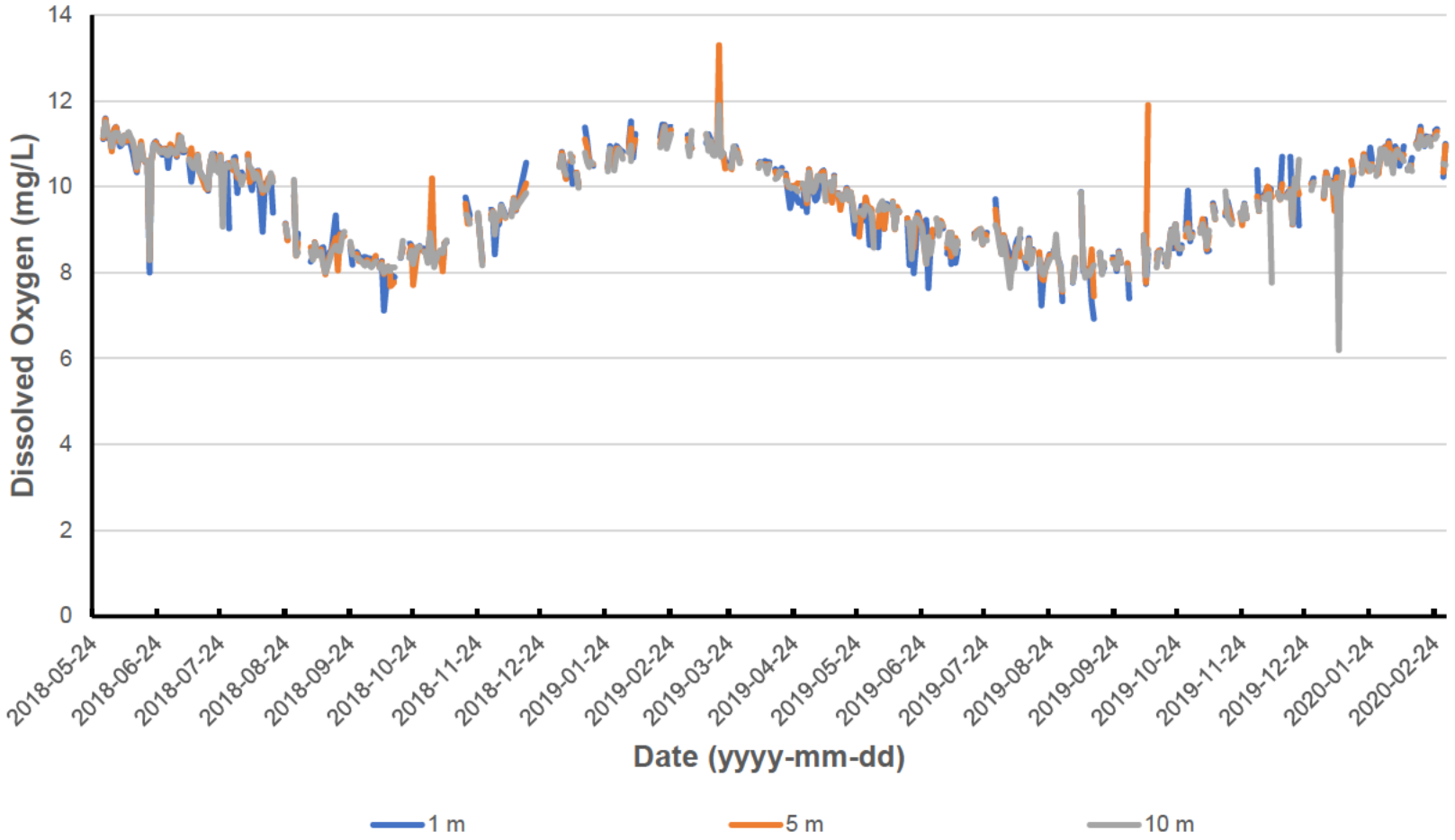
Figure 5. Water Temperatures at Site #1040



4.1.6 Oxygen

Dissolved oxygen (DO) concentrations at the Victoria Beach #1040 aquaculture site were recorded by KCS staff during site operations for the 2018 year class. Given the proximity of #1041 to #1040, the DO is expected to be the same. The minimum DO value recorded was approximately 6.2 mg/L on January 2, 2020 at 10 m below the surface; however, this was an anomaly since DO is typically around 10 mg/L at this time of year. The second lowest DO value was 6.9 mg/L, recorded on September 14, 2019 at 1 m deep. The maximum value recorded was approximately 13.3 mg/L on March 19, 2020 at 5 m deep. For adult salmon, the lower limit of DO for optimal growth is generally accepted as 6 mg/L. The Victoria Beach site typically displays DO values well above this threshold. Figure 6 displays DO-concentration trends from the 2018 production cycle at Victoria Beach.

Figure 6. Dissolved Oxygen at Site #1040



4.1.7 KCS Mitigation Strategy

Water quality is monitored at KCS farm sites because of the uncertainty of natural cycles and processes such as season, thermoclines, weather, haloclines, algal blooms, etc. Monitoring specific water parameters aids the producer in dealing with fish health and feeding regimes. Mitigative actions will be taken when conditions are less than optimum.

Requirements for water-quality monitoring and mitigation strategies will be contained in the site-specific FMP, which will be developed when introductions of fish are planned for site #1041.

KCS uses Fishtalk, a software system, to track water-quality parameters such as oxygen, temperature, and turbidity, as well as other records including inventory (biomass, fish number, average weight), feeding (type and quantity), and fish density.

4.2 Environmental Monitoring

As stated in section **3.1 Impact on Fisheries Activities**, NSDFA's Environmental Monitoring Program Framework for Marine Aquaculture in Nova Scotia – July 2021 (NSDFA 2021a) and the Standard Operating Procedures for the Environmental Monitoring of Marine Aquaculture in Nova Scotia – July 2021 (NSDFA 2021b) provide a means for NSDFA to monitor the environmental performance of active aquaculture sites in Nova Scotia. KCS and their contractors adhere to the Environmental Monitoring Program Framework and Standard Operating Procedures established by NSDFA. The FMP will contain site-specific mitigation strategies which are reviewed annually and amended after every production cycle by NSDFA.

4.3 Site Design

KCS has spent 30 years researching the mooring, grid, and cage components that are used on their aquaculture sites. KCS uses an in-house professional engineer to complete modeling and engineering analyses on the components to ensure that they can withstand the extreme conditions anticipated. Each site operated by KCS in NS has an Infrastructure Analysis Report approved by NSDFA. For site #1041, the engineering process has not yet been completed. However, tentative plans are to install a 3 x 4 grid with 100-m cages (Fig. 7 & 8).

Figure 7. Annapolis Site Development Plan Showing Cage Configuration

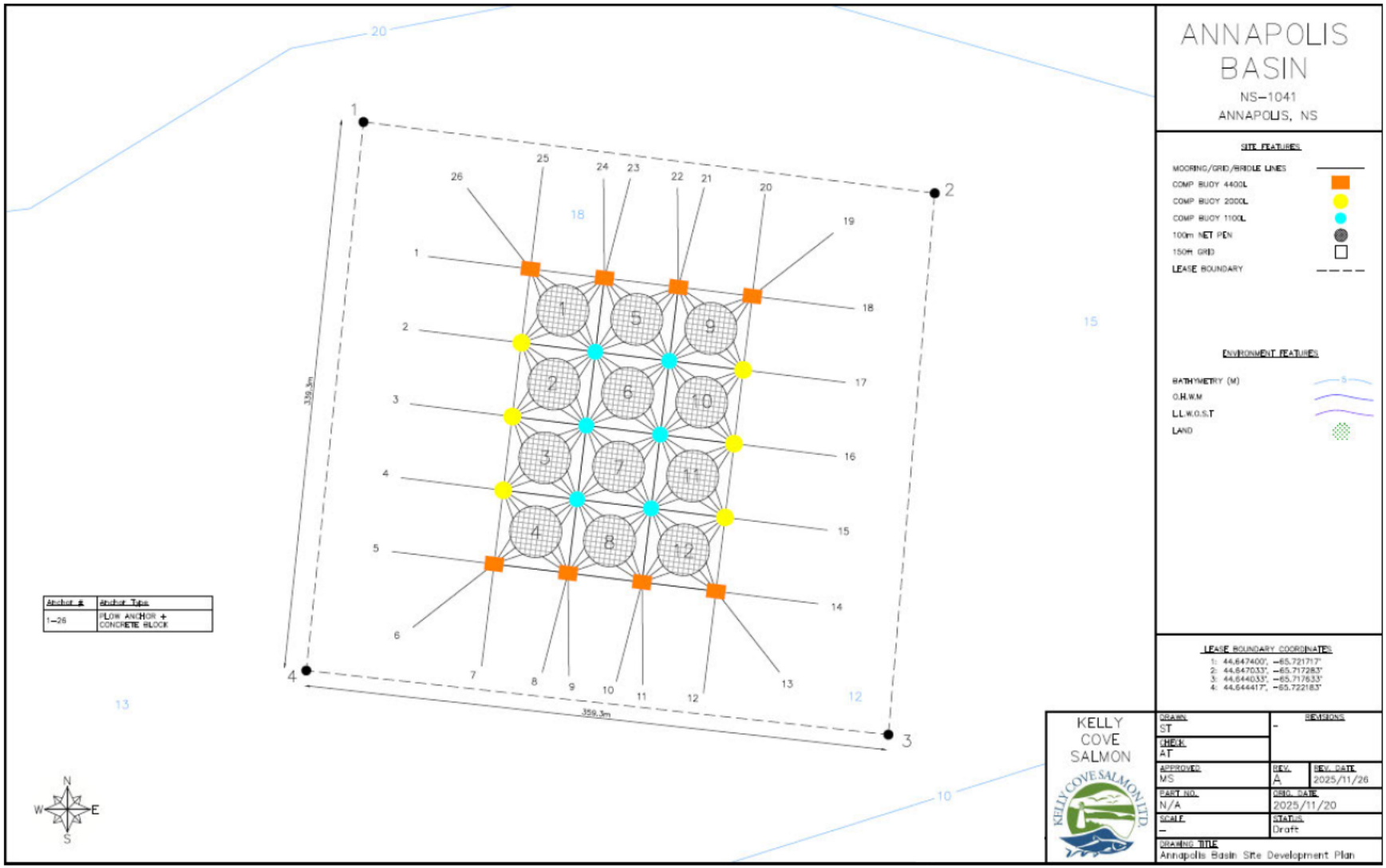
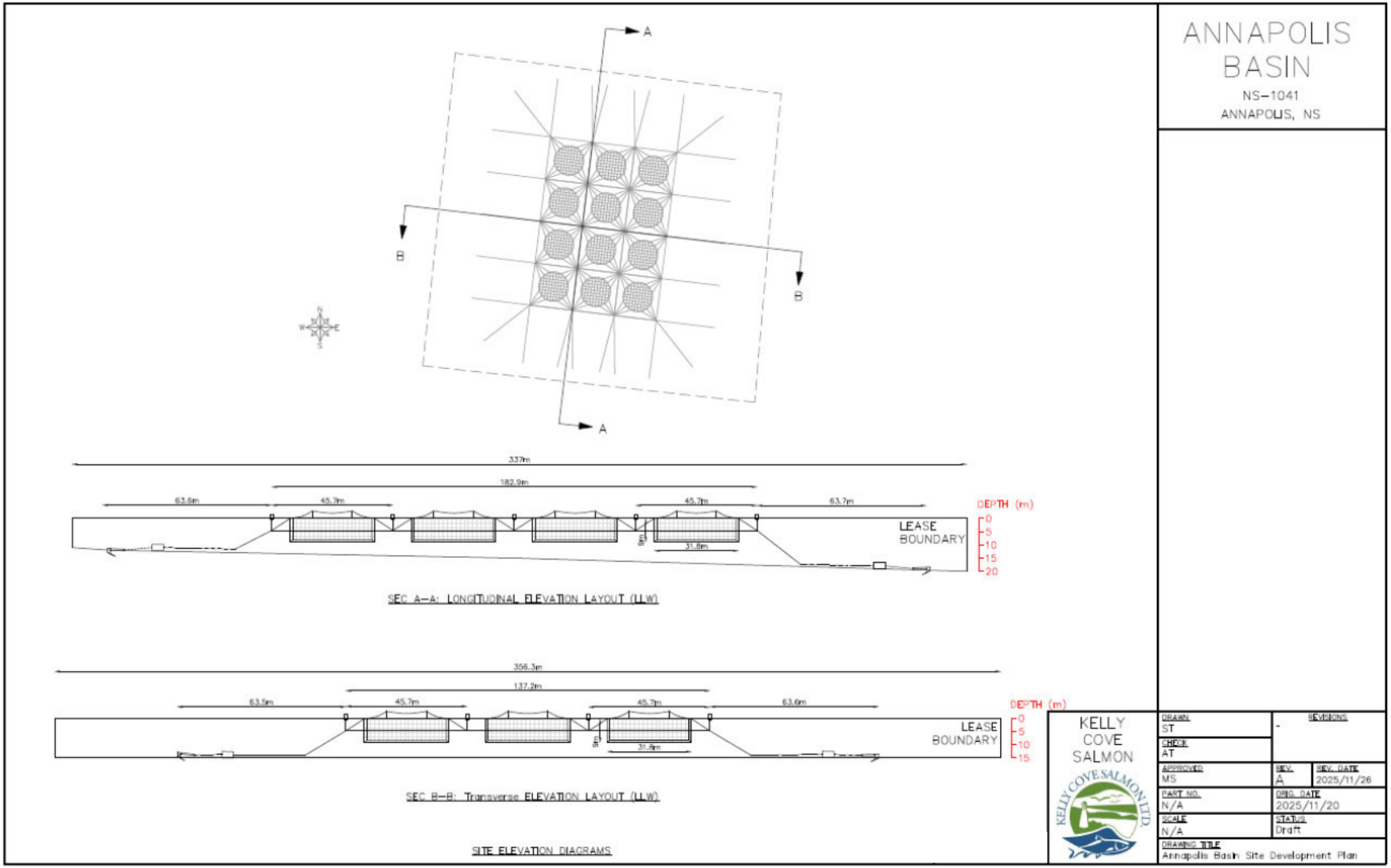


Figure 8. Annapolis Cross-sectional Plan



Section 5.0 The Other Users of the Public Waters Surrounding the Proposed Aquacultural Operation

5.1 Impacts to Other Users Including Wildlife

The Annapolis site was first licenced to KCS in 2006. It is north of Bear Island in Annapolis Basin. There are no properties within 1 km of site #1041. The closest land is Bear Island at ~ 1.5 km.

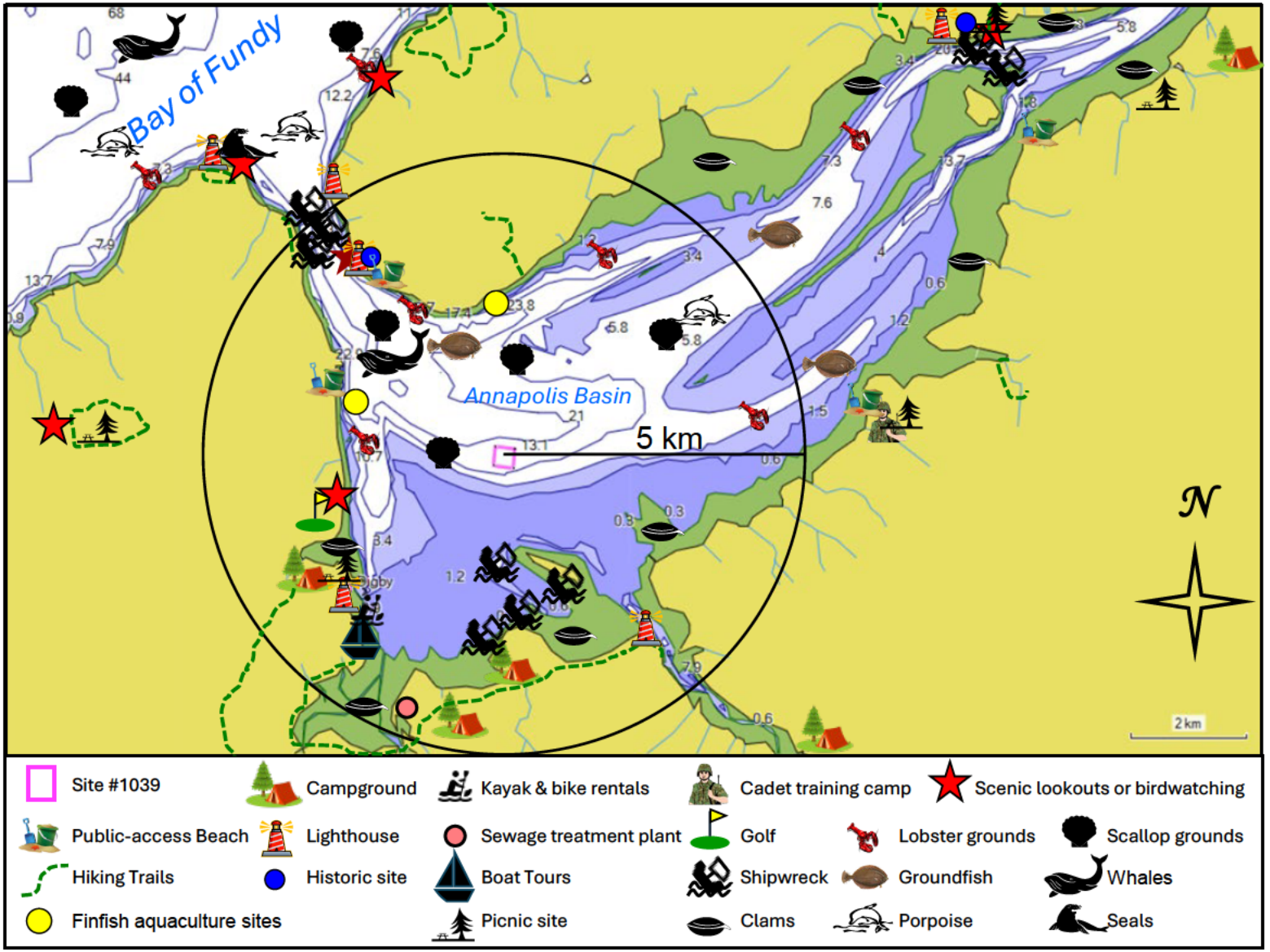
Commercial fishermen, pleasure craft operators, and a few tour operators are the only known human users of this section of Annapolis Basin.

Other users in the vicinity of the Annapolis aquaculture lease include outdoor enthusiasts and marine wildlife, including migratory birds (Nova Scotia Canada 2021b). A general resource map (Fig. 9) showing other users is made available in the following sections.

5.1.1 Adjacent Property Owners

There are no properties within 1 km of site #1041. The closest land is Bear Island at ~ 1.5 km.

Figure 9. Resource Map of the Area around the Annapolis Site



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5.2 Impacts by Other Users Including Wildlife

5.2.1 *Wildlife*

When site #1041 is developed and readied for fish introductions, each cage will be equipped with a primary net for fish containment, a predator net to deter predators, and a bird net.

Predator nets surrounding the primary nets will be in use year-round to aid with predator deterrence. Measures taken to protect fish from predators are always carried out in a manner that considers predator welfare and does not endanger the predator population.

To deter birds and to mitigate against interactions, each cage containing fish will be equipped with a bird stand and net for the duration of the grow-out. These stands and nets remain in place during the production cycle but may be temporarily lifted during activities such as mortality dives, net washing, fish transfers, or treatments. KCS performs and documents surface inspections to ensure netting and gear are maintained in good working order for all their marine sites. At minimum, weekly bird-net inspections are performed.

KCS operates with a Wildlife Interaction Plan (WIP). The WIP outlines all control measures and special requirements as they relate to wildlife encounters at the site. Birds are specifically addressed in the WIP. The WIP contains prevention and control measures for wildlife (Appendix A).

5.2.2 *People Interaction*

Interaction with people outside of KCS will be inevitable. Use of the government wharf in Digby will contribute to this. Interactions with people and organizations outside of KCS can raise concerns for biosecurity, pollution, and safety of site staff. All KCS aquaculture sites have a wharf-usage biosecurity procedure, which considers other users of the wharf

When site #1041 is stocked, visitors will be welcomed and will be expected to follow basic biosecurity and health and safety (H&S) rules. This helps ensure that all parties on the site remain safe. The Site Management will confirm with the Area Manager that any visitor has approval to be on site if the Site Manager was not previously informed. All visitors must sign the logbook. Visitors must change their footwear prior to stepping on site; rubber boots will be provided from the office. All visitors must wear a PFD while travelling to/from the site and while on site, and the use of footbaths and proper hygiene will be mandatory. By adhering to strict biosecurity, H&S rules, and visitor protocols, KCS will provide a safe environment for employees, visitors, and the fish on site.

Section 6.0 THE PUBLIC RIGHT OF NAVIGATION

6.1 Navigation Protection Program Approval

6.1.1 Notice of Works

Transport Canada requires a notice of works form to notify the Navigation Protection Program (NPP) regarding a proposed work or change to an existing work in navigable waters. An application for approval will be filed via the online portal for site #1041 in Annapolis Basin once the site design and plans are complete.

6.1.2 Project Description

The lease will have to incorporate all proposed aquaculture-related gear, above and below the water line. Installation of specific buoys to mark the lease area will have to be completed as per Transport Canada's requirements.

Section 7.0 THE SUSTAINABILITY OF WILD SALMON

7.1 Identification of Local Salmon Populations

The Annapolis marine aquaculture site is in the range of the Nova Scotia Southern Upland population of Atlantic salmon. There are at least 72 rivers in the Southern Uplands region thought to have historically held Atlantic salmon (Bowlby et al 2013a). The Southern Upland region of Nova Scotia is divided into three salmon fishing areas: SFA 20, SFA 21, and part of SFA 22. The marine aquaculture site in Annapolis Basin is in SFA 22. The SFA 22 includes the traditional range of the Nova Scotia Southern Upland (SU) population of Atlantic salmon, as well as the Inner Bay of Fundy (IBoF) population of Atlantic salmon. The SU salmon populations differ from the IBoF stocks in that they migrate to the Northwest Atlantic off the west coast of Greenland and have a significant 2 sea-winter (2SW) component to their life history, while the IBoF population is thought to remain in the Bay of Fundy/Gulf of Maine (DFO 1998). Notable salmon rivers of SFA 22 connected to the Annapolis basin are the Annapolis/Nictaux/Round Hill, Bear, and Moose Rivers.

Historically, these regional rivers supported strong salmon populations (Dunfield 1985). DFO stock-status reports, most of which pre-date any significant local commercial aquaculture activity (mid 2000's), indicate an increasingly dire condition of the local stock. According to the DFO Science Stock Status Report D3-12 (1998), all commercial fisheries of wild salmon, due to reduced catches, were closed in 1985. Following subsequent local salmon declines, all remaining recreational and aboriginal fisheries were also closed by 1990. Extensive regional electrofishing surveys conducted in 2000 found remaining salmon in only 28 of 52 rivers surveyed (54%), and more recent surveys conducted in 2008/2009 indicated continuing decline, with remaining salmon in only 21 of 54 rivers surveyed (39%) (DFO 2011). Although adjacent rivers of the Annapolis Basin watershed (Annapolis, Bear, Moose, Round Hill Rivers) likely retain some residual salmon populations (Smith 2021; Native Council of Nova Scotia Netukulimkewe'l Commission 2018, Bear River Historical Society; The Atlantic Salmon Conservation Foundation 2015), these watersheds have been severely degraded by centuries of silting and runoff from forestry and intensive agricultural activities, acid rain, commercial fishery dredging, as well as by substantial dams/barriers and sewer outfalls associated with human settlements along former salmon habitats. Indeed, the massive tidal power dam on the mouth of the Annapolis River had a tangible, adverse effect on all anadromous fish. According to a 2019 DFO report by Gibson, Fulton & Harper, the barrage and turbines presented an "extreme risk" to wild salmon, and all species of fish migrating into the Annapolis/Nictaux/Round Hill watersheds.

7.2 Support of the Sustainability of Wild Salmon

7.2.1 Potential Impacts to the Wild Salmon Population

To reduce potential impacts to the wild salmon population, Doelle-Lahey (2014) panel suggested that a regulatory framework should deal more extensively with the prevention of escape and should require operators to adopt, implement, track, and report on the performance of a comprehensive containment system. Such a system should aim to prevent escapes to the greatest extent that is practicable, using best management practices and the best-available, commercially proven technologies.

Accidental farmed-salmon escapes and potential breeding with wild-salmon populations (introgression) are both concerns for wild-salmon conservation and KCS' business continuity. Proactively, KCS is constantly improving aquaculture practices with new and proven technologies. KCS routinely provides updated training and refreshes the knowledge of their operators in the leading best practices. Cage integrity is addressed with state-of-the-art, engineered netting and anchoring materials, extensive computational modelling of real and potential farm environments, regular and frequent failure testing, and replacement of critical components and materials. All smolt stocked into marine farms can be tracked back to the operator via DNA as per the enhanced regulations in NS. Farms in Nova Scotia are managed by experienced teams, with a demonstrated, excellent track record for site integrity and performance. Additionally, KCS is consistently developing new protocols to suit changing conditions, allowing it to adaptively manage operations for over 25 years in Nova Scotian waters. Lastly, KCS operates under full transparency regarding any real or potential escape events, communicating to government immediately as is required.

7.2.1.1 *Infrastructure*

An essential component of a marine finfish farm is containment. Equipment and infrastructure must be capable of withstanding the prevailing environmental factors. Any mechanical damage from ill-repaired or ill-suited equipment/infrastructure can become a fish health and containment concern. All moorings, cages, containment nets, and predator nets used on KCS sites meet best management practices and are engineered to meet the expected conditions of the location and have engineering approval.

7.2.1.2 *Containment Strategy*

Fish

KCS ensures that the fish size is adequate not only for fish health and survival but to prevent containment breaches due to inappropriate netting size in relation to fish size. The net-mesh-sizing strategy was determined to be adequate based on thirty years of experience with fish farming in Atlantic Canada and exceeds the guidelines proposed by research conducted at Memorial University of Newfoundland Marine Institute in March 2000 (Newfoundland Fisheries and Aquaculture 2012).

Infrastructure and Equipment

Moorings and anchors are inspected prior to the stocking of a new production cycle. This may include removing them from the water and visually inspecting prior to redeployment. Once installed, the grid system, moorings, and anchors are inspected every 6 months, unless otherwise required. After a change in tension, a shift in the array, or a significant storm event, the moorings and anchors are visually inspected at depth using divers or ROV. Any issues and their causes will be determined and corrected as soon as possible. All inspections and corrections/repairs are recorded by KCS in a central database.

Above-water inspections will be continuous as staff work on the site daily. Any net repairs will be recorded in the on-site net-repair record. In addition, formal inspections will occur on a weekly basis for surface components, and they will be recorded in the surface-inspection record. This inspection will examine compensator buoys, visible portions of the grid, shackles, thimbles, float collars, stanchions, jump-net rails, above-water nets (containment, bird), attachment of nets, and site markers.

Underwater inspections will be conducted every six months using divers and/or an ROV. Additionally, cameras placed in each of the cages on site can be used to ensure all below-water infrastructure is being monitored and maintained. Additionally, maintenance barges will be used to lift the components to the surface for visual inspection at the end of each production cycle when the site is fallowed. Any weaknesses in the containment structure will be repaired as soon as possible and recorded. Suspected underwater irregularities, damage, or points of wear will be investigated and repaired as soon as possible and recorded in the on-site net-repair record. Furthermore, below-water net inspections will be formally completed every 60 days; a below-surface inspection checklist is to be completed.

Severe Weather

Severe weather can greatly impact the containment structures. Immediately after a severe weather event, a detailed evaluation of damage(s) will be conducted. A complete list of repairs will be created. Repairs will then be prioritized and tracked until completed. In some instances, temporary repairs may take place until permanent repairs can be completed.

Mortality Collection

The procedure to collect mortalities at the Annapolis site will be outlined in the site's FMP and approved by NSDFA. The procedure will consider containment risks. Note, the mortality collection schedule varies depending upon the age of the fish. During smolt entry and the first few weeks after entry, the frequency of mortality collection may increase. After these production milestones, mortality collection typically occurs once per week unless there is a fish-health event identified.

Harvesting

Harvesting procedures consider fish health and welfare, biosecurity, and containment risks. These procedures will be outlined in the site's FMP and provided to NSDFA for approval.

7.2.1.3 *Breach Response*

All sites have an emergency response plan to address a breach as outlined in the site's FMP. This plan considers the areas of potential impact and respects all federal and provincial regulations and licencing requirements. After a breach of containment is confirmed or suspected, NSDFA will be notified as soon it is safe and possible to do so. If the cages or nets have been damaged or compromised by an unusual event such as vandalism or boat collision, KCS' escape-and-response procedures will be followed. These procedures have been approved under the Best Aquaculture Practices (BAP) certification. Situations such as interactions with vessels, marine mammals, or other users will require specific handling, and the best course of action is determined in consultation with senior management and/or regulatory bodies.

7.2.2 Restoration Efforts

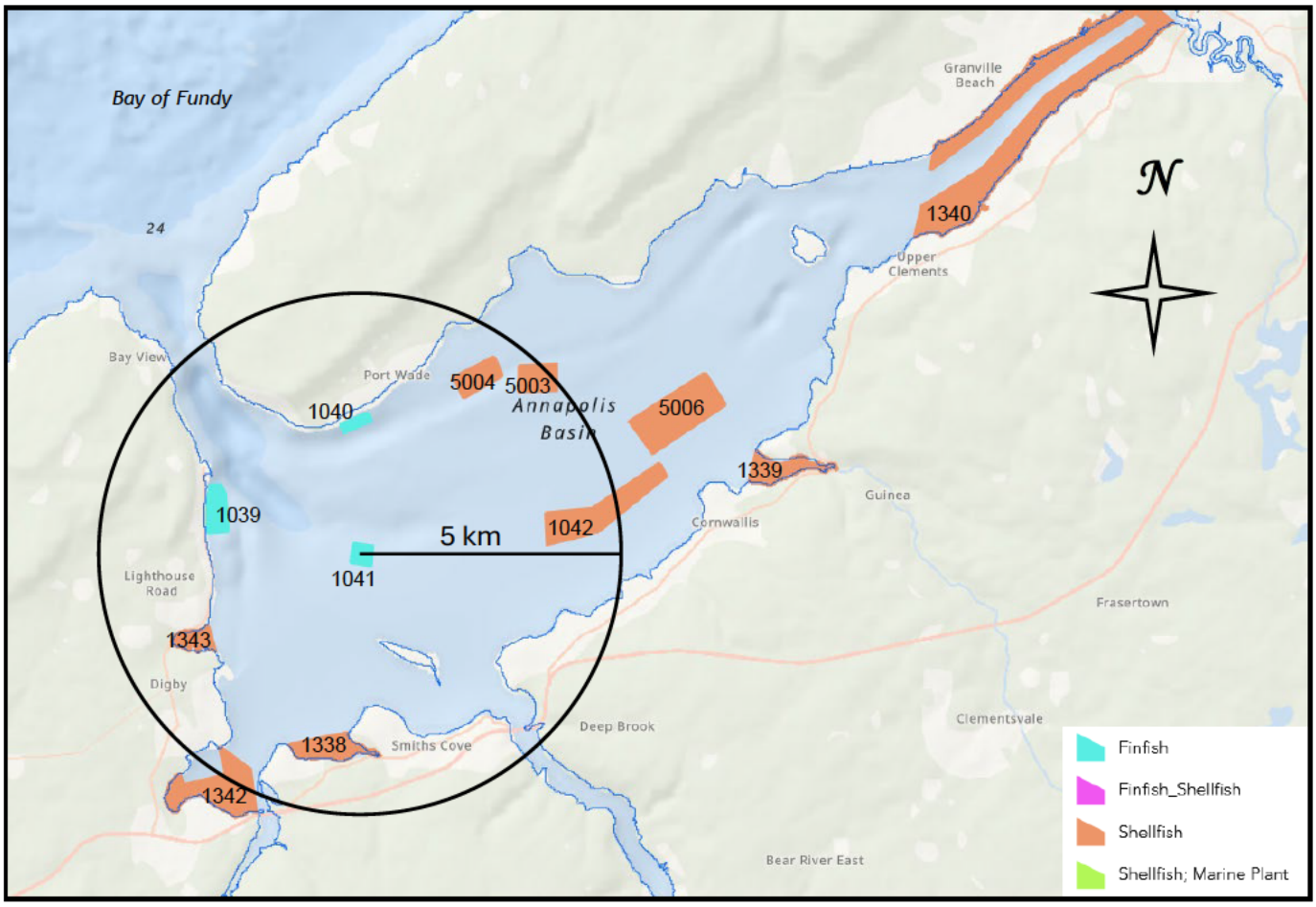
Leadership by CAI towards salmon conservation in Atlantic Canada is demonstrated by its founding role in the Fundy Salmon Recovery (FSR) project. CAI helped develop and operate the world's first wild-salmon marine conservation farm on Grand Manan Island, New Brunswick. This on-going project is a collaboration of community, academic, government, First Nations, and industry stakeholders to protect and restore severely threatened IBoF salmon. FSR is the first project in the world to rear wild-origin salmon within a marine conservation farm (operated by CAI) and subsequently return mature adults back to their natal river to spawn naturally. FSR project is built on research demonstrating the immense value of early wild exposure on Atlantic salmon development and fitness (Clarke et al. 2016).

Section 8.0 The Number and Productivity of Other Aquaculture Sites in the Public Waters Surrounding the Proposed Aquacultural Operation

8.1 Identification of Other Aquaculture Sites

There are eight aquaculture sites less than 5 km from the Annapolis site. Marine finfish aquaculture sites #1039 and #1040 are licenced/leased to KCS for producing Atlantic salmon. Bear River First Nation is the lease/licence holder of the two experimental shellfish sites (#5003 and #5004). They are licenced for American oyster. Site #1042 is issued to Innovative Fisheries Products Inc. and is licenced for sea scallop, bay scallop, American oyster, and European oyster. Sites #1338, #1342, and #1343 are licenced/leased to Innovative Fisheries Products for soft-shell clams (Fig. 10).

Figure 10. Marine Chart Showing Other Aquaculture Operations within Annapolis Basin
Note: Figure was sourced from CMAR Resource Map



8.2 Interactions with Other Aquaculture Operations

This site is not part of an aquaculture management area (AMA) for the purpose of managing the health of aquatic animals. KCS agrees to establish an AMA agreement(s) with other licence holders, if required by the Minister. However, KCS operates with a company management stocking/harvesting plan that follows similar principles to an AMA.

Shellfish aquaculture is present in Annapolis Basin. Shellfish aquaculture near Annapolis is not cause for concern for either industry as there are no known direct interactions between shellfish and Atlantic salmon aquaculture, specifically related to disease transfer.

Section 9.0 DEVELOPMENT VIABILITY

[redacted]

[redacted]

9.2 Technical Ability

KCS is a family-owned company that has been operating in Atlantic Canada for over 30 years. Beginning with one cage stocked with 2,500 fish, they have grown to be a vertically intigrated company with global operations. With both internal and external partnerships, KCS has the capacity to build their own equipment designed to meet the specifications of each location in which they operate.

KCS maintains control of every phase of production from egg to plate, ensuring superior products and attention to safety and environmental stewardship.

KCS is part of the Cooke Seafoods group of companies, which includes a dedicated sales and marketing team who access global markets for sale of products created with fresh Atlantic salmon produced at KCS' marine farms, including site #1041. The salmon from site #1041 will be sold under the True North Seafood brand. True North Seafood has sales representatives across North America and has acquired years of marketing success dealing directly with retailers and food service customers. True North Salmon sells fresh fish, both whole and as value-added products such as fillets, portions, skewers, and smoked, achieving the best possible return for the product. Marketing and sales campaigns use all the most up-to-date digital platforms as well as site tours, chef demonstrations, and trade shows to promote the products.

There is a well-established fresh-seafood logistics system in Atlantic Canada, delivering fresh seafood to markets east of Ontario and south to Florida, USA. This network has developed and improved over the past 35 years with Atlantic salmon being produced in the region.

Atlantic salmon pricing fluctuates, and the demand for fresh Atlantic salmon continues to grow. Marketing campaigns promoting the freshness, flavor, and excellence of seafood from Eastern Canada have developed customers who continue to pay a premium for the quality of east coast Atlantic salmon.

Table 6 details the technical team for the Nova Scotian operations of KCS.

Table 6. KCS Technical Team

Team Member	Affiliation	Role	Qualification
[redacted]	KCS	Vice President of Aquaculture	[redacted] brings 25 years of experience in aquaculture; he has held senior roles in both corporate and entrepreneurial settings across Canada and Chile.
[redacted]	KCS	Global Chief Sustainability Officer	[redacted] has over 25 years of experience in the aquaculture industry. He will provide overall leadership on the project.
[redacted]	KCS	VP of Public Relations	[redacted] leads community engagement processes with his knowledge and skills in public engagement.
[redacted]	KCS	Director of Marine Infrastructure	[redacted] has over 10 years of experience in ocean and aquaculture engineering and is responsible for the technical development of mooring and containment infrastructure for all marine farming sites.
Jennifer Hewitt	KCS	Compliance Manager	Jennifer is responsible for all farm management plans and will work as a liaison with government and community leaders to ensure farm compliance.
[redacted]	KCS	Production Manager NS	[redacted] has over 25 years' experience in the Nova Scotia aquaculture industry. He will oversee all saltwater sea sites.
[redacted]	KCS	Area Manager – South	[redacted] has over 20 years' experience with aquaculture, and he is responsible for all sea sites on the south side of the province.
[redacted]	KCS	Area Manager - West	[redacted] has 8 years' experience with aquaculture, and he is responsible for the sea sites on the northwest side of the province.

9.3 Compliance History

There has been no Natural Resources inspection during KCS' occupancy of the Annapolis lease.

LIST OF CONTACTS

Table 7. Contacts

Contact Name	Affiliation	E-mail	Phone	Date of Contact	Reason for Contact
[redacted]	DFO – Commercial Data, Policy & Economics	XMARComData@dfo-mpo.gc.ca	(902) 440-0392	March 24, 2023	Landings data Fisheries

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APPENDIX A
Wildlife Interaction Plan

Wildlife Interaction Plan

for Marine Salmonid Farms on the East Coast of North America

Version 24.09-09

This Wildlife Interaction Plan (WIP) has been created to address Section 7 Environment – Predator and Wildlife Interactions of the Best Aquaculture Practices (BAP) Salmon Farms Standard. The guidance and practices herein have and will continue to be followed by all North American-East Coast employees of Cooke Aquaculture who are employed in the Saltwater Division and those who directly interact with the salmon farms. This plan merely acts as an overall summary of the current requirements that each salmon farm must follow and in the event of any conflict of information or direction between this document and the requirements and the plans related to address those requirements, those plans, and the requirements will prevail.

Table of Contents

Appendices

Agrilaser® Handheld User Manual
CAF Safe Operation Agreement: Bird Control Group Agrilaser® Handheld 200/500

Maine
USFWS: Maine Coastal Islands National Wildlife Refuge Complex

New Brunswick
NB Protected Wildlife ID Chart

Newfoundland
NL Protected Wildlife ID Chart

Nova Scotia
NS Protected Wildlife ID Chart

SECTION 1 - Local Laws and Regulations for Wildlife Management and Protection

1.1 Canadian Federal Legislation

- **Aquaculture Activities Regulations (AAR), 2015** - Fisheries and Oceans Canada has developed the Aquaculture Activities Regulations, to clarify conditions under which aquaculture operators may treat their fish and deposit organic matter, while ensuring the protection of fish and fish habitat and sector sustainability.
- **Canadian Environmental Assessment Act, 2012** - CEAA is an environmental assessment focused on potential adverse environmental effects that are within federal jurisdiction, including: fish and fish habitat; other aquatic species; migratory birds; federal lands; effects that cross provincial or international boundaries; effects that impact on Aboriginal peoples, such as their use of lands and resources for traditional purposes; changes to the environment that are directly linked to or necessarily incidental to any federal decisions about a project. If there is a Provincial requirement for an environmental assessment or review, the applicant has an exemption form the CEAA.
- **Canadian Environmental Protection Act, 1999** - an Act respecting pollution prevention and the protection of the environment and human health to contribute to sustainable development.
- **Fisheries Act, 1985** - established to manage and protect Canada's fisheries resources. It applies to all fishing zones, territorial seas and inland waters of Canada and is binding to federal, provincial, and territorial governments.
- **Marine Mammal Regulations, 1993** - regulations that govern the fishing and hunting and in effect treatment of marine mammals in Canada[1].
- **Migratory Birds Convention Act, 1994** - protecting and conserving migratory birds.
- **Oceans Act, 1997** - Canada made a legal commitment to conserve, protect, and develop the oceans in a sustainable manner.
- **Species at Risk Act (SARA), 2002** - the purposes of this Act are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered, or threatened because of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.

1.2 Canadian Provincial Legislation

1.2.1 New Brunswick

- **Fish and Wildlife Act, 1980** - *policies and programs created under this Act help to maintain diversity of wildlife species in New Brunswick. Among other things, it enables the provincial government to create wildlife refuges and wildlife management areas, it regulates hunting, fishing, possession, and sale of wildlife in the province, and it establishes the provincial Wildlife Fund.*
- **Species at Risk Act (SARA), 2012** - *the purposes of this Act are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered, or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.*

[1] Previously, Nuisance Seal Licences (NSL) were issued by the Department of Fisheries and Oceans (DFO) to aquaculture sites which allowed farmers to intentionally kill a nuisance seal. In March 2019, the Minister of Fisheries, Oceans, and the Coast Guard issued a statement that that the DFO has ceased the issuance of the licence in efforts to meet the requirements of the US Marine Mammal Protection Act, Import Provisions scheduled to come into force on January 1, 2022. The Minister also stated that the "DFO will undertake regulatory amendments to the Marine Mammal Regulations (MMR) to either amend or repeal provisions respecting the issuance of NSLs for aquaculture purposes. https://www.dfo-mpo.gc.ca/fisheries-peches/consultation/mmr-par-rmm-rap-eng.html

1.2.2 Nova Scotia

- **Fisheries and Coastal Resources Act**, **1996** - *this Act revises the outstanding fisheries law and promotes programs to encourage the development of a sustainable fishery. It sets standards for aquaculture, harvesting, and fish processing, and expands the recreational fishery. It also outlines the requirements for administration, and enforcement.*
- **Endangered Species Act, 1998** - *the purpose of this Act is to provide for the protection, designation, recovery, and other relevant aspects of conservation of species at risk in the province, including habitat protection.*

1.2.3 Newfoundland

- **Endangered Species Act, 2001** - p*rovides special protection for plant and animal species considered to be endangered, threatened, or vulnerable in the province.*
- **Wilderness and Ecological Reserves Act, 1990** - *an act to provide for the natural areas in the province to be set aside for the benefit, education, and enjoyment of the people of the province.*

1.3 United States Federal Legislation

- **Endangered Species Act of 1973** (16 U.S.C 1531 et seq.) - requires federal agencies, in consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the U.S National Oceanic and Atmosphere Administration (NOAA) Fisheries Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species.
- **Clean Water Act of 1972 (Formerly the Federal Water Pollution Control Act of 1948)** (33 U.S.C 1251 et seq.) - under this Act, it is unlawful for any person to discharge any pollutant from a point of source into navigable waters, unless a permit is obtained under its provisions.
- **Migratory Bird Treaty Act of 1918** (16 U.S.C 703-712) - protecting and conserving migratory birds, or the parts, nests, or eggs of such birds.
- **Marine Mammal Protection Act of 1972** - prohibits the hunt, harassment, capture or killing of any marine mammal or attempts to do so. Also prohibits the import and export of marine mammals, in whole or parts. Three federal entities share responsibility for implementation of the Act: NOAA, USFWS and the Marine Mammal Commission.

1.4 US State Legislation

1.4.1 Maine

- **Maine Endangered Species Act, 1975** – *the Department of Inland Fisheries and Wildlife administers the Act (MESA) and is responsible for monitoring resident inland fish and wildlife (including invertebrates). The Department, through scientific studies, determines whether a species should be listed as endangered or threatened.*
- **Maine Marine Endangered Species Act, 2003** – *enacted to separate marine species from the inland species, the Act (MMESA) is administered by the Maine department of Marine resources.*
- **Maine Coastal Management Program, 1978** - *led by the Maine Department of Agriculture, Conservation, and Forestry. The coastal management program consists of a network of 19 state laws with four state agencies working in cooperation with local governments, nonprofit organizations, private businesses, and the public to improve management of coastal resources. Maine's coastal zone extends to the inland boundary of all towns bordering tidal waters and includes all coastal islands.*

SECTION 2 - Operating Permit Considerations for Wildlife Management and Protection

2.1 Maine

2.1.1 DMR Lease

The Department of Marine Resources (DMR) Rule Chapter 2.37; Area Resources (Essential Habitats/Endangered Species) – under the Maine Endangered Species Act a state agency or municipal government shall not permit, license, fund or carry out projects occurring partly or wholly within the Essential Habitat, without the approval of the Commissioner of Maine Department of Inland Fisheries and Wildlife (MDIFW). Applicants are required to provide a signed statement to confirm the proposed lease either does not fall within the boundary of an Essential Habitat or that the applicant has contacted MDIFW, and preliminary review will grant approval for the Maine DMR to issue an aquaculture lease within part or the entire boundary of a designated Essential Habitat. No nuisance shall be permitted to exist on the leased premises. Lessee shall not operate in a manner as to be detrimental to public health, personal property or marine resources, or as to create a serious threat to the marine environment.

2.1.2 ACOE Permit

Appendix C: Special Conditions which are intended to minimize potential impact to Atlantic salmon, Atlantic salmon critical habitat, other fisheries, benthic habitat, and local water quality.

2.1.3 DEP MEPDES Permit

Refer to the Atlantic Salmon Aquaculture General Permit PART II, Section I. Protection of Atlantic Salmon. In summary, only salmon of North American strain are permitted, and fish must be marked to identify their origin.

2.2 New Brunswick

2.2.1 Commercial Aquaculture Licence

Schedule A – Operating Terms and Conditions; this licence may be suspended or revoked should the licensee fail to acquire or comply with any approvals, permits or licences which may be required under the *Clean Water Act,* the *Clean Environment Act*, the *Canadian Navigable Waters Act*, the Federal *Fisheries* Act or the *Crown Lands and Forests Act*, the *Public Health Act,* the *Seafood Processing Act*, the *Fish and Wildlife Act,* or any other applicable law.

2.2.2 Approval to Operate

Schedule A – Terms and Conditions (E); the Approval Holder operate the Facility in accordance with the most recent version of the *Environmental Management Program for the Marine Finfish Cage Aquaculture Industry in New Brunswick,* issued by the Department of Environment and Local Government. The Approval Holder shall ensure that all chemicals are stored in a manner such that any spill is contained and not released to the environment.

2.3 Newfoundland

2.3.1 Lease for Aquaculture

Schedule C; the use of the demised premises will, for its intended purpose, be subject to and in accordance with all provincial acts and regulations respecting the promotion of efficient aquaculture and environmental control. The Lessee agrees that upon cancellation or non-renewal of this Lease, the demised premises shall be restored to a condition satisfactory to the Minister, which restoration shall include the removal of all buoys, mooring lines, anchors, floating structures, and any other items placed or installed in or on the demised premises.

2.3.2 Aquaculture Licence

Licence Conditions: Licensees must ensure that all required plans are approved by the department. These plans include but are not limited to: Environmental and Waste Management Plan; Integrated Pest Management Plan; Biosecurity Plan; and Fish Health Management Plan.

2.3.3 Marine Aquaculture Water Use Licence

Appendix A – Terms and Conditions: The Licensee/Holder shall not impair, pollute, or cause to be polluted the quality of water. In the event that the site is no longer being used during the term created by this Licence, the Licencee/Holder shall remove the aquaculture gear and other work(s)/system(s) associated with and restore all areas affected by this facility to a state that resembles local natural conditions.

2.4 Nova Scotia

2.4.1 Lease

The Lessee must adhere to the Farm Management Plan, as it is in effect for this lease from time to time, and any failure to adhere to the Farm Management Plan is a breach of the lease. The Lessee agrees to comply with any permits, protocols, approvals, licences, or permissions (the “licencing requirements”) which may be required under the laws of the relevant municipality, the Province or Canada. The Lessee is responsible for confirming any licencing requirements and ensuring compliance with them.

2.4.2 Licence

The Licencee must adhere to the Farm Management Plan, as it is in effect for this licence from time to time, and any failure to adhere to the Farm Management Plan is a breach of the licence. The Licencee agrees to comply with any permits, protocols, approvals, licences, or permissions (the “licencing requirements”) which may be required under the laws of the relevant municipality, the Province or Canada. The Lessee is responsible for confirming any licencing requirements and ensuring compliance with them.

SECTION 3 - Ecologically and Biologically Sensitive and Significant Areas

An Ecologically and Biologically Sensitive Area (EBSA or EBSAs) is an area that has been determined to be of high ecological or biological significance and as such, should receive a higher level of risk aversion when activities are occurring to avoid disruption of the overall ecosystem and structure. It is important that employees are aware of areas that are in proximity to their farm and avoid impacting these areas intentionally and follow company protocols regarding garbage containment, proper fuel and chemical storage, equipment maintenance, among others to reduce the risk of unintentional damage.

3.1 Atlantic Canada EBSAs

Both the DFO and the Convention on Biological Diversity (CBD) have criteria for evaluating areas. These criteria consider biological functions, physical oceanography, structural habitat features and biodiversity. Criteria established by DFO to rank an area are uniqueness; aggregation; fitness consequences, plus 2 additional modifying criteria: resilience and naturalness. Criteria established by the CBD are uniqueness or rarity; special importance for life history stages of species; importance for threatened, endangered or declining species and/or habitats; vulnerability, fragility, sensitivity, or slow recovery; biological diversity and naturalness. Both the DFO and CBD criteria were used to establish the EBSAs.

There are three sub-regions within the DFO Maritimes Region in which EBSAs were identified: the Bay of Fundy, the Atlantic coast of Nova Scotia and the offshore Scotian Shelf.

The Bay of Fundy forms a significant part of the Gulf of Maine. A total of 16 areas (**Fig.1**) were identified (DFO[2]) as EBSAs with the Bay of Fundy, Gulf of Maine. There is no formal list of Ecologically Sensitive Species (ESS) in the Bay of Fundy yet, but there is the presence of potential ESS and the reason that some areas have been established as an EBSA.

In the Atlantic coast sub-region, Cape St. Mary's to Cape North, a total of 38 areas (**Fig. 2**) were identified (DFO[3]) as EBSAs.

[2] 2014. DFO CSAS Research Document 2013/065. Identification and Review of Ecologically and Biologically Significant Areas in the Bay of Fundy.
[3] 2014. DFO Canadian Technical Report of Fisheries and Aquatic Sciences 3107. Ecologically and Biologically Significant Areas in the Atlantic Coastal Region of Nova Scotia.

Figure 1. Location of identified Bay of Fundy EBSAs – boundaries represent a best approximation of where a significant feature or features exist.

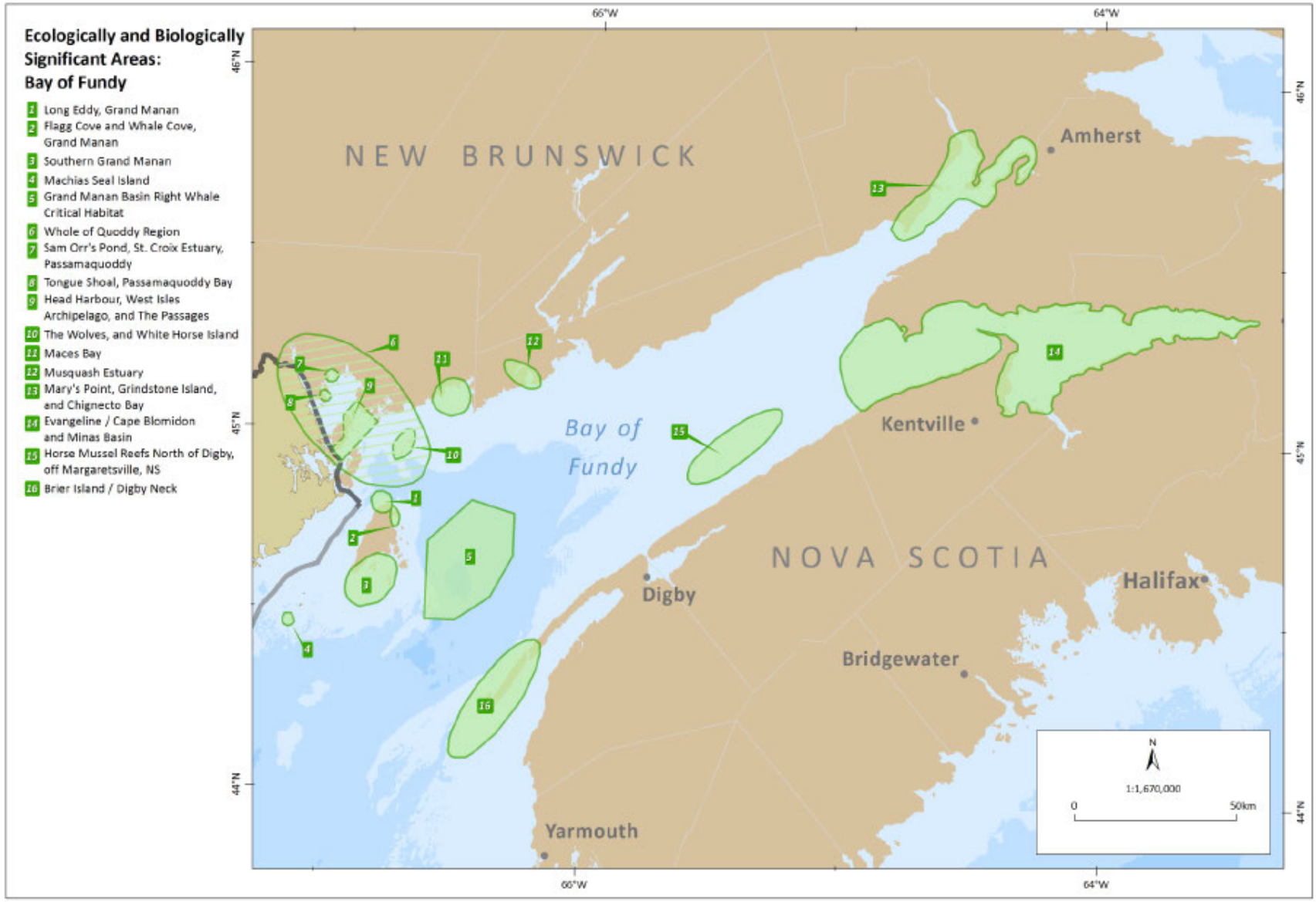
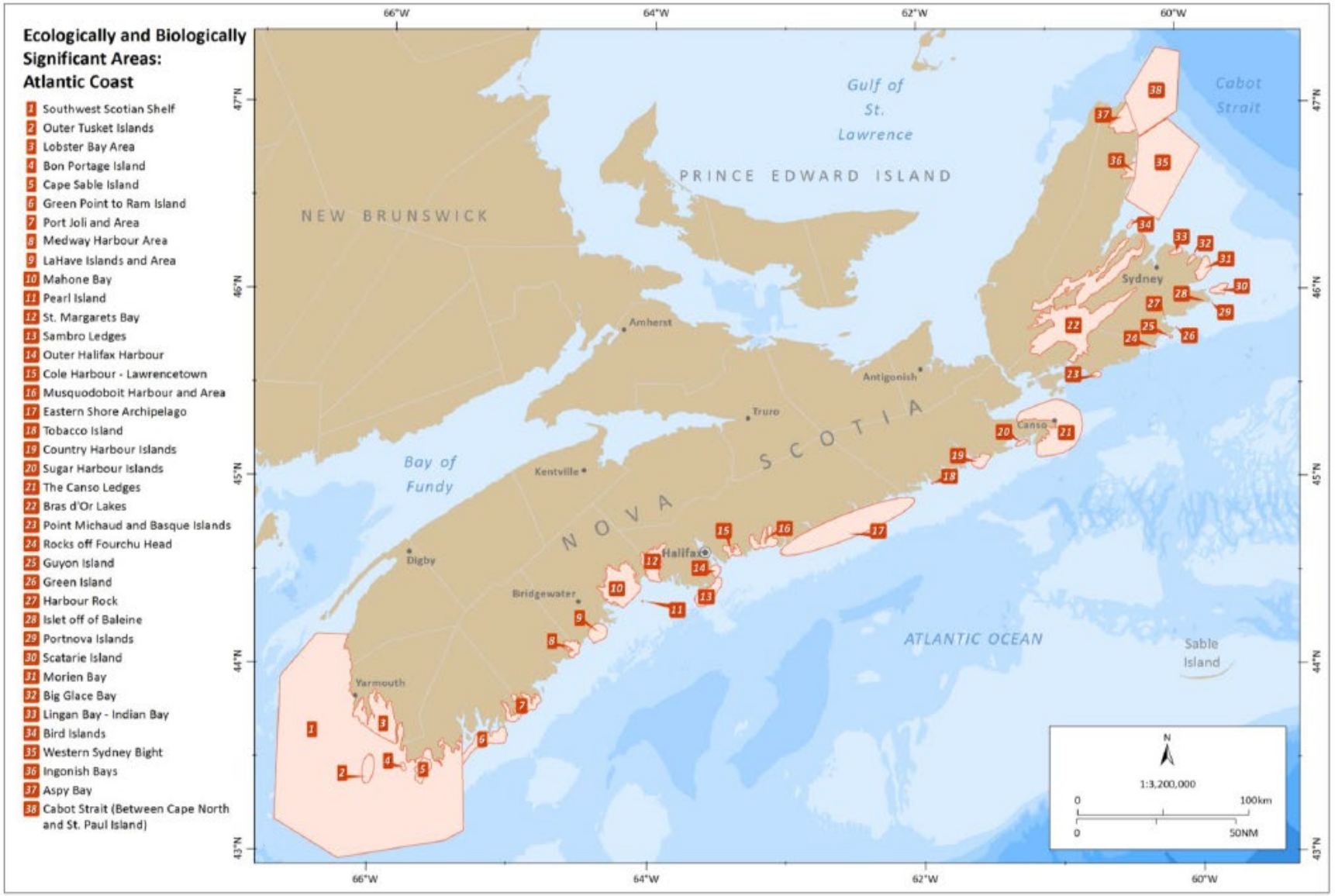
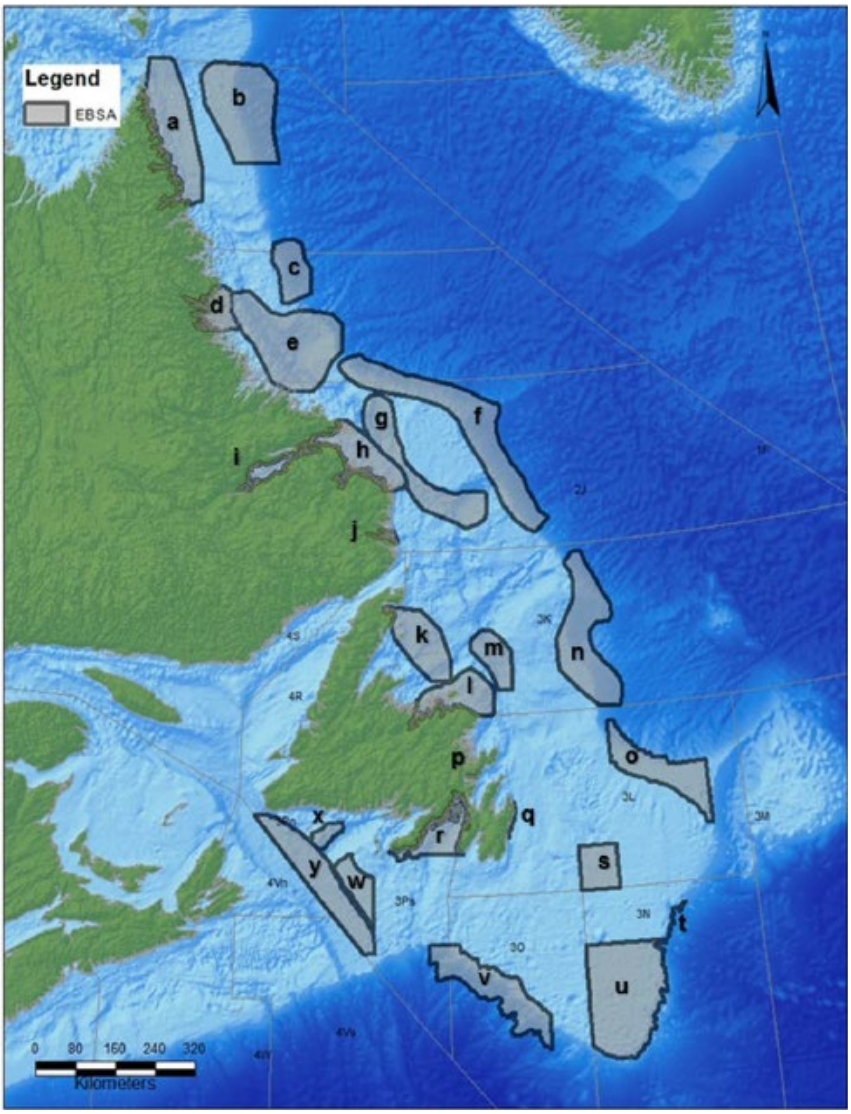


Figure 2. Location of identified Atlantic coast sub-region EBSAs – boundaries represent a best approximation of where a significant feature or features exist.



Within the DFO Newfoundland and Labrador Region 26 EBSAs have been identified in the Newfoundland and Labrador Shelves Bioregion since 2007 (**Fig. 3**)[4]. One of the 26 EBSAs is a transitory EBSA that encompasses the southern extent of pack ice. Unlike other EBSAs, the location of the southern pack ice is transitory and varies both within and among years, as it is influenced by winds and currents. However, it is usually located south of Hamilton Inlet, as far south as Notre Dame Bay. Although it cannot be defined by rigid boundaries, the southern pack ice is an area that is highly productive and ecologically important within the Newfoundland shelf ecosystem and the North Atlantic.

Figure 3. EBSAs in the Newfoundland and Labrador Bioregion: a) Northern Labrador, b) Outer Shelf Saglek Bank, c) Outer Shelf Nain Bank, d) Nain Area, e) Hopedale Saddle, f) Labrador Slope, g) Labrador Marginal Trough, h) Hamilton Inlet, i) Lake Melville, j) Gilbert Bay, k) Grey Islands, l) Fogo Shelf m) Notre Dame Channel, n) Orphan Spur, o) Northeast Shelf and Slope, p) Smith Sound, q) Eastern Avalon, r) Placentia Bay Extension, s) Virgin Rocks, t) Lilly Canyon-Carson Canyon, u) Southeast Shoal and Tail of the Banks, v) Southwest Shelf Edge and Slope, w) St. Pierre Bank, x) Burgeo Bank, and y) Laurentian Channel.



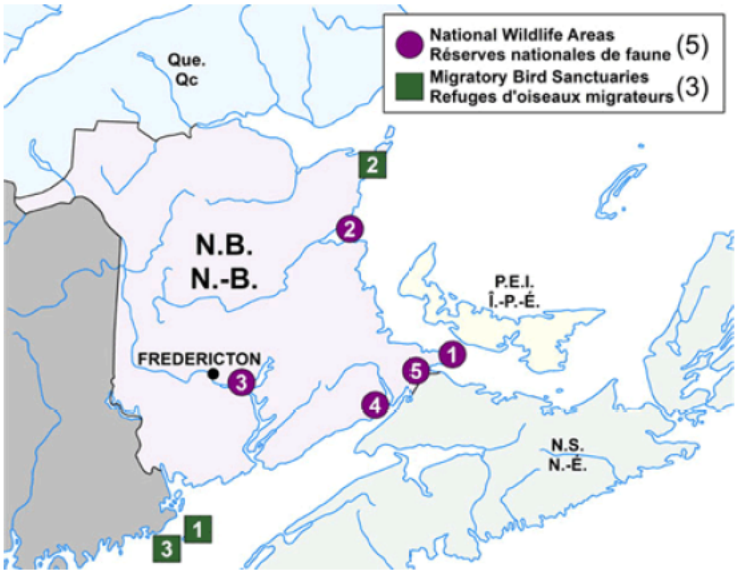
[4] DFO. 2016. Refinement of Information Relating to Ecologically and Biologically Significant Areas (EBSAs) Identified in the Newfoundland and Labrador (NL) Bioregion. DFO Can. Sci. Advis. Sec. Sci. Resp. 2016/032.

3.1.1 National Wildlife Areas and Migratory Bird Sanctuaries

According to the Canada Wildlife Act, National Wildlife Areas are created and managed for the purposes of wildlife conservation, research, and interpretation. There are currently 55 National Wildlife Areas across Canada containing nationally significant habitats for animals or plants. The National Wildlife Areas managed by Environment and Climate Change Canada (ECCC) protect over 2.1 million hectares of habitat with over 75% of that area protecting marine habitat[5].

Migratory Bird Sanctuaries (MBS) are listed under the Schedule in the Migratory Bird Sanctuary Regulations, which prescribe rules and prohibitions regarding the taking, injuring, destruction or molestation of migratory birds or their nests or eggs in the sanctuaries. Hunting of listed species under the Act is not permitted in any Migratory Bird Sanctuary. At present, there are 92 MBS across Canada, comprising almost 11.5 million hectares of migratory bird habitat that provides safe refuge for migratory birds in the terrestrial and marine environment. The Canadian Wildlife Service of Environment Canada is the agency responsible for MBS, although the sanctuaries can be located on federal, provincial, or private land[6].

Figure 4. National Wildlife Areas and Migratory Bird Sanctuaries in New Brunswick.



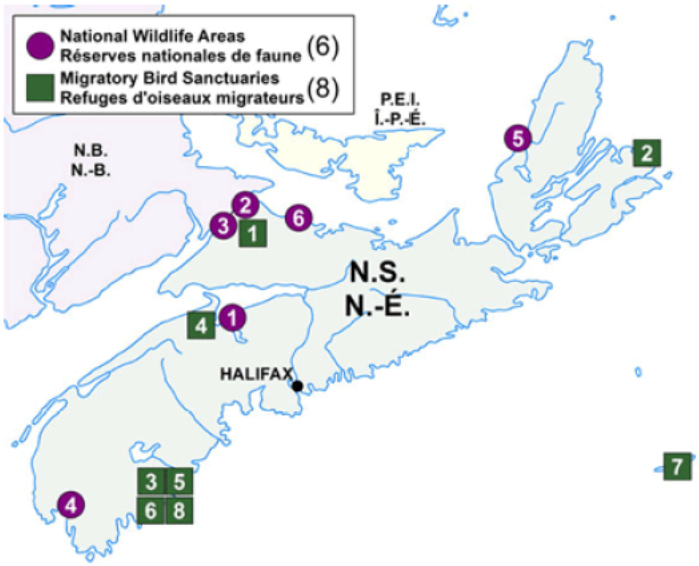
National Wildlife Areas			
No.	**Name**	**Year Established**	**Size in Hectares**
1	Cape Jourimain	1980	654
2	Portage Island	1979	349
3	Portobello Creek	1995	3,011
4	Shepody	1980	1,062
5	Tintamarre	1977	1,970

Migratory Bird Sanctuaries			
No.	**Name**	**Year Established**	**Size in Hectares**
1	Grand Manan MBS	1931	433
2	Inkerman MBS	1998	16
3	Machias Seal Island MBS	1944	1,046

[5] https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations.html

[6] https://www.canada.ca/en/environment-climate-change/services/migratory-bird-sanctuaries/locations.html

Figure 5. National Wildlife Areas and Migratory Bird Sanctuaries in Nova Scotia.



National Wildlife Areas			
No.	**Name**	**Year Established**	**Size in Hectares**
1	Boot Island	1979	107
2	Chignecto	1982	409
3	John Lusby Marsh	1978	552
4	Sand Pond	1977	531
5	Sea Wolf Island	1982	76
6	Wallace Bay	1980	701
#	Isle Haute	In Progress	80

Migratory Bird Sanctuaries			
No.	**Name**	**Year Established**	**Size in Hectares**
1	Amherst Point	1947	433
2	Big Glace Bay Lake	1939	393
3	Port Herbert	1941	346
4	Kentville	1939	506
5	Port Joli	1941	397
6	Sable River	1941	313
7	Sable Island	1977	3,100
8	Haley Lake	1980	95

There are no designated National Wildlife Areas in Newfoundland and Labrador, however, there are 3 designated Migratory Bird Sanctuaries. The first two are located near Belle Isle, off the northeast coast of Newfoundland, the third is in the Bonavista Bay region of northeastern Newfoundland, adjacent to Terra Nova Provincial Park.

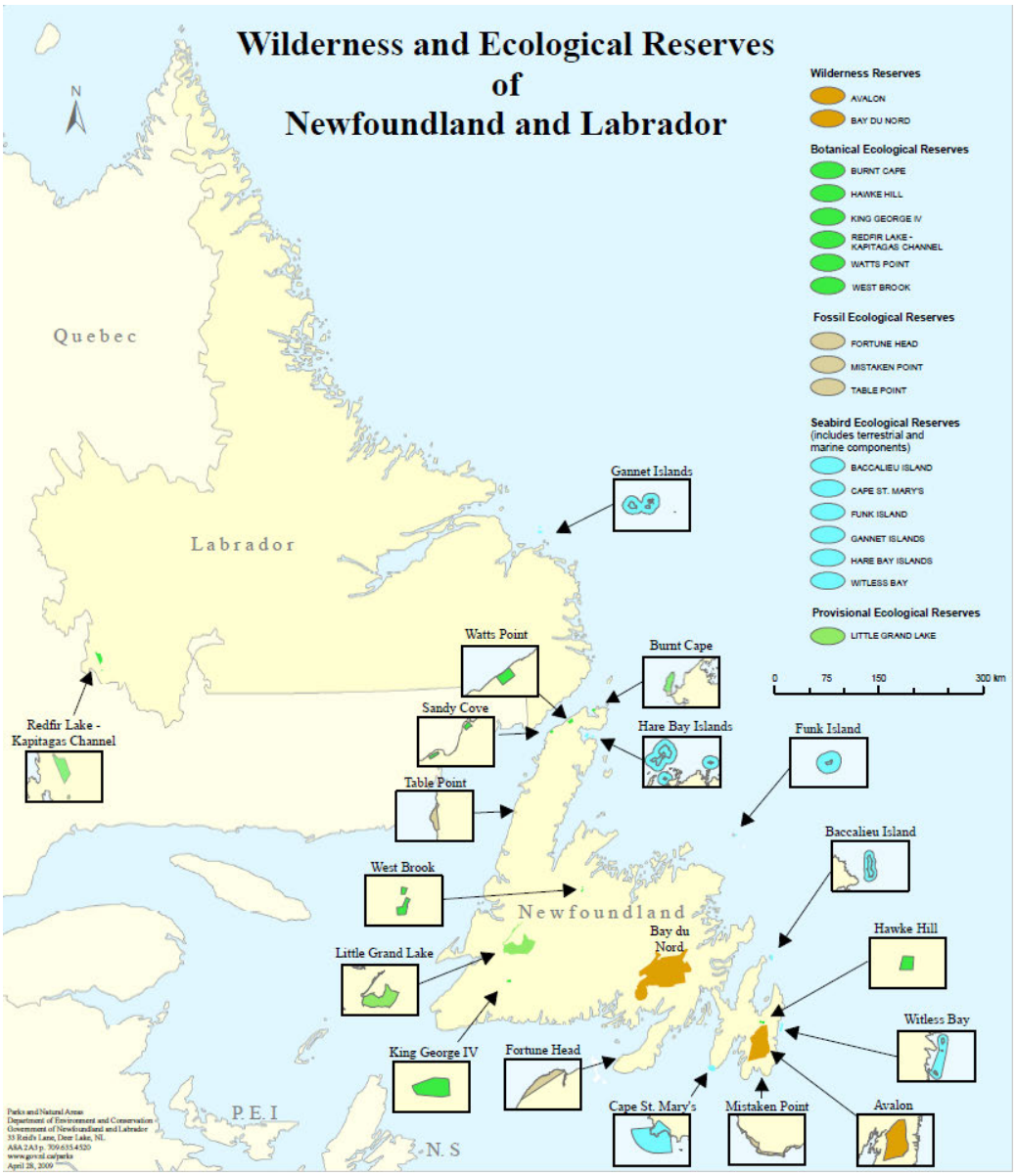
Table 1. Migratory Bird Sanctuaries in Newfoundland and Labrador.

Migratory Bird Sanctuaries			
No.	**Name**	**Year Established**	**Size in Hectares**
1	Shepherd Island	1991	18
2	Ile aux Canes	1991	162
3	Terra Nova	1967	1,178

The government of Newfoundland and Labrador has designated 18 wilderness and ecological reserves (**Fig. 6**)[7] which protect wide-ranging caribou herds, diverse seabird colonies, globally important fossil sites, and habitat for endangered or threatened plants and animals. Several protected areas are representative examples of the province's natural regions. Wilderness reserves are large, protected areas (greater than 1,000 km^2) that are designed to protect significant natural features and landscapes. There are two wilderness reserves in Newfoundland - the Avalon and the Bay du Nord and none in Labrador which were created primarily to protect the habitat and range of a caribou herd. Ecological reserves are protected areas (less than 1,000 km^2) that were created for two main purposes: a) to protect representative examples of ecosystems or ecoregions, or b) to protect unique, rare, or endangered plants, animals, or other elements of our natural heritage.

Most of the reserves in the second category are divided into three general types-botanical, fossil, and seabird ecological reserves.

Figure 6. Wilderness and Ecological Reserves of Newfoundland and Labrador.



[7] Department of Environment and Conservation. 2006. A Guide to our Wilderness and Ecological Reserves – Newfoundland and Labrador.

3.1.2 Marine Protected Areas

Marine Protected Areas (MPAs) are defined geographic areas dedicated to and managed for the long-term conservation of nature. The Department of Fisheries and Oceans (DFO) Canada establishes and manages MPAs under the Oceans Act in order to conserve numerous aspects which include, but are not limited to, commercial and non-commercial fishery resources, endangered or threatened marine species, unique habitats and other marine resources, or habitats necessary to fulfill the DFOs mandate of scientific research.

As of June 2024, there are 15 MPAs designated across Canada[8], **8 of these are in the Atlantic Ocean.**

- Anguniaqvia niqiqyuam – located in the Northwest Territories, within the Inuvialuit Settlement Region, as defined by the Western Artic Claim – Inuvialuit Final Agreement, Western Artic Bioregion.
    - To maintain the integrity of the marine environment offshore of the Cape Parry Migratory Bird Sanctuary so that it is productive and allows for higher trophic level feeding.
    - To maintain the habitat to support populations of key species (such as beluga whales, Arctic char, and ringed and bearded seals).
- **Banc-des-Américans** – located off the eastern tip of the Gaspé Peninsula, Estuary, and the Gulf of St. Lawrence bioregion.
    - Conserve and protect benthic (seabed) habitats.
    - Conserve and protect pelagic (water column) habitats and forage species (prey).
    - Promote the recovery of at-risk whales and wolffish.
- **Basin Head** – located off the eastern tip of Prince Edward Island, Estuary and Gulf of St. Lawrence Bioregion.
    - Maintain the quality of the marine environment and the physical structures of the ecosystem supporting the *Chondrus crispus* variety of Irish Moss.
    - Maintain the health (biomass and coverage) of the Basin Head *Chondrus crispus*.
    - Maintain the overall ecological integrity of the Basin Head lagoon and inner channel, including avoidance of excessive Ulva growth, maintenance of adequate oxygen levels, and diversity of indigenous flora and fauna.
- **Eastport** – located off the northeast coast of Newfoundland; Newfoundland-Labrador Shelves Bioregion.
    - Maintain a viable population of American lobster through the conservation, protection, and sustainable use of resources and habitats within the Eastport Peninsula Lobster Management Area (EPLMA); and
    - Ensure the conservation and protection of threatened or endangered species.
- Endeavour Hydrothermal Vents – located on the Juan de Fuca Ridge, British Columbia, Offshore Pacific Bioregion.
    - Conserve the biological diversity, productivity, structural habitat, and ecosystem function of the hydrothermal vents.
- **Gilbert Bay** – located off the southeast coast of Labrador; Newfoundland-Labrador Shelves Bioregion.
    - Conservation and protection of the Gilbert Bay cod and its habitats.
    - Conservation and protection of the Gilbert Bay ecosystem.
    - Facilitation of scientific research opportunities in the Gilbert Bay ecosystem.
    - Promotion of public awareness, education, and support of the Gilbert Bay MPA.
- **The Gully** – located east of Nova Scotia's Sable Island, Scotian Shelf Bioregion.
    - Minimize harmful impacts from human activities on cetacean populations and their habitats.
    - Minimize the disturbance of seafloor habitat and associated benthic communities caused by human activities.
    - Maintain and monitor the quality of water and sediments of the Gully; and manage human activities to minimize impacts on other commercial and non-commercial living resources.
- Hecate Strait/Queen Charlotte Sound Glass Sponge Reefs – located north and south of the entrance to Douglas Channel, British Columbia, Northern Shelf Bioregion.
    - Conserve the biological diversity, structural habitat, and ecosystem function of the glass sponge reefs.

[8] http://www.dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html

- **Laurentian Channel** – located off the southwest coast of Newfoundland and Labrador, Newfoundland, and Labrador Shelves Bioregion.
    - Protect corals, particularly significant concentrations of sea pens, from harm due to human activities (e.g., fishing, oil and gas exploratory drilling, submarine cable installation and anchoring) in the Laurentian Channel.
    - Protect Black Dogfish from human induced mortality (e.g., bycatch in the commercial fishery) in the Laurentian Channel.
    - Protect Smooth Skate from human induced mortality (e.g., bycatch in the commercial fishery) in the Laurentian Channel.
    - Protect Porbeagle sharks from human induced mortality (e.g., bycatch in the commercial fishery, seismic activities) in the Laurentian Channel.
    - Promote the survival and recovery of Northern Wolffish by minimizing risk of harm from human activities (e.g., bycatch in the commercial fishery) in the Laurentian Channel.
    - Promote the survival and recovery of Leatherback Sea Turtles by minimizing risk of harm from human activities (e.g., entanglement in commercial fishing gear, seismic activities) in the Laurentian Channel.
- **Musquash Estuary** – Bay of Fundy, New Brunswick; Scotian Shelf Bioregion.
    - Maintain productivity of harvested species.
    - Maintain biodiversity of individual species, communities, and populations within the different ecotypes.
    - Safeguard habitat, including the physical and chemical properties of the ecosystem, by maintaining water and sediment quality.
- SGaan Kinghlas-Bowie Seamount - located 180 kilometers offshore and to the west of Haida Gwaii (formerly known as Queen Charlotte Islands) in the northeast Pacific, off the coast of British Columbia. The seamount rises from a depth of 3,000 meters to within 24 meters of the surface.
    - Conserve and protect the unique biodiversity and biological productivity of the area's marine ecosystem, which includes the SGaan Kinghlas-Bowie, Hodgkins and Davidson seamounts and the surrounding waters, seabed, and subsoil.
- **St. Anns Bank** – located east of Cape Breton Island, Nova Scotia, Scotian Shelf Bioregion.
    - Conserve and protect all major benthic, demersal (i.e., close to the sea floor) and pelagic (i.e., in the water column) habitats within the MPA, along with their associated physical, chemical, geological, and biological properties and processes.
    - Conserve and protect marine areas of high biodiversity at the community, species, population, and genetic levels within the MPA.
    - Conserve and protect biological productivity across all trophic levels so that they can fulfill their ecological role in the ecosystems of the MPA.
- Tang.ɣwan – ḥačxwiqak – Tsigis – located west of Vancouver Island, British Columbia; Offshore Pacific Bioregion (OPB)
    - To conserve, protect and enhance understanding of unique seafloor features including seamounts and hydrothermal vents, and the marine ecosystems they support in the proposed MPA.
- Tarium Niryutait – located in the Mackenzie River Delta and estuary in the Beaufort Sea, Western Artic Bioregion.
    - To conserve and protect beluga whales and other marine species (anadromous fish, waterfowl, and seabirds), their habitats and their supporting ecosystem.
- Tuvaijuittuq – located off the northwest coast of Ellesmere Island, Nunavut in the Arctic Ocean, encompasses areas within the Artic Basin and Arctic Archipelago Bioregions.
    - To contribute to the conservation, protection and understanding the natural diversity, productivity, and dynamism of the High Arctic Sea ice ecosystem.
        - Tuvaijuittuq is the first MPA to be designated for interim protection by ministerial order under the *Oceans Act*, limiting human activities in the area for up to five years.

3.2 Maine Natural Areas Program

Ecological Reserves are lands specifically set aside to protect and monitor the State of Maine's natural ecosystems. These lands are managed by the Bureau of Parks and Public Lands, and the Maine Natural Areas Program oversees the long-term ecological monitoring plan. As of 2013, Maine has designated more than 90,000 acres of Ecological Reserves on 17 public land units. The purposes of the Reserves are:

1. To maintain one or more natural community types or native ecosystem types in a natural condition and range of variation and contribute to the protection of Maine's biological diversity,
2. To act as a benchmark against which biological and environmental change may be measured, as a site for ongoing scientific research, long-term environmental monitoring, and education, and
3. To protect sufficient habitat for those species whose habitat needs are unlikely to be met on lands managed for other purposes.

Reserves were designated following a multi-year inventory and assessment project coordinated by the Maine Forest Biodiversity Project, with staff assistance from The Nature Conservancy, the Maine Natural Areas Program, and the Bureau of Parks and Public Lands. In total, there are 17 Maine Ecological Reserves as of July 2018 - ranging in size from 775 acres at Wassataquoik Stream to over 11,000 acres at Nahmakanta.

Factsheets on each of the reserves are available through the Maine Department of Agriculture, Conservation and Forestry website[9].

- Big Spencer Mountain
- Bigelow Preserve
- Chamberlain Lake/Lock Dam
- Cutler Preserve
- Deboullie
- Duck Lake
- Gero Island
- Great Heath
- Mahoosucs Unit
- Mt. Abraham
- Nahmakanta
- Number Five Bog
- Rocky Lake
- Salmon Brook Lake
- St. John Ponds
- Tunk Lake Area, including Donnell Pond and Spring River Lake
- Wassataquoik Stream

[9] https://www.maine.gov/dacf/mnap/reservesys/index.htm

SECTION 4 - Risk Assessment

4.1 Atlantic Canada Aquaculture Sites and the Species at Risk Act (SARA)

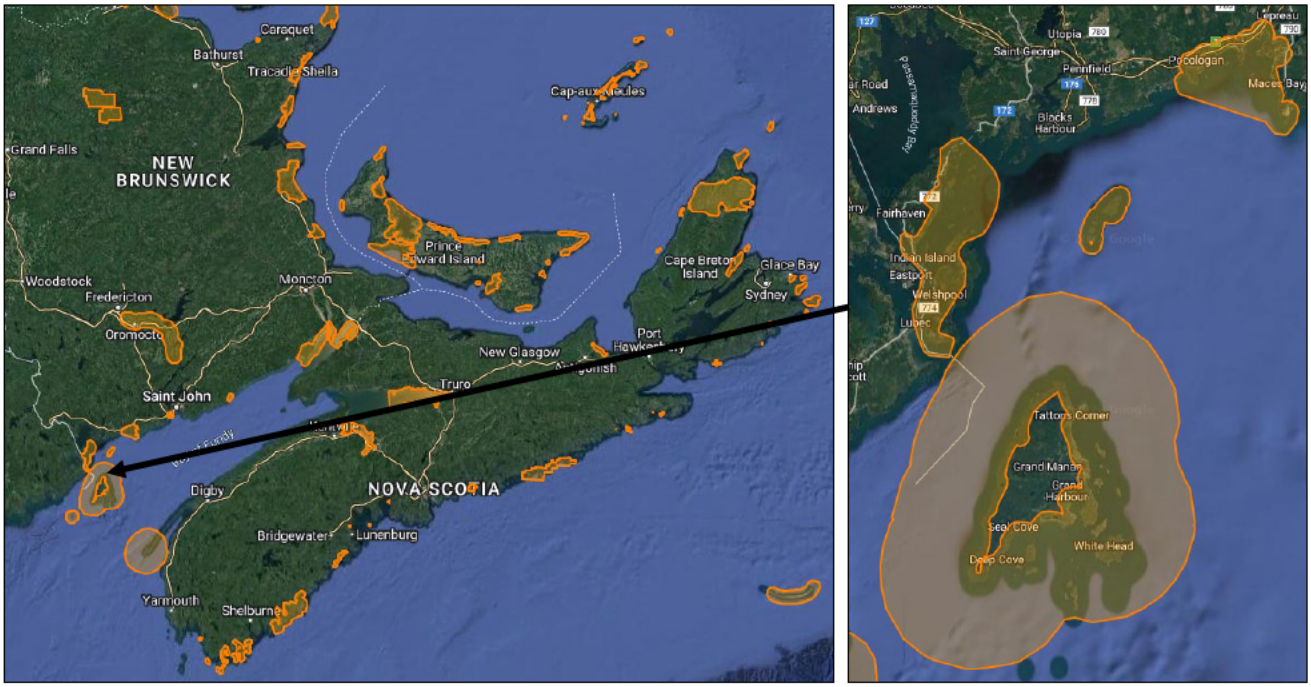
The SARA is a key federal government commitment *"to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened".* SARA provides for the legal protection of wildlife species and the conservation of their biological diversity.

When scoping new sites or proposing boundary amendments for pre-existing farms, endangered, at risk and threatened species that have been or may be found within the proposed area must be identified. Species identified that are listed under the SARA designation must be protected and considered within the proposal. Applicants must provide mitigation plans for those species regarding how the operation will strive to not impede or otherwise cause harm. Applicants must also consider those species identified by regional conservation strategies, including Provincial Species at Risk Acts or Endangered Species Acts.

4.1.1 Important Birds and Biodiversity Areas (IBA)

Important Bird Areas (IBAs)[10] are discrete sites that support specific groups of birds: threatened birds, large groups of birds, and birds restricted by range or by habitat. When bird species occur at a site in sufficient numbers during one or more seasons (winter; migration; breeding), they become known as trigger species, and the site at which they are found is designated as an IBA. IBAs range in size from very tiny patches of habitat to large tracts of land or water. They may encompass private or public land, and they may or may not overlap partially or entirely with legally protected sites, such as EBSAs, National Wildlife Areas, Migratory Bird Sanctuaries and Wilderness and Ecological Reserves mentioned previously. While there are no IBAs located near our marine farms in Newfoundland, there are several identified within New Brunswick and Nova Scotia (**Fig. 7**).

Figure 7. IBAs in the Maritimes Region, with focus of Grand Manan Island, Passamaquoddy Bay and Maces Bay, NB.



[10] https://www.ibacanada.org/index.jsp?lang=en

4.2 Maine Aquaculture Sites and the Endangered Species Act (ESA)

The ESA aims to conserve, protect, and recover imperiled species and the ecosystems upon which they depend. The National Oceanic and Atmospheric Administration (NOAA) Fisheries is responsible for the protection, conservation, and recovery of endangered and threatened marine and anadromous species under the ESA.

Generally, NOAA Fisheries manages the marine and anadromous species including whales, corals, sea turtles, and salmon. The US Fish and Wildlife Service (USFWS) manages terrestrial and freshwater species such as polar bears, sea otters, and manatees.

The Maine Endangered Species Act (MESA) provides the Maine Department of Inland Fisheries and Wildlife (MDIFW) with a mandate to conserve all the species of fish and wildlife found in the State, as well as the ecosystems upon which they depend. Under the MESA, as stated in Maine aquaculture site Department of Marine Resources (DMR) Leases, a state agency or municipal government shall not permit, licence, fund or carry out projects occurring partly or wholly within the essential habitat, without the approval of the Commissioner of MDIFW.

Applicants are required to provide a signed statement to confirm the proposed lease either does not fall within the boundary of an essential habitat or that the applicant has contacted MDIFW, and preliminary review will grant approval for the Maine Department of Marine Resources (MDMR) to issue an aquaculture lease within part or all the boundary of a designated Essential Habitat.

SECTION 5 - Local Endangered or Threatened Species

5.1 Atlantic Canada

The following species are listed as endangered or threatened in Atlantic Canada[11] (excluding Prince Edward Island as well as terrestrial plants and animals) either under the Federal Species at Risk Act (SARA) and/or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and may be seen in the vicinity of our marine farms:

E = Endangered under the SARA and listed by the COSEWIC
T = Threatened under the SARA and listed by the COSEWIC
s = Special Concern under the SARA and listed by the COSEWIC
c = COSEWIC Designation, no SARA Status

Birds

1 Bank Swallow (*Riparia riparia*) **T**
2 Barn Swallow (*Hirundo rustica)* **T**
3 Barrow's Goldeneye (*Bucephala islandica*) **s**
4 Bicknell's Thrush (*Catharus bicknelli*) **T**
5 Bobolink (*Dolichonyx oryzivorus*) **T**
6 Canada Warbler (*Wilsonig anadensis*) **T**
7 Chimney Swift (Chaetura pelagica) **T**
8 Common Nighthawk (*Chordeiles minor*) **T**
9 Eastern Meadowlark (*Sturnella magna*) **T**
10 Eastern Whip-poor-will (*Antrostomus vociferus*) **T**
11 Eastern Wood Pewee (*Contopus virens*) **c**
12 Eskimo Curlew (*Numenius borealis*) **E – LIKELY EXTINCT**
13 Evening Grosbeak (*Coccothraustes vespertinus*) **s**
14 Harlequin Duck (*Histrionicus histrionicus*) **s**
15 Horned Grebe – Western population (*Podiceps auratus*) **s**[12]
16 Hudsonian Godwit (*Limosa haemastica*) **c**
17 Ipswich Sparrow (*Passerculus sandwichensis princeps*) **s**
18 Ivory Gull (*Pagophila eburnean*) **E**
19 Leach's Storm-Petrel (*Oceanodroma leucorhoa*) **c**
20 Least Bittern (*Ixobrychus exilis*) **T**
21 Lesser Yellowlegs (*Tringa flavipes*) **c**
22 Olive-sided Flycatcher (*Contopus cooperi*) **T**
23 Peregrine Falcon – Anatum Subspecies (*Falco peregrinus anatum*) **s**
24 Piping Plover (*Charadrius melodus*) **E**
25 Red Crossbill percna (*Loxia curvirostra percna*) **T**
26 Red Knot Rufa (*Calidris canutus rufa*) **E**
27 Red-necked Phalarope (*Phalaropus lobatus*) **s**
28 Roseate Tern (*Sterna dougallii*) **E**
29 Ross's Gull (*Rhodostethia rosea*) **T**
30 Rusty Blackbird (*Euphagus carolinus*) **s**
31 Savannah Sparrow princeps (*Passerculus sandwichensis princeps*) **s**
32 Short-eared Owl (*Asio flammeus*) **s**
33 Wood Thrush (*Hylocichla mustelina*) **T**
34 Yellow Rail (*Coturnicops noveboracensis*) **s**

[11] https://species-registry.canada.ca/index-en.html#/species?ranges=15,9,7,8&taxonomyId=4,5,2&sortBy=commonNameSort&sortDirection=asc&pageSize=10 (Filtered by NB, NL, NS, Atlantic Ocean; Birds, Fishes (Marine), Mammals)
[12] The Western population is recognized by the Province of New Brunswick under the provincial Species at Risk Act, though the SARA Registry does not consider New Brunswick as a range of the species. Due to its listing on the provincial list, it is included here.

Fish

1 Acadian Redfish (*Sebastes fasciatus*) **c**
2 American Eel (*Anguilla rostrata*) **T**
3 American Plaice (*Hippoglossoides platessoides*) **c**
4 Atlantic Bluefin Tuna (*Thunnus thynnus*) **c**
5 Atlantic Cod – Newfoundland and Labrador, Laurentian North and South, Southern populations (*Gadus morhua*) **c**
6 Atlantic Salmon – Eastern Cape Breton, Gaspe-Southern Gulf of St. Lawrence, Outer Bay of Fundy, Nova Scotia Southern Upland, South Newfoundland populations (*Salmo salar*) **c**
7 Atlantic Salmon – Inner Bay of Fundy (*Salmo salar*) **E**
8 Atlantic Sturgeon – Maritime population (*Acipenser oxyrinchus*) **c**
9 Atlantic Whitefish (*Coregonus huntsman*) **E**
10 Atlantic Wolffish (*Anarhichas lupus*) **s**
11 Basking Shark (*Cetorhinus maximus*) **c**
12 Cusk (*Brosme brosme*) **c**
13 Lumpfish (*Cyclopterus lumpus*) **c**
14 Northern Wolffish (*Anarhichas denticulatus*) **T**
15 Porbeagle (*Lamna nasus)* **c**
16 Shortfin Mako – Atlantic population (*Isurus oxyrinchus*) **c**
17 Shortnose Sturgeon (*Acipenser brevirostrum*) **s**
18 Smooth Skate – Lauranian-Scotian population (*Malacoraja senta*) **c**
19 Spiny Dogfish (*Squalus acanthias*) **c**
20 Spotted Wolffish (*Anarhichas minor*) **T**
21 Striped Bass – Bay of Fundy, Southern Gulf of St. Lawrence Population (*Morone saxitilis*) **c**
22 Thorny Skate (*Amblyraja radiata*) **c**
23 White Shark (*Carcharodon Carcharias*) **E**
24 White Hake (*Urophycis tenuis*) **c**
25 Winter Skate – Georges Bank, Western Scotian Shelf, Bay of Fundy populations (*Leucoraja ocellate*) **c**

Mammals

26 Beluga Whale (*Delphinapterus leucas*) **c**
27 Blue Whale (*Balaenoptera musculus*) **E**
28 Fin Whale (*Balaenoptera physalus*) **s**
29 Harbour Porpoise - Northwest Atlantic Population (*Phocoena phocoena*) **c**
30 Killer Whale – Northwest Atlantic population (*Orcinus orca*) **c**
31 North Atlantic Right Whale (*Eubalaena glacialis*) **E**
32 Northern Bottlenose Whale – Scotian Shell population (*Hyperoodon ampullatus*) **E**
33 Polar Bear (*Ursus maritimus*) **s**
34 Ringed Seal (*Pusa hispida*) **c**
35 Sowerby's Beaked Whale (*Mesoplodon bidens*) **s**

Turtles

36 Leatherback Sea Turtle – Atlantic population (*Dermochelys coriacea*) **E**
29 Loggerhead Sea Turtle (*Caretta caretta*) **E**

5.1.1. New Brunswick

In addition to the Federal SARA Registry, the following species are listed under Schedule A of the New Brunswick *List of Species at Risk Regulations - Species at Risk Act*[13] and may be seen within the vicinity of our marine farms:

E = **Endangered Species**
T = **Threatened Species**
S = **Species of Special Concern**

Birds

1 Bald Eagle (*Haliaeetus leucocephalus*) **E**

Fish

2 Blue Shark – Atlantic population (*Prionace glauca*) **S**
3 Rainbow Smelt – Lake Utopia Large-Bodied, Small-Bodied populations (*Osmerus mordax*) **T**
4 Winter Skate – Southern Gulf of St. Lawrence population (*Leucoraja ocellata*) **E**

5.1.2 Newfoundland

Newfoundland and Labrador's Endangered Species Act provides special protection for plant and animal species considered to be endangered, threatened, or vulnerable in the province. The Act considers species and populations that are native to the province but does not include marine fish. The following species are additional species relevant to those listed under the Federal SARA Registry and are listed under the Newfoundland and Labrador Endangered Species Act[14]:

E = Endangered
T = Threatened
V = Vulnerable

Birds

1 Newfoundland Gray-cheeked Thrush (*Catharus minimus minimus*) **T**

5.2 Maine

Endangered and threatened marine species in the state of Maine are listed under the Marine Endangered Species Act[15]. Endangered and threatened inland fish and wildlife species in Maine are listed either under Maine's Endangered Species Act[16], the US Endangered Species Act[17], or both. The following species are listed as endangered or threatened in Maine and may be seen in the vicinity of our marine farms:

F = Federally Endangered under the U.S. Endangered Species Act
f = Federally Threatened under the U.S. Endangered Species Act
S = State Endangered under the Maine Endangered Species Act
s = State Threatened under the Maine Endangered Species Act
M = State Endangered under the Maine Marine Endangered Species Act
m = State Threatened under the Maine Marine Endangered Species Act

[13] https://laws.gnb.ca/en/showdoc/cr/2013-38
[14] https://www.gov.nl.ca/ffa/wildlife/endangeredspecies/
[15] http://www.mainelegislature.org/legis/statutes/12/title12sec6975.html
[16] https://www.maine.gov/ifw/fish-wildlife/wildlife/endangered-threatened-species/listed-species.html
[17] https://www.fisheries.noaa.gov/species-directory/threatened-endangered?title=&species_category=any&species_status=any&regions=1000001111&items_per_page=25&sort=#

Birds

1 American Pipit (*Anthus rubescens*) (Breeding population only) **S**
2 Arctic Tern (*Sterna paradisaea*) **s**
3 Atlantic Puffin (*Fratercula arctica*) **s**
4 Barrow's Goldeneye (*Buchephala islandica*) **s**
5 Black-crowned Night Heron (*Nycticorax nycticorax*) **S**
6 Black Tern (*Chlidonias niger*) **S**
7 Common Gallinule (*Gallinula chloropus*) **s**
8 Giant Manta Ray (*Manta birostris*) **f**
9 Golden Eagle (*Aquila chrysaetos*) **S**
10 Grasshopper Sparrow (*Ammodramus savannarum*) **S**
11 Great Cormorant – Breeding population (*Phalacrocorax carbo*) **s**
12 Harlequin Duck (*Histrionicus histrionicus*) **s**
13 Least Bittern (*Lxobrychus exilis*) **S**
14 Least Tern (*Sterna antillarum)* **S**
15 Peregrine Falcon – Breeding population (*Falco peregrinus*) **S**
16 Piping Plover (*Charadrius melodus*) **S f**
17 Razorbill (*Alca torda*) **s**
18 Red Knot (*Calidris canutus rufa*) **f**
19 Roseate Tern (*Sterna dougallii*) **S F**
20 Sedge Wren (*Cistothorus platensis*) **S**
21 Short-eared Owl (*Asio flammeus*) (Breeding population only) **s**
22 Upland Sandpiper (*Bartramia longicauda*) **s**

Fish

23 Atlantic Salmon (*Salmo salar*) **F**
24 Atlantic Sturgeon (*Acipenser oxyrinchus*) **f**
25 Shortnose Sturgeon (*Acipenser brevirostrum*) **F M**
26 Oceanic Whitetip Shark (*Carcharhinus longimanus*) **f**

Mammals

27 Blue Whale *(Balaenoptera musculs)* **F**
28 Fin Whale (*Balaenoptera physalus*) **F M**
29 Humpback Whale (*Megaptera novaeangliae*) **M**
30 North Atlantic Right Whale (*Eubalaena glacialis*) **F M**
31 Sei Whale (*Balaenoptera borealis*) **F M**
32 Sperm Whale (*Physeter catodon*) **F M**

Turtles

33 Atlantic (Kemp's) Ridley Turtle (*Lepidochelys kempi*) **F M**
34 Green Turtle (*Chelonia mydas*) **f**
35 Leatherback (*Dermochelys coriacea*) **F M**
36 Loggerhead (*Caretta caretta*) **f m**

SECTION 6 - Control Measures

From the careful selection of farm sites and investment in the best technology in everything from cage and net construction to feeding systems, to regular monitoring and sampling of sediment under cage sites, we ensure that all the necessary steps to safeguard the health of our salmon and of the surrounding areas are taken. Any measures taken to protect fish from predators are always carried out in a manner that considers predator welfare and does not endanger the predator population; however, if a predator cannot be deterred and is threatening human safety or the security of the containment, it may be dispatched with Saltwater Management consent AND in accordance with Provincial, State or Federal Regulations.

6.1 Passive Control Measures

The primary containment net will be protected from predators using a predator net as needed. The predator net mesh size will be consistent with that utilized in the area for controlling access by predators. Bird nets shall be present over top of each containment net when fish are present and only pulled back to allow access to the cage. During daily inspections, bird nets are checked for damage and pulled tight. 150m cages may require additional support lines to reduce sagging. In winter months, bird nets should be simmed to main nets.

6.2 Active Control Measures

Non-lethal, visual, or audible surface deterrent devices may be used on sites to discourage birds from landing on the cages. Use of audible deterrents must take into effect proximity to other users and abide by noise regulations in the respective area and as described in the operational licences and permits.

Visual active controls include the use of handheld lasers, specifically the Agrilaser® Handheld 200/500 developed by Bird Control Group. The beam produced is classified as a 3B Laser with an effective range of 2,500m. Birds see the laser beam differently than humans and see the beam as a physical danger. The goal is that after consistent use, the birds will perceive the farm as unsafe and will not return. Range of the laser is highly dependent upon weather conditions, with the longest range seen on dark or cloudy days. Sites designated to use this deterrent require specific training and must completed a Safe Use Agreement prior to being assigned a laser.

For predatory marine mammals, Acoustic Deterrent Devices (ADDs) may deployed underneath the water to deter the animals away from our cages. The use of ADDs has drastically reduced in recent years largely due in part to the advances in passive control systems, such as the use of the steel-core nets, redesign of our grid systems and other technologies. ADDs may only be used if:

- The use of an ADD has been first communicated with and approved by the respective Area and/or Production Manager to ensure that all other preventative measures have been taken.
- Other factors such as the legality to use such devices or the requirements of certification programs need to be referred to prior to deployment and your Compliance Manager (or similar) and/or Production Manager are your best resources to answer these questions.
- To ensure that non-target species are not negatively impacted, the use of any ADDs is limited during periods of high population densities. As such, the use of ADDs will NOT BE PERMITTED during the months of June through September – any ADDs must be physically removed from the water during this time.

For smaller marine predators, such as the mink. active measures to control or remove these predators is the use of traps. Traps are only permitted to be used under permit, such as the Nuisance Animal Control Permit in New Brunswick or through those who hold a valid licence, such as the Nuisance Wildlife Control Operator Licence or utilizing the services of local Wildlife Control Officers.

6.3 Lethal Control Measures

Lethal control measures for predators are prohibited unless there is a permit in place and actions are carried out according to said permit under the instructions and guidance of Senior Management. In most instances, marine mammals, primarily seals, found inside cages can be removed by lowering the net to allow the animal to remove themselves. Birds should never require the use of lethal control measures and only require intervention if entangled, entrapped or to aid, refer to *General Predator Interactions*.

6.4 Daily Inspections

Each day crews are to inspect the farm to check water quality, inspect cages and netting and to make general observations of the fish and fish activity from the surface. Any debris that could cause harm to the fish and/or damage netting should be removed from around or in the cages including garbage, large sticks, and excessive amounts of kelp or rockweed. Any garbage shall be removed from the water and placed in site garbage to be disposed properly.

Inspections on the cages and netting should include infrastructure inspections, such as:

- Checking for waterlines or handrail ties that are untied, missing, broken, or chaffed. Any lines that are untied must be retied; all others shall be replaced as soon as possible.
- Inspecting netting and the water surface inside of the cage for any entangled or entrapped wildlife. When possible, to do so without handling the wildlife, all attempts shall be made to release the wildlife without additional harm. Any species found deceased should be removed from the structure.
- Inspecting netting and cage for any damage. For larger repairs, such as broken, chaffed, or missing bridals, weight ring ropes or camera lines should be reported to the Site Manager as these types of repairs may require the use of divers, maintenance vessels, or plastic welders. Any holes discovered in the netting should immediately be repaired, if able, or reported to the Site Manager so that divers can be called in to assess and check for signs of fish escapement.

SECTION 7 - Special Requirements

7.1 Newfoundland Species at Risk; Bald Eagles and Miawpukek First Nation

Interactions between wildlife and aquaculture facilities are bound to occur from time to time. Therefore, our activities should be conducted with respect and care for the local wildlife, ensuring that harmful encounters are minimized. In cases where we do encounter entangled birds, other wildlife, and marine mammals on our sites, whether alive or dead, we are obligated to contact the following authorities for their information and action.

- Report any sightings of species listed on the Newfoundland and Labrador Species at Risk to the Department of Environment and Conservation – Endangered Species and Biodiversity, Wildlife Division at (709) 637-2026.
- Birds and other wildlife: notify the local Conservation Officer, Department of Environment and Conservation (in the Bay D'Espoir area the phone number is (709) 882-2200). If the animal in question is an eagle, we will also contact the Miawpukek First Nation Council, located in Conne River, at (709) 882-2470.
- Marine mammals and fish (tuna, etc.): contact the local Department of Fisheries and Oceans Canada Conservation and Protection Officer in your community.

In the case of wild animals that are alive, the province's Department of Environment and Conservation has a "Wildlife Care and Rehabilitation Program" at Salmonier Nature Park. The local Conservation Officer will be able to determine if the animal in question should be sent to the Salmonier Park.

If a dead animal is encountered, it should be retrieved where possible, treated respectfully, and turned over to the appropriate authority when directed to do so. In the case of deceased bald eagles, the Conservations Officer will make properly permitted arrangements to turn them over to the Miawpukek First Nation Council for respectful burial at Conne River.

7.2 Maine Coastal Islands National Wildlife Refuge Complex

Established between 1972 and 1980, the US Fish and Wildlife Service (USFWS) oversees the Maine Coastal Islands National Wildlife Refuge Complex, which were established for the protection of migratory birds, principally colonial nesting seabirds, The Complex, containing more than 73 offshore islands and 4 coastal parcels, is comprised of five individual refuges which span the coast of Maine and support an incredible diversity of habitats including coastal islands, forested headlands, estuaries, and freshwater wetlands. **Refer to APPENDIX USFWS: Maine Coastal Islands National Wildlife Refuge Complex**[18]

The Cross Island marine farm (MACH CI2), located just inside Northwest Harbour off Cross Island in Machias Bay, is positioned near the Cross Island National Wildlife Refuge. A "line of impasse" is described within the Army Corp of Engineers Permit for MACH CI2 (1989) in which the permit states that no aquaculture gear can be placed south of this line.

7.3 National (US) Bald Eagle Management Guidelines

Bald Eagles were removed from the US endangered species list in August 2007 due to sufficient population recovery, however both bald eagles and golden eagles are still protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act. The National Bald Eagle Management Guidelines[19] were developed by the USFWS to advise individuals who share public and private lands with bald eagles about when and under what circumstances the protective provisions of the Eagle Act may apply to their activities.
The Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance" which is prohibited by the Eagle Act.

[18] fws.gov/refuge/maine-coastal-islands-complex
[19] https://www.fws.gov/media/national-bald-eagle-management-guidelines-0

Due to the farms proximity to Stone Island, the Stone Island marine farm (MACH ST), located in Machias Bay, must comply with the Guidelines to minimize disturbance of nesting eagles on Stone Island. Such guidelines include sensitive periods (**Table 1**) within various ranges across the US, such as the Northern US which includes Maine.

Table 1. Chronology of typical reproductive activities of Bald Eagles for the Northern U.S., including Maine.

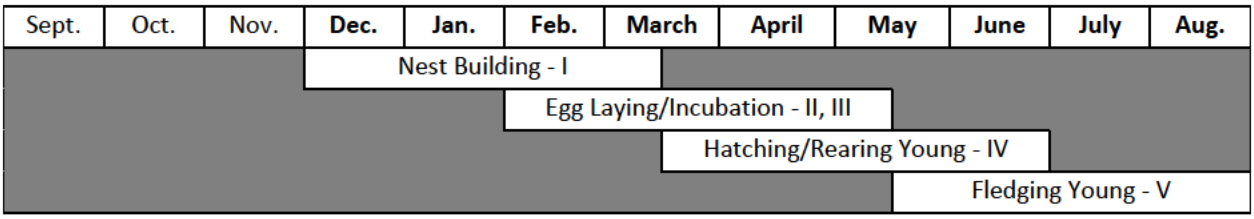


Table 2. Nesting Bald Eagle sensitivity to human activities.

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most Sensitive	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg Laying	Very Sensitive	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and Early Nestling Period (up to 4 weeks)	Very Sensitive	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately Sensitive	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very Sensitive	Gaining flight capacity, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

7.4 Coffin Island, Nova Scotia

Coffin Island is used for nesting by colonial birds, including the Roseate Tern, which are particularly vulnerable to the effects of human disturbance. The period spent at the colony prior to egg-laying is very important for seabirds, disturbance prior to egg-laying may cause birds to abandon historical colony locations. Meanwhile, disturbances during the breeding season can cause these birds to abandon their nests or young, or to use valuable energy reserves for defense, instead of incubating eggs and feeding their young. The presence of humans in close proximity to nests may prevent parent birds from returning to protect and feed their young, and expose eggs or chicks to predation, and to the lethal effects of heat, cold and rain.

The Liverpool marine farm (NS-1205) is located in close proximity to Coffin Island, which is pending designation as a 50-hectare Nature Reserve in Nova Scotia[20]. Although not officially designated under the IBAs program, the surrounding beaches and flats at East Berlin, West Berlin, Eagle Head, Beach Meadows, and Western Head all host

[20] https://novascotia.ca/parksandprotectedareas/plan/interactive-map/

small populations of migrant shorebirds as well in late summer and early fall. Given the distance from the marine farm to the surrounding beaches and flats, there is no anticipated interaction with these areas.

There is concern for potential negative interactions with sensitive species, therefore it is important that mitigation measures, such as the following, be implemented to avoid/minimize adverse effects on migratory birds in the vicinity of Coffin Island:

- Marine travel should take place at steady speeds, moving parallel to the shore, rather than approaching Coffin Island directly.
- Vessels and equipment should be well muffled, and should avoid any sharp or loud noises, should not blow horns or whistles, and should maintain constant engine noise levels.
- Radio communications should be the primary source of communication, as opposed to whistle blasts and horns.
- Marine vessels should not pursue seabirds/waterbirds swimming on the water surface and avoid concentrations of birds on the water.
- There should be no access to Coffin Island, including the intertidal zone, by employees and/or equipment. Beaches and wetlands are sensitive habitats, and these habitats shall not be used for construction, operational or decommissioning activities, with the exception of beach clean-up activities, which should be timed to not coincide with sensitive periods for breeding birds.
- Beach clean-ups should be conducted in outer Liverpool Bay (Western Head to West Berlin) but avoid the mid-March to September 30th period.
- Should equipment wash up at these sites during the courtship, nesting, and/or chick rearing seasons of colonial nesters (spring and summer), the Canadian Wildlife Service will be contacted prior to retrieval of equipment.

Farms are expected to comply with the requirements as included in the Materials, Storage Handling and Waste Disposal Plan regarding fuel and chemical storage, household, and hazardous waste as well as feed storage that may affect wildlife through contamination or through the artificial enhanced presence of avian and mammalian predators.

SECTION 8 - Reporting and Training

Farm staff have available to them a copy of this plan. All site staff, as well as management, are responsible for both implementation and compliance of this plan.

Annually all marine farm employees participate in CREW Training which is an in-house developed and delivered session that discusses the day-to-day practices and responsibilities of all employees. Topics covered include Fish Health, Waste Management, Wildlife Interactions, Spill Prevention and Reporting, Escape Prevention and Reporting. Farm staff will be trained in recognizing endangered, threatened, and protected species they may see from their farm and a system for recording and reporting such observations to farm management. A Standard Operating Procedure for Predator Interaction is also included in the Fish Health Management Plan available on each site.

An IMS Incident Record is part of the Cooke Aquaculture Integrated Management System and is to be used to report various incident types, including wildlife interactions. The form is available electronically through Pronto Forms and is also available on SharePoint and hard copy if necessary.

All records of training are recorded in Intelex.

8.1 General Predator Interactions

Due to the environment in which we operate, wildlife interactions will be unavoidable – both neutral and negative. Neutral interactions are those where no wildlife is harmed but may be sighted by employees and been seen as a positive or rewarding experience. Though there is no direct contact, some species may require management notification if the species is listed on a Species at Risk list or other similar list. Negative interactions can be further divided into two subcategories – those that affect the marine farm populations (predators) and those where the wildlife has been impacted (entangled, entrapped, death). Based on historical knowledge, negative interactions will generally identify instances of predator activity and should be noted to determine if there is an increase or decrease in activity. If a predator is persistent or there is the potential for endangerment of employees, deterrence methods may be required. Any negative interaction, including those involving non-predatory species whether intentional or accidental, in addition to those neutral interactions with at risk species, must be reported.

8.2 General Wildlife Interactions

Marine birds and mammals have the greatest likelihood for interactions with marine farms given that they share the same waters and migrate through areas where farms are located. Wildlife may become entangled, entrapped, contaminated, or oiled from gear or chemicals on an aquaculture site. The first step to preventing such emergencies is prevention. Proper installed containment and predator exclusion netting, continually checking nets for integrity and avoiding oil, gas and chemical spills is important.

8.2.1 Entanglement, Entrapment

Birds, mainly gulls, will stand atop the bird stands and bird netting, both as a form of rest and in an attempt to access feed. Occasionally other birds such as crows, herons, among other may be seen but this is generally limited to smolt entry when the fish are small. Birds interested in fish generally loose interest once the fish are larger and as long as the bird nets remain taught. Other birds may be seen as they are passing through to other destinations.

Birds may become entrapped under the bird netting if there are holes in the net or if it is not properly secured. Should a bird become entrapped, employees must roll back the bird net and allow the bird to exit. The bird net must be gathered in a manner that prevents entanglement by neither the bird nor fish while it is pulled back. Once released, the bird net must be repaired, if applicable, and/or properly secured.

Marine mammals and large fishes may enter or entangle themselves within netting or anchor lines, either through forceful entry or accidental entanglement. Should a marine mammal such as a seal enter a cage, the seal should be immediately released by lowering the net to the height of the float pipe to allow the seal to swim out. The seal should be encouraged to leave the cage from the opposite side of the cage from where the net has been dropped. Once removed, the net is to be retied and divers should immediately be contacted to perform a net inspection.

These types of interactions require the submission of a Wildlife Interaction on the IMS Incident Record.

8.2.2 Oiled Birds

If a fuel, chemical or oil spill does occur or is discovered, immediately contact the Coast Guard, and activate the Spill Prevention and Response Plan (Canada) or Spill Prevention, Control and Countermeasure Plan (Maine). If wildlife is not initially affected, efforts should be made to keep wildlife out of the affected area, if possible.

Birds that have come into contact with oil may have exhibit obvious indicators of being oiled, such as oil coating, discolored feathers, or feathers having a wet or ragged appearance. Heavily oiled birds or individuals oiled below the waterline may also appear as though they are sitting low on the water, perhaps struggling to maintain above water. As such, oiled birds are also likely to be intently focused on preening in an attempt to remove the oil, so much so that they may not exhibit a strong flight reaction upon approach. They may also stand or rest on wharves, barges, or vessels with a more solid structure than those that might usually rest on the cages or netting.

DO NOT attempt to capture the bird without first seeking advice as their handling may require the issuance of permits, depending on species. Injured and oiled birds, especially those washed ashore are extremely weak, dehydrated, and often near death. The added stress of attempted capture could cause more harm than good, perhaps even fatality. Should an oiled bird be found, alive or deceased, contact the regional Compliance Manager, or designate and complete an IMS Incident Record. If further actions are required, the regional Compliance Manager or designate will communicate any advice or recommendations provided by the appropriate authorities.

8.3 Canadian Wildlife Service Permit

Migratory birds are protected under the Migratory Birds Convention Act and some species are also protected under the Species at Risk Act (SARA); this protection can extend to the point where evening handling these species is not allowed without a Canadian Wildlife Service Permit.

Common sense must prevail in all circumstances and caution must be exercised when dealing with birds. In stressful situations, birds may react with more force to protect themselves. As well, birds can carry diseases and parasites which may be transmitted to humans. If a bird can be easily released from entrapment without handling, this may be attempted by site workers. Employees should not touch birds, regardless of the situation. If an incident cannot be resolved, employees must contact the Compliance Manager or designate and provide information regarding the incident such as the cause of the incident (entanglement, oil spill, etc.), wildlife involved and the location of the incident - good directions and/or coordinates are essential to help experts arrive in time. Canadian Wildlife Services should be contacted, (506)-364-5068 orPermi.Atl@ec.gc.ca, for further direction. A permit may become necessary to handle and transport the bird to a rehabilitation facility. If a bird must be handled, clean work gloves must be worn, and the bird handled with care.

If crews find a dead migratory bird, the Site Manager must be informed and the Compliance Manager or designate contacted. The Compliance Manager or designated will contact the Canadian Wildlife Health Cooperative (https://www.cwhc-rcsf.ca/)at 1-800-567-2033.

8.4 SARA Reporting

Species identified on the Provincial Protected Wildlife factsheets are protected under SARA (Species at Risk Act) and COSEWIC (Committee on the status of Endangered Wildlife in Canada) and have been or could be found in the area of aquaculture sites in Atlantic Canada.

Should you observe wildlife around aquaculture facilities identified under SARA/COSEWIC, special care should be taken to not disturb or harm the species. If able, collect a photograph and submit the details of the sighting on the IMS Incident Record, including location of the sighting. The Compliance Manager or designate will report sighting of these listed species to the species at risk hotline at 1-866-727-3467 or emailed to sightings@speciesatrisk.ca. Should the animal be found in distress, the Compliance Manager or designate will contact the Canadian Coast Guard National Environmental Emergencies Centre at 1-800-565-1633.

The IMS Incident Record can be used to report both neutral and negative interactions.

8.5 Endangered Species – Federal and State

If you see a sick, injured, stranded, or dead marine mammal or sea turtle, immediately contact Northeast Marine Mammal and Sea Turtle Stranding and Entanglement Hotline at 1-866-755-NOAA (866-755-6622), or the Maine Marine Animal Reporting Hotline at 1-800-532-9551. A stranded animal is one that is dead on the beach or in the water, one that is alive on land and unable to return to the water and/or in need of medical attention, or a live animal in the water that is unable to return to its natural habitat under its own power or without assistance.

For Federally listed species, the National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service (NMFS) should be contacted through David Bean, Consultation Biologist/Atlantic Salmon Team via email david.bean@noaa.gov and/or phone 1-207-866-4172.

Allied Whale is authorized by NOAA Fisheries to respond to marine mammal emergencies and strandings, covering the area from Rockland, Maine north to the Canadian border.[21] To report a marine mammal stranding contact Allied Whale at 1-207-288-5644 (office) or 1-207-266-1326 (cell).

Endangered and threatened marine species are listed under Maine's Marine Endangered Species Act or ESA. The Maine Department of Marine Resources (MDMR) has responsibility for these species. For State listed species, the MDMR, Aquaculture Division should be contacted through Marcy Nelson, Aquaculture Program Director via phone (207) 441-4681.

[21] https://www.coa.edu/allied-whale/marine-mammal-strandings/

APPENDICES

All Included in Master or Online Version Only
Applicable Regional Documents are Included in Site Reference Binders

Agrilaser® Handheld User Manual
CAF Safe Operation Agreement: Bird Control Group Agrilaser® Handheld 200/500

Maine
USFWS: Maine Coastal Islands National Wildlife Refuge Complex

New Brunswick
NB Protected Wildlife ID Chart

Newfoundland
NL Protected Wildlife ID Chart

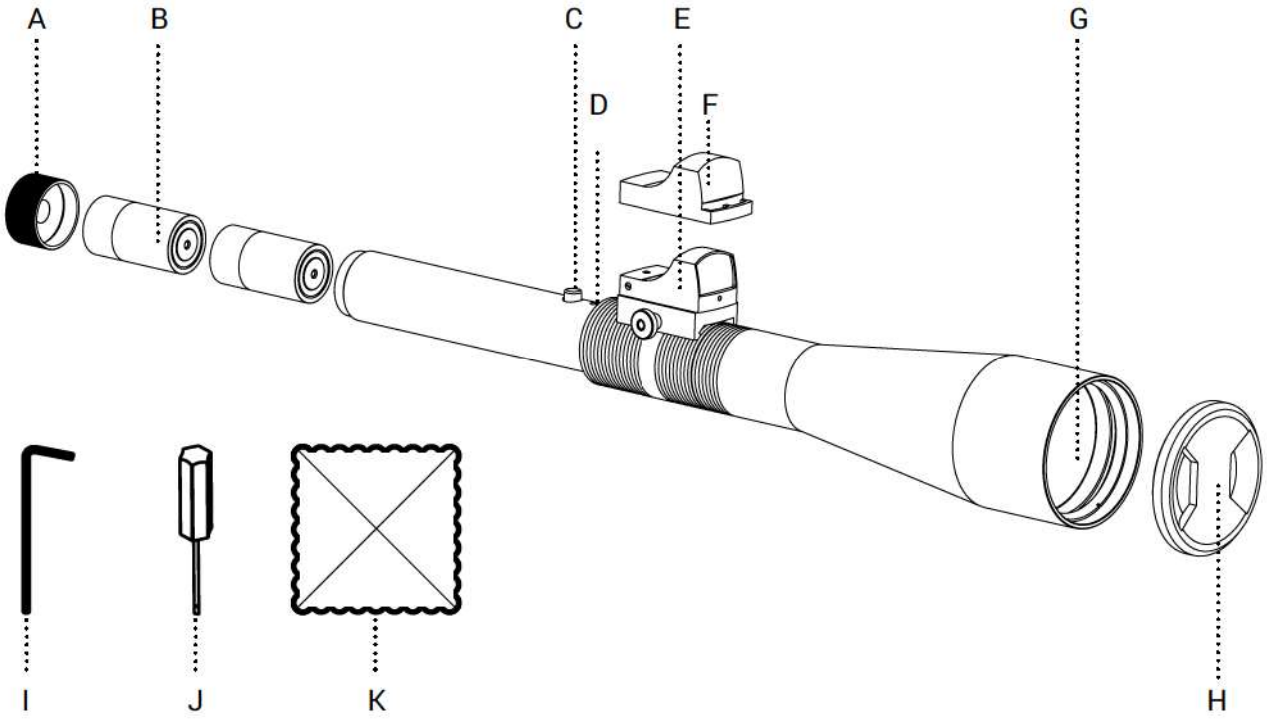
Nova Scotia
NS Protected Wildlife ID Chart

END OF DOCUMENT

Agrilaser® Handheld

User manual	EN
Mode d'emploi	FR
Benutzerhandbuch	DE
Gebruikershandleiding	NL
Manual de usuario	ES
Manual do usuário	PT
Руководство пользователя	RU

Agrilaser® Handheld V1.0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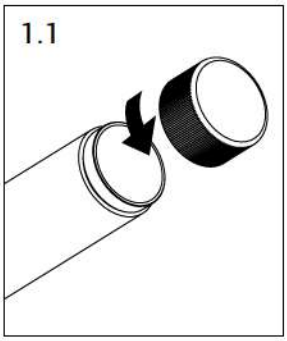
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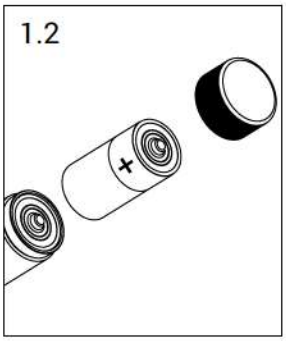
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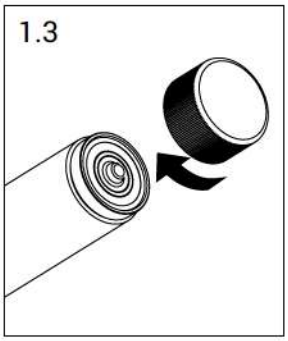
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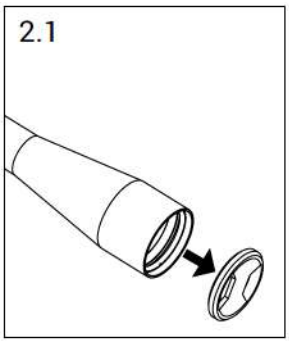
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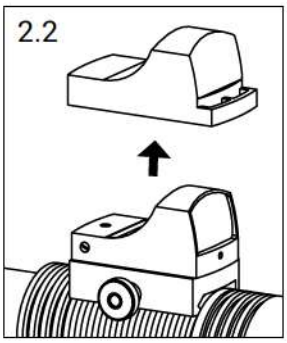
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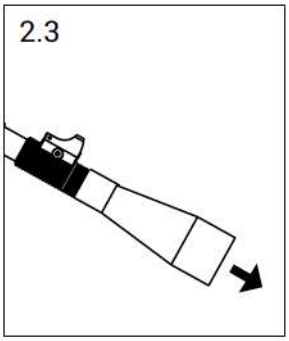
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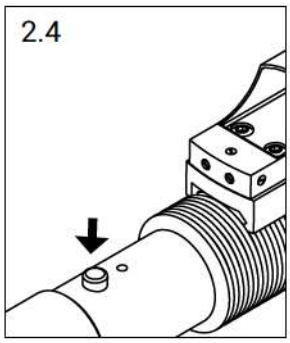
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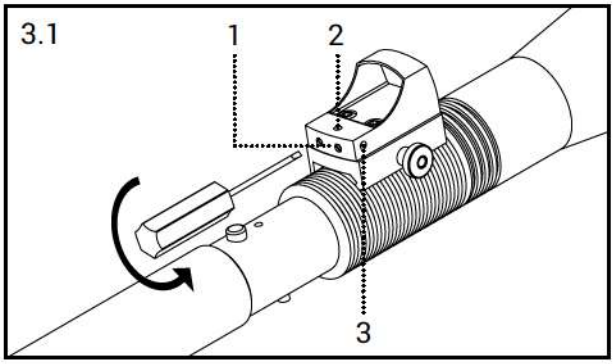
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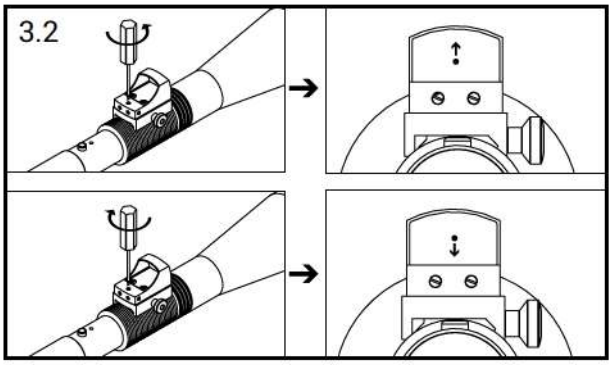
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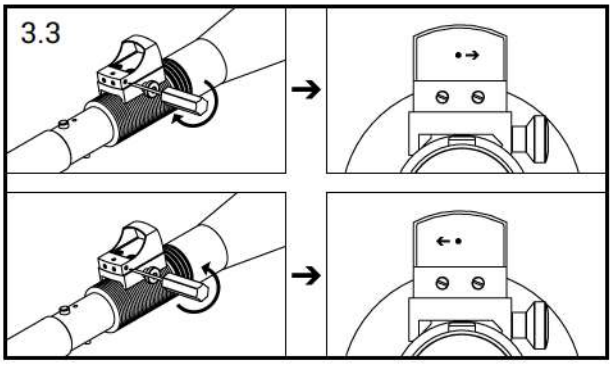
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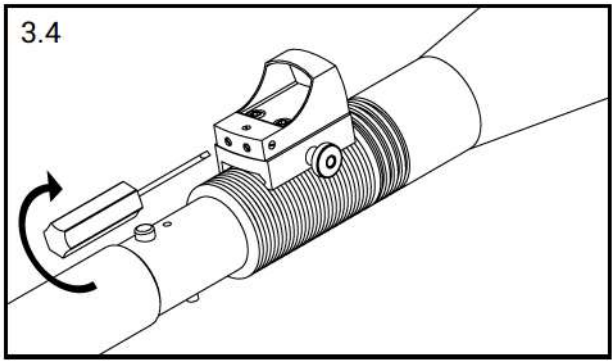
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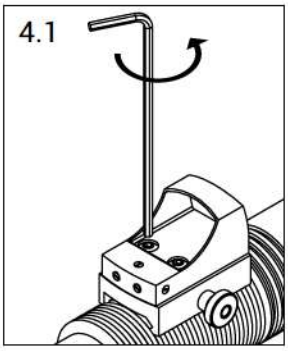
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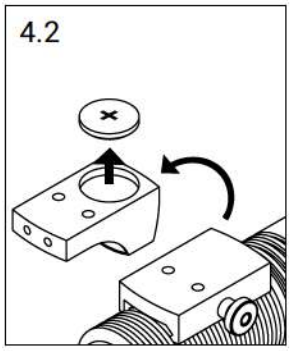
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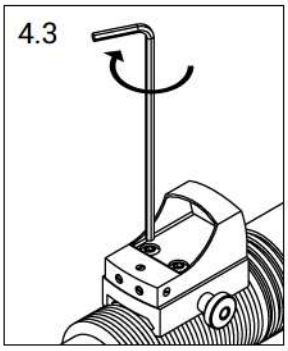
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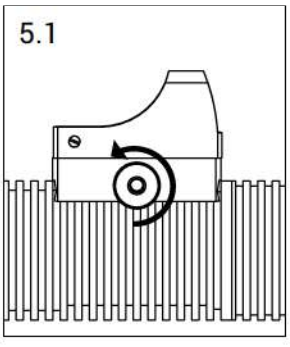
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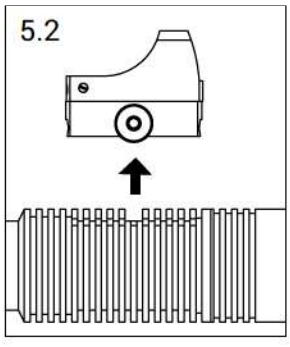
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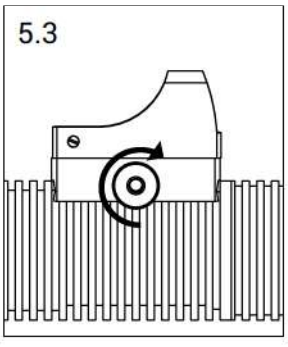
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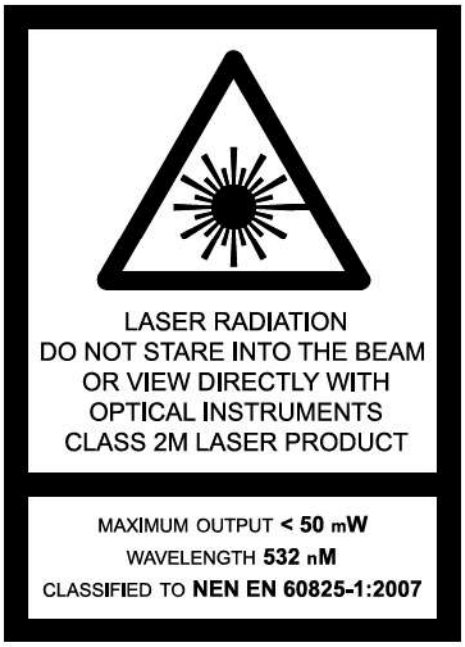


CAUTION - USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE

ENGLISH

Explanation of general view

A	Screw cap	G	Laser aperture
B	C battery (LR14)	H	Lens cap
C	ON/OFF button	I	Hex key
D	Output indicator	J	Screw driver
E	Aiming sight	K	Cleaning cloth
F	Protection cap		

Table of contents

Thank you for your purchase of the Agrilaser® Handheld.

Agrilaser offers silent, effective and easy to use bird control products. Our patented optical technology is optimized for long distance bird repelling. Birds perceive the laser beam as an approaching physical danger and fly away in search for safer grounds. After consistent use birds will perceive the area as unsafe and will not return.

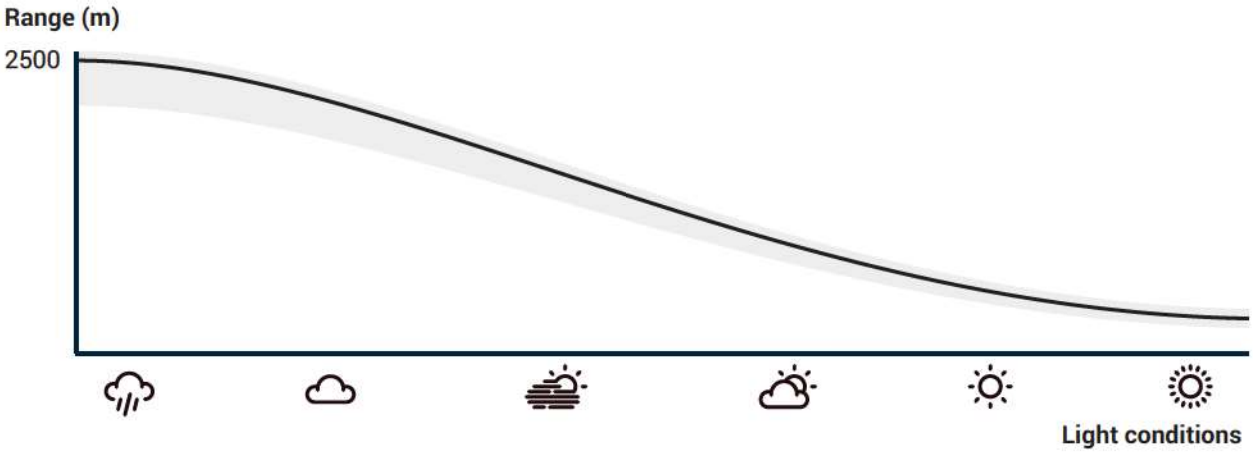
Package contents:
1x Agrilaser Handheld
1x Lens cap
2x LR14 battery
1x Aiming sight
1x Protection cap for aiming sight
1x Hex screw
1x Screw driver
1x Cleaning cloth
1x Storage case

CE The "CE" mark indicates that this product complies with the applicable European Directives which relate to health, safety, environmental and customer protection.

Technical specifications

Agrilaser® Handheld

Laser class	2M (classified according to NEN EN 60825-1:2007)
Laser beam color	Green
Service life laser source (during normal operating conditions)	5,000 h
Power source	Agrilaser Handheld: 2x C battery (LR14)
	Aiming sight: 1x CR2032 battery
Power input	3 VDC – 3.6 VDC
Energy consumption	4 W
Dimensions	424 (16.7) x 66 (2.6) x 83 (3.3) mm (in) (LxWxH)
Weight	760 g (27 oz)
Operating temperature	10 °C to 35 °C (50 °F to 95 °F)
Storage temperature	-10 °C to 50 °C (14 °F to 122 °F)



* actual range of effective bird repelling depends on environmental conditions

Safety instructions

⚠ **WARNING:** Carefully read all safety warnings and all instructions. Save all safety warnings and all instructions for future reference.

Agrilaser Handheld

⚠ **WARNING**: Staring into the beam or viewing the laser output with certain optical instruments designed for use at a distance (for example, telescopes or binoculars) may pose an eye hazard.

⚠ **WARNING**: The laser beam of the Agrilaser Handheld could cause dazzle or after images, particularly under low ambient light conditions. This may have indirect safety implications if experienced while performing safety-critical operations.

⚠ **CAUTION:**

- The Agrilaser Handheld should be used by adults only.
- The Agrilaser Handheld has no serviceable parts inside.
- To reduce risk of injury, only use the supplied batteries.
- Operate only in undamaged condition. Use of the product when damaged may result in exposure to hazardous laser radiation.

The safety labels as shown in figure 6.1 can be found on the bottom side of the Agrilaser Handheld body.

Contact your local Agrilaser dealer for any questions related to product safety.

Batteries

⚠ **CAUTION:**

- To prevent product malfunction, always insert batteries in correct orientation.
- Do not short circuit batteries.
- Misuse or abuse of batteries may result in leakage, burns, fire or explosion/disassembly causing personal injury or damage to other devices.
- Eye contact with battery contents may cause severe irritation. If battery is leaking and material contacts the eye, flush thoroughly with copious amounts of running water for 15 minutes. Seek immediate medical attention.
- Skin contact with battery contents may cause irritation. If battery is leaking and material contacts the skin, remove any contaminated clothing and flush exposed skin with copious amounts of running water. If irritation, injury or pain persists, seek medical attention.
- Inhalation of vapors or fumes released due to a large number of leaking batteries may cause respiratory and eye irritation. High concentration may cause central nervous system effects including headache, dizziness and nausea.
- Do not swallow batteries. Irritation to the internal/ external mouth area, may occur following exposure to a leaking battery. If battery is leaking, contents may be irritating to respiratory passages. Move to fresh air. If irritation persists, seek medical attention.
- In case of fire, use dry chemical, alcohol foam, water or carbon dioxide as appropriate for the surrounding fire. For incipient fires, carbon dioxide extinguishers are more effective than water. Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing. Fight fire from a distance or protected area. Cool fire exposed batteries to prevent rupture. Use caution when handling fire-exposed batteries as they may explode in heat of fire.

Functional use

Preparing for use

⚠ **CAUTION:**

- Point the laser towards to ground when inserting batteries.

- Do not drop. The product may malfunction if subjected to strong shocks or vibration.
- Avoid sudden changes in temperature: Sudden changes in temperature, such as those that occur when entering or leaving a heated building on a cold day, can cause condensation inside the device. To prevent condensation, keep the device in a storage box or plastic bag before exposing it to sudden changes in temperature.

Perform the following steps to replace the batteries of the Agrilaser Handheld:

1. Turn the end cap anti-clockwise to open the battery compartment (figure 1.1).
2. Insert the two batteries with the positive side facing the end cap (figure 1.2). Make sure the batteries are charged.
3. Turn the end cap clockwise to close the battery compartment (figure 1.3).

Only disperse birds with landowner's permission.

Never point the laser device towards aircraft, windows and vehicles.

Never point the laser device at humans.

Never point the laser device towards water or reflective surfaces such as mirrors, windows and metallic objects.

Using the Agrilaser® Handheld

⚠ **CAUTION:**

- The Agrilaser Handheld is a handheld laser device intended for bird repelling purposes only.
- When using the Agrilaser Handheld, always take into account the safety precautions as described in this document.
- The Agrilaser Handheld is not suited for continuous use. Use for short repelling actions only.

Perform the following steps to prepare the Agrilaser Handheld for active bird repelling:

1. Remove the lens cap (figure 2.1)
2. Remove the protection cap to activate the aiming sight (figure 2.2).

***Important**: To increase battery life, always replace the protection cap of the aiming sight after using the Agrilaser Handheld.*

3. Point the Agrilaser Handheld towards the ground (figure 2.3).
4. Switch on the Agrilaser Handheld by pushing the ON/OFF button (figure 2.4).
5. Project the laser dot on the ground in front of you and slowly move the dot towards the birds. Make sure no reflective objects, vehicles or people are between you and the birds. The Agrilaser Handheld should not be used like a gun, i.e. point and shoot.

Weather conditions: The Agrilaser Handheld is most effective during sunrise, sunset and overcast, rainy or foggy weather conditions. During bright weather conditions, make sure that the birds are positioned between the user and the sun. If not, bright sunlight could inhibit the repelling action.

Rain: Make sure the Agrilaser Handheld is kept out of the rain. Remove any moisture with a dry cloth.

Protected species: : Local regulations may prohibit the deterrence of certain (protected) bird species. Always consult local legislation before using the Agrilaser Handheld.

Aiming sight

Aligning the aiming sight

Applicable when the red dot is not aligned with the laser beam.

⚠ **CAUTION**: Do not stare into laser beam while aligning the aiming sight.

Step 1: Preparing for alignment

Unlock the two locking screws (number 1 on the aiming sight) at the back of the aiming sight (figure 3.1). For each locking screw, execute three full counter-clockwise rotations with the screwdriver.

Step 2: Vertical alignment.

1. Switch on the laser and project the beam on a distant object. Make sure that the green dot is visible through the aiming sight.
2. Rotate the adjustment screw (number 2 on the aiming sight) in clockwise direction to move the red dot downwards and vice versa (figure 3.2).

Continue to the horizontal alignment after the red dot is correctly aligned in vertical position.

Step 3: Horizontal alignment.

1. Project the beam on a distant object and make sure that the green dot is visible through the aiming sight.
2. Rotate the adjustment screw (number 3 on the aiming sight) in clockwise direction to move the red dot to the left and vice versa (figure 3.3).

Step 4: Securing new position

Fasten the two locking screws (number 1 on the aiming sight) in clockwise direction to secure the new alignment position (figure 3.4). Do not use excessive force.

Replacing the battery of the aiming sight

Applicable when the red dot is not visible.

1. Unscrew the two hex screws using the hex key (figure 4.1).
2. Remove the upper compartment of the aiming sight from its base to replace the CR2032 battery (figure 4.2).
3. Place the upper compartment in original position and fasten the hex screws using the hex key (figure 4.3).

Replacing the aiming sight

Applicable when the aiming sight is defective.

1. Unscrew the locknut by hand (figure 5.1).
2. Remove the aiming sight from the body of the Agrilaser Handheld (figure 5.2).
3. Place the aiming sight on the body of the Agrilaser Handheld and fasten it by hand (figure 5.3).

Maintenance

Cleaning

Body (Agrilaser Handheld and aiming sight)

Use a soft dry cloth to remove dust and dirt from the Agrilaser Handheld and the aiming sight. Do not use any liquids.

***Important**: Dust and other foreign matter inside the Agrilaser Handheld may cause damage not covered under warranty.*

Lens (Agrilaser Handheld and aiming sight)

The lenses are easily damaged. Remove dust and dirt with a soft dry cloth. To remove fingerprints and other stains, apply a small amount of lens cleaner to a soft cloth and clean with care.

Storage

When the Agrilaser Handheld is not used for an extended period, replace the lens cap and remove the batteries. To prevent mold or mildew, store the Agrilaser Handheld in a dry, well-ventilated area.

Do not store your Agrilaser Handheld in a location that is:

- poorly ventilated or subject to humidity's of over 60%.
- next to equipment that produce strong electromagnetic fields, such as televisions or radios
- exposed to temperatures above 65°C (149°F) or
- below -20°C (-4°F).

Store batteries in the original storage box together with the Agrilaser Handheld.

Disposal

Do not dispose of the Agrilaser Handheld, aiming sight or batteries together with household material. Recycle in accordance with local regulations.

Always recycle batteries.

Warranty

⚠ **CAUTION:** Disassembly attempts of the product voids warranty.

The Agrilaser Handheld is developed and produced according to the highest quality standards. Should you encounter any problems with your model, please carefully read this manual. If you encounter defects, please contact your local Agrilaser dealer. Should any defect arise as a result of production faults, free repair or replacement is guaranteed. The Agrilaser Handheld has a warranty period of 12 months, starting on the date of purchase. In case of replacement, the warranty period of the original product will remain valid.

Warranty conditions

The warranty is valid only if the Agrilaser Handheld is used according to the instructions as presented in the user manual. In addition, warranty only applies if a valid receipt is presented, showing the date of purchase, the name of dealer and the product name.

The warranty is invalid if:

- Water damage or damage due to falling or jolting occurred.
- The serial number has been removed.
- Any repairs have been carried out by unauthorized individuals.
- Any defects occurred as a result of misuse or use in environments that are not prescribed.
- The defect is due to wear of replaceable parts, such as batteries.
-

Spare parts

The following parts are available as spare parts for the Agrilaser Handheld. For requests of spare parts contact your local Agrilaser dealer.

Spare parts
Agrilaser Handheld battery (LR14 battery)
Screw cap
Lens cap
Aiming sight
Protection cap (for aiming sight)
Hex key
Screw driver
Cleaning cloth

Troubleshoot

Agrilaser Handheld

Check the following if the Agrilaser Handheld appears non-functional:

- Is the ON/OFF button activated?
- Is the lens cap removed?
- Are the batteries charged?
- Are both batteries inserted in correct orientation (as shown in figure 1.2)?

Aiming sight

Check the following if the aiming sight appears non-functional:

- Is the battery not empty?
- Is the protection cap removed?
- Are all screws sufficiently tightened?

FRANÇAIS

Explication de la vue globale

A	Capuchon à vis	G	Ouverture laser
B	Pile C (LR14)	H	Capuchon d'objectif
C	Bouton Marche/Arrêt	I	Clé hexagonale
D	Voyant de sortie	J	Tournevis
E	Viseur	K	Chiffon de nettoyage
F	Capuchon de protection		

Table des matières

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Contenu du colis :
1x Agrilaser Handheld
1x capuchon d'objectif
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1x viseur
1x capuche de protection du viseur
1x vis hexagonale
1x tournevis
1x chiffon de nettoyage
1x boîtier de rangement

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Thank You

Agrilaser® Handheld

Maine Coastal Islands National Wildlife Refuges
P.O. Box 279 (Water Street)
Milbridge, ME 04658
207/546 2124

P.O. Box 1735 (9 Water Street)
Rockland, ME 04841
207/594 0600

Hearing-impaired visitors may call the Maine Relay Center:
1 800/457 1220 (voice) or 1 800/437 1220 (TDD)

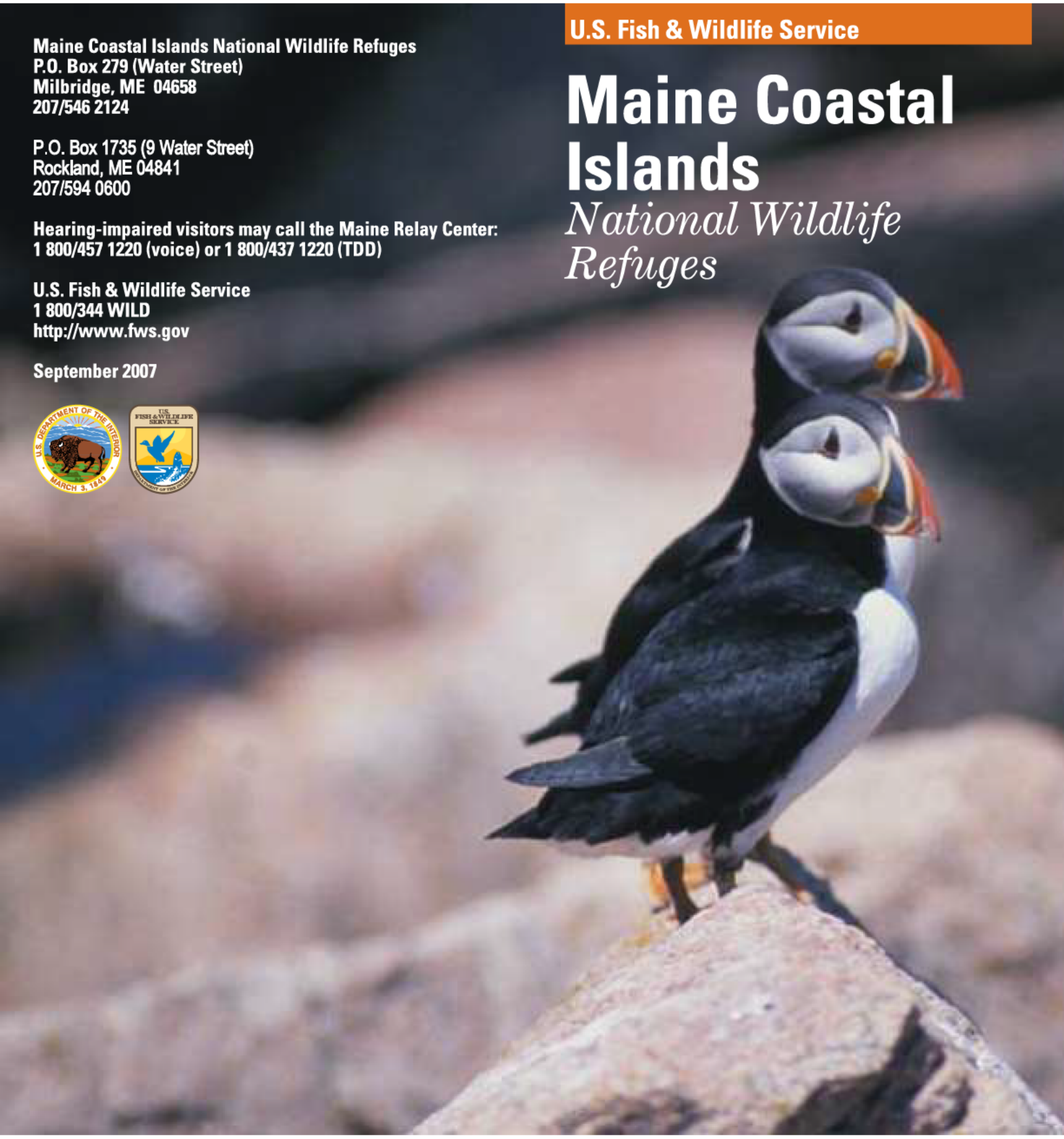
U.S. Fish & Wildlife Service
1 800/344 WILD
http://www.fws.gov

September 2007

U.S. Fish & Wildlife Service

Maine Coastal Islands

National Wildlife Refuges



Strung along the Maine coast like a strand of pearls, the islands of Maine Coastal Islands National Wildlife Refuges protect precious habitat for nesting seabirds, wading birds, and bald eagles. The refuge's mainland units complement the offshore gems by supporting migratory songbirds, shorebirds, and waterfowl.

Conserving the Nature of the Coast

This blue goose, designed by J.N. "Ding" Darling, has become a symbol of the National Wildlife Refuge System.

The Maine Coastal Islands National Wildlife Refuges span over 200 miles of Maine coastline and contain 49 offshore islands and four coastal parcels, totaling more than 8,000 acres. The refuge complex includes five national wildlife refuges — Petit Manan, Cross Island, Franklin Island, Seal Island, and Pond Island. The U.S. Fish and Wildlife Service manages the refuge complex as part of the National Wildlife Refuge System.

The Service's primary focus at Maine Coastal Islands is colonial seabird restoration and management. Refuge islands provide nesting habitat for common, Arctic, and endangered roseate terns, Atlantic puffins, razorbills, black guillemots, Leach's storm-petrels, laughing gulls, and common eiders. Over the last 25 years, the Service has worked to reverse the decline in these birds' populations. As a result, many species have returned to islands where they nested historically.

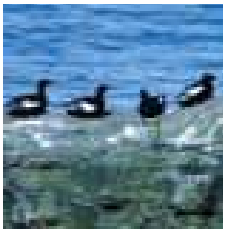
In addition to seabirds, wading birds and bald eagles nest on refuge islands. The mainland divisions provide habitat for songbirds, shorebirds, and waterfowl, as well as opportunities for bird watching and hiking.

Bald eagle

cover and facing photo: Bill Silliker, Jr.©

photo: Maine Dept. of Inland Fisheries & Wildlife

Seabird Struggles



James C. Leupold

Black guillemots

Seabirds have always relied on Maine's offshore islands as havens for raising their young. Small, unforested, rocky islands provide a setting free of mammalian predators such as foxes, coyotes, and raccoons. Flying distance from the mainland discourages avian predators such as great horned owls. The cold waters surrounding the islands hold an abundant supply of fish for adults and young alike.

Native Americans have used the coast's natural resources for more than 4,000 years. The Red Paint people camped on offshore islands in the summer and fished the deep ocean waters. Although they hunted seabirds and their eggs, they used sustainable methods, limiting harvest to certain islands and hunting any one colony once every three years.

Europeans began settling the islands in the 1600s, farming and raising sheep and hogs. The livestock disturbed nesting seabirds and trampled their habitat. The people hunted the birds and collected their eggs. In the late 1800s, the fashion industry posed an additional threat to the birds' existence. Women's hats were decorated with feathers. Egrets, herons, and terns were especially popular and, therefore, most harmed by the trend. At the start of the 20th Century, most seabirds in the Gulf of Maine were on the brink of extinction.

Concern for the future of all birds led to passage of the Migratory Bird Treaty Act in 1918. The Act protects migratory birds, their nests, and their eggs. At about the same time, trains and automobiles replaced boats as preferred forms of transportation. People relocated to the mainland, easing pressure on seabird habitat. Common and Arctic tern populations rebounded, reaching a high of almost 16,000 pairs along the Maine coast in 1940.

The recovery was short-lived, however. During the mid-1900s, the spread of open landfills along the coast and an increase in fishery waste provided easy pickings for herring and great black-backed gulls. These birds nest earlier than terns, claiming prime habitat and relegating terns to inferior nest sites. Some gulls also prey on tern eggs and chicks. The artificial food sources led to an explosion in gull populations. By 1977, the tern population in the Gulf of Maine had declined to roughly 5,000 nesting pairs.

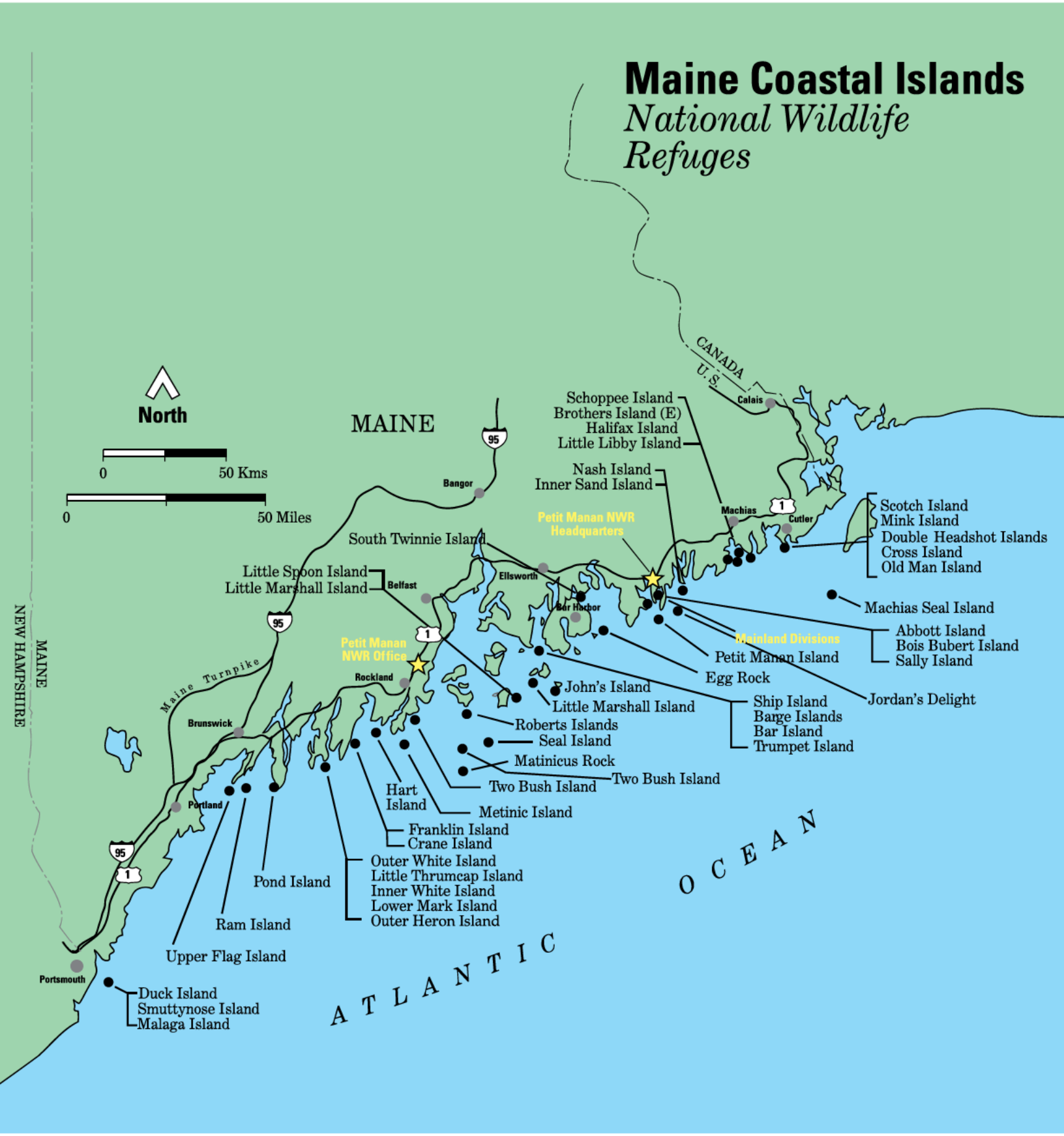
Burton Glendenning

Common terns

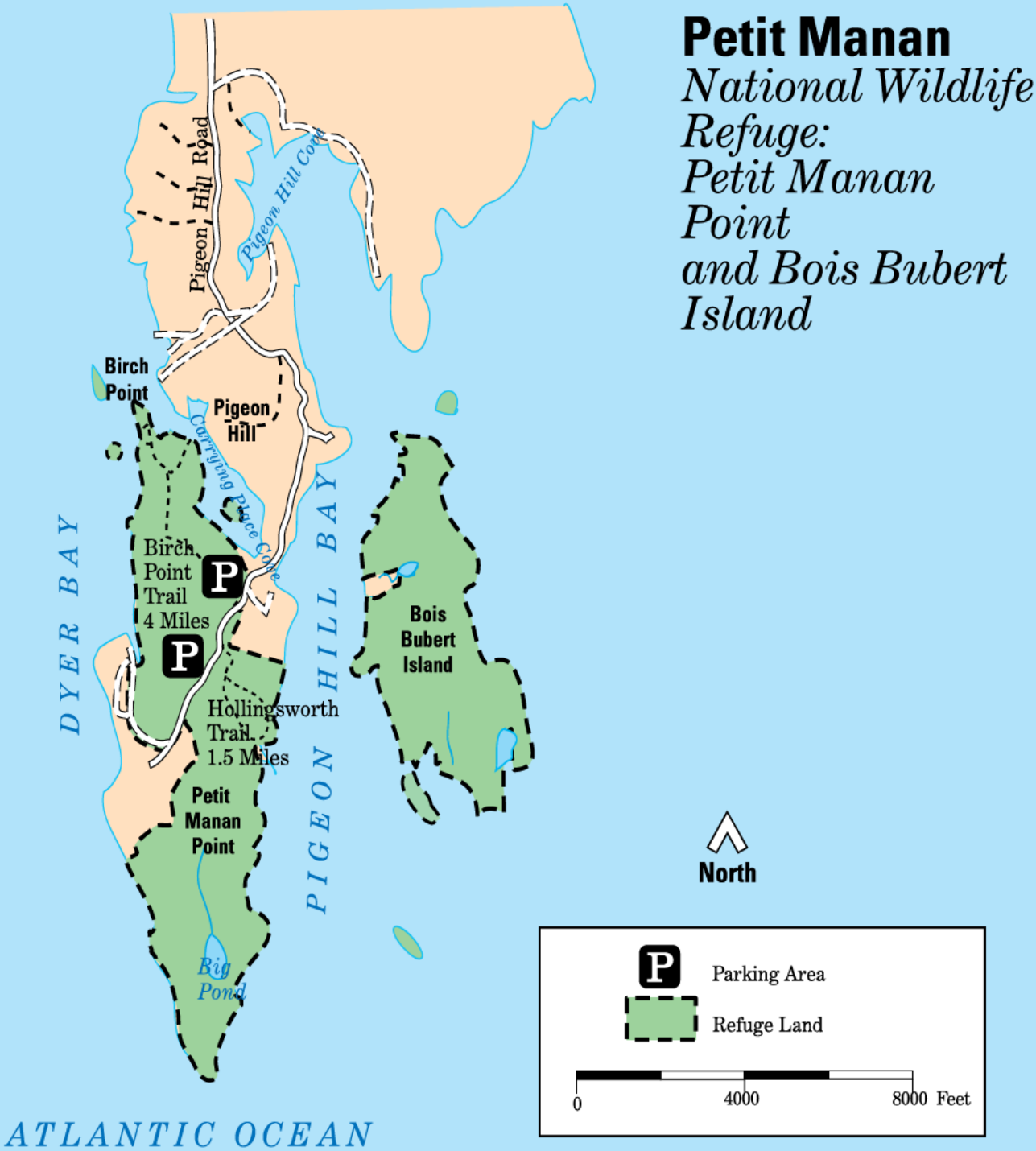
Seabird Restoration

Between 1972 and 1980, the refuges in the Maine Coastal Islands National Wildlife Refuge were established for the protection of migratory birds, principally colonial nesting seabirds. The Service has focused on restoring terns because their populations were particularly low. The roseate tern, a federally endangered species, prefers large colonies of common or Arctic terns in which to nest. Therefore, saving this species requires assisting the other two.

To restore terns to an island, it must first be made suitable for the birds again. This requires discouragement of herring and great black-backed gulls. In some cases, human presence on the island during the start of the gull nesting season is enough. Small populations of gulls can be controlled


Maine Coastal Islands
National Wildlife Refuges
North
0
50 Kms
0
50 Miles
MAINE
NEW HAMPSHIRE
CANADA
U. S.
Calais
Machias
Cutler
Bangor
Ellsworth
Bar Harbor
Belfast
Rockland
Brunswick
Portland
Portsmouth
Maine Turnpike
95
1
Petit Manan NWR Headquarters
Petit Manan NWR Office
Mainland Divisions
Schoppee Island
Brothers Island (E)
Halifax Island
Little Libby Island
Nash Island
Inner Sand Island
Scotch Island
Mink Island
Double Headshot Islands
Cross Island
Old Man Island
Machias Seal Island
Abbott Island
Bois Bubert Island
Sally Island
Petit Manan Island
Egg Rock
Jordan's Delight
Ship Island
Barge Islands
Bar Island
Trumpet Island
South Twinnie Island
Little Spoon Island
Little Marshall Island
John's Island
Little Marshall Island
Roberts Islands
Seal Island
Matinicus Rock
Two Bush Island
Two Bush Island
Metinic Island
Hart Island
Franklin Island
Crane Island
Outer White Island
Little Thrumcap Island
Inner White Island
Lower Mark Island
Outer Heron Island
Pond Island
Ram Island
Upper Flag Island
Duck Island
Smuttynose Island
Malaga Island
ATLANTIC OCEAN


Petit Manan
National Wildlife Refuge:
Mainland Divisions
Milbridge
Steuben
East Steuben
Gouldsboro
Prospect Harbor
Smithville Road
Chicken Mill Pond Rd.
Rogers Point Road
Dyer Bay Road
Pigeon Hill Road
Wymen Road
Fickett Pt. Road
Lookout Mtn
Wyman
Sawyer's Marsh Division
Gouldsboro Bay Division
Williams Point
Corea Heath Division
Cranberry Point
Forbes Pond
Eagle Hill
Parker Head
Dyer Neck
Morgador Road
Rocky Gulch Rd.
Shores Rd.
Dyer Neck Road
Yeaton Cove
Stanley Cove
Stanley Point
Dyer Point
Pinkham Bay
Dyer Harbor
Pigeon Hill Cove
Pigeon Hill
Petit Manan Point Division
Petit Manan Point Road
Over Cove
Petit Manan Point
Big Pond
Bois Bubert Island
Little Bois Bubert Island
Green Island
Petit Manan Island
Foster Island
Ripley Neck
Dyer Island
Trafton Island
Flint Island
Pond Island
Douglas Island Harbor
NARRAGUAGUS RIVER
NARRAGUAGUS BAY
JOY BAY
WEST BAY
GOULDSBORO BAY
DYER BAY
PIGEON HILL BAY
PROSPECT HARBOR
North
MAINE
Mainland Divisions
Other Refuge Lands
Lighthouse


Petit Manan
National Wildlife Refuge:
Petit Manan Point
and Bois Bubert Island
Pigeon Hill Road
Pigeon Hill Cove
Birch Point
Pigeon Hill
Coupling Place Cove
DYER BAY
PIGEON HILL BAY
Birch Point Trail 4 Miles
Hollingsworth Trail 1.5 Miles
Petit Manan Point
Bois Bubert Island
Big Pond
ATLANTIC OCEAN
North
Parking Area
Refuge Land
0
4000
8000 Feet

through egg and nest destruction and noise-makers. If a gull colony has grown too large, these techniques may be ineffective. Lethal means, including limited shooting and the use of an avicide, may be necessary.

If terns have recently abandoned an island, they may return rapidly once the gulls are gone. However, in many cases, it has been decades since terns nested on an island. To entice them back, the Service uses sound systems playing recordings of a tern colony and tern decoys scattered in suitable nesting habitat. This method has been highly effective on several islands within the Gulf of Maine.

Bill Silliker, Jr.©

Roseate tern

Tern restoration began in 1984 on Seal and Petit Manan islands, which now support large colonies of common and Arctic terns. Roseates have returned to Petit Manan. More recent restorations have occurred on Pond, Metinic, and Eastern Brothers islands. The goal is to establish tern colonies on numerous refuge islands. This will ensure that a singular catastrophic event such as disease, an oil spill, or a hurricane, will not wipe out a species.

Other colonial nesting seabirds have benefited from tern restoration efforts. Atlantic puffins, black guillemots, laughing gulls, Leach's storm-petrels, and common eiders have recolonized some islands. Petit Manan Island now hosts all of these species during the nesting season. Razorbills, a relative of the extinct great auk, are at the southern end of their range along the Maine coast and nest on three refuge islands: Seal, Matinicus Rock, and Old Man. Herring and great black-backed gulls and double-crested cormorants breed on some refuge islands.

A "Bed and Breakfast" for the Birds

In addition to seabirds, refuge islands provide habitat for raptors, wading birds, shorebirds, and songbirds. Some of the forested islands, including Outer Heron, Sally, Bois Bubert, and Mink, have active bald eagle nests. Outer White Island supports a black-crowned night heron rookery. Migrating peregrine falcons stop on Seal Island to hunt and rest. Warblers such as the bay-breasted and blackpoll, and shorebirds, including ruddy turnstones and semipalmated plovers, rely on the islands as stepping stones on their long trips north and south.

Tern decoys

USFWS

Points of Light

Eight refuge islands possess historic light houses. For more than a century, light keepers operated beacons on Petit Manan, Franklin, Pond, Nash, Two Bush, and Libby islands and Matinicus and Egg rocks to ensure safe travel for passing vessels. With the advent of underwater electric cables and solar power, automation of the lights became possible. The islands were transferred to the Service from the Coast Guard. The Coast Guard maintains all of the lights except Nash Island Light, which no longer functions. All are on the National Register of Historic Places, with the exception of Two Bush Island Light.

USFWS

Petit Manan Island Light

Meanwhile, On the Mainland

The refuge's four mainland properties are located in Hancock and Washington counties. Upland areas are characterized by spruce-fir forests with some mixed hardwoods. The 2,195-acre Petit Manan Point Division, in Steuben, also includes jack pine stands, coastal raised heath peatlands, blueberry barrens, old hayfields, freshwater and saltwater marshes, cedar swamps, granite shores, and cobble beaches. The Gouldsboro Bay Division, in Gouldsboro, protects 623 acres, including a large tidal saltmarsh and mudflat. The 1028-acre Sawyer's Marsh Division lies at the head of a broad saltmarsh in Milbridge, just north of Petit Manan Point.

The Corea Heath Division is a 431-acre raised coastal peatland situated on the Corea peninsula in Gouldsboro.

A Seasonal Home

Neotropical migratory songbirds thrive in the forests of the mainland divisions. These birds breed in North America and winter in the Caribbean, Mexico, and Central and South America. Recently, populations of species such as the American redstart, Swainson's thrush, and song sparrow, have declined due to habitat loss throughout their migratory routes.

Sid Bahrt

Yellow warbler

The Service monitors songbird populations by conducting surveys at the height of the breeding season each year. Experts walk designated routes, stopping at set intervals to identify and count birds by sight and song. Other studies use banding to identify individuals and track their survival and productivity.

The saltmarshes and mudflats of the mainland divisions attract waterfowl, wading birds, and shorebirds. Black ducks, great blue herons, and American bitterns ply the waters of the saltmarshes. Semipalmated sandpipers, short-billed dowitchers, greater and lesser yellowlegs, and dunlins probe the mudflats for invertebrates.

During fall migration, the 80-acre Cranberry Flowage on Petit Manan Point is filled with over 4,000 ducks. Black ducks, green-winged teal, and mallards rest and feed on wild rice

in preparation for the long flight south. Long-tailed duck, surf, black, and white-winged scoters, common goldeneyes, and common eiders winter in coastal waters.

The former pastures and blueberry fields on Petit Manan Point provide nesting habitat for grassland birds such as bobolinks and savannah sparrows. In the spring, American woodcock use the clearings for their unique courtship displays. Whimbrels stop off here during their fall migration from the Arctic tundra to the southern United States. The Service maintains open areas through periodic mowing and controlled burning.

Some species call the refuge's mainland "home" year-round. Resident wildlife include ruffed and spruce grouse, white-tailed deer, bobcats, snowshoe hares, porcupines, coyotes, and raccoons.

A Group Effort

Partnerships between the Service and other public and private organizations are key to the success of seabird restoration efforts at the refuge. Since 1984, refuge staff have worked closely with representatives from the Maine Department of Inland Fisheries and Wildlife, College of the Atlantic, National Audubon Society, Maine Audubon Society, and Canadian Wildlife Service in the Gulf of Maine Seabird Working Group. The Group guides restoration efforts on Maine's offshore islands, including those in the refuge.

Razorbill

Linda Welch/USFWS

Linda Welch/USFWS

Atlantic Puffin

Since the early 1980s, the National Audubon Society has worked with the Service to restore seabirds to Seal Island, located 21 miles southeast of Rockland, Maine. Through its Project Puffin, the Society successfully re-introduced Atlantic puffins to the island by transporting chicks from Newfoundland, Canada, and hand-raising them. Puffins now nest on the island, after a 150-year absence. Seal Island also supports the largest tern colony in the Gulf of Maine, with 2,000 pairs. National Audubon is working with the Service to manage and restore seabirds on Matinicus Rock and Pond Island.

Tom Goettel/USFWS

Old Man Island

The Service works with private organizations at the local, state, and national levels to add land to the refuge. These groups serve a vital function by purchasing property from willing sellers and protecting it until it can be acquired by the Service. Through conservation easements, refuge staff help landowners manage their properties for wildlife.

Where You Come In

Wildlife comes first on national wildlife refuges. All human activities must be compatible with the needs of wildlife. Six priority public uses are encouraged when they do not interfere with the individual refuge's mission. These are: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

The refuge offers excellent opportunities for bird watching and hiking. Foot trails wind through a variety of habitats, from spruce-fir woodlands to grasslands to freshwater and saltwater marshes to mudflats. On Petit Manan Point, the Hollingsworth Trail is a 1.5-mile loop with views of heaths and cobble beaches. Interpretive signs offer insight into refuge wildlife, habitats, and management. The Birch Point Trail (four miles round trip) begins in a blueberry field and leads to the saltmarshes of Dyer Bay, passing through a mixed-wood forest. A hiking trail on the Gouldsboro Bay Division is under development.

USFWS

Hollingsworth Trail - Petit Manan Point

Cross, Scotch, Halifax, and Bois Bubert islands are open to visitors all year. Seal Island and Duck Island are closed at all times. The remaining refuge islands are open from September 1 through March 31 and closed during the seabird nesting season, April 1 - August 31. Commercial tour boats provide views of nesting seabirds on Petit Manan and Machias Seal islands.

USFWS

Parts of the refuge are open to hunting. Contact the refuge office for a list of open areas and current regulations.

To reach the Petit Manan Point Division, take Pigeon Hill Road off U.S. Route 1 in Steuben. The parking area for the Birch Point Trail is 5.8 miles from Route 1, and the parking area for the Hollingsworth Trail is 6.2 miles. The Gouldsboro Bay, Corea Heath and Sawyer's Marsh divisions have no public use facilities at present.

Your Cooperation is Appreciated....

To protect the refuge's wildlife and habitats, please comply with the following:

The refuge is open during daylight hours only.

Dogs are allowed on mainland divisions only and must be on hand-held leashes no longer than 10 feet.

All-terrain vehicles and open fires are not allowed.

Blueberries may be hand-picked; raking is not allowed.

New Brunswick's Protected Wildlife

The following species are protected under SARA (Species at Risk Act) and/or COSEWIC (Committee on the status of Endangered Wildlife in Canada). Of the protected species found in New Brunswick and the Atlantic Ocean, these either have (recently) been observed in the area of southwestern NB's aquaculture sites or they are likely to be found in the area of the aquaculture sites due to their environmental preferences. If any of these animals are found in distress around the aquaculture sites, Canadian Coast Guard should be contacted at **1-800-565-1633**. If any of these animals are observed, care should be exercised to avoid causing them any harm.

Atlantic Cod *(Gadus morhua)*, Southern population

Habitat: Shoreline to continental shelf in Northeast Atlantic
Description: Brown to green or grey with spots on dorsal surface, pale underside. Distinctive chin barbell.
3 dorsal fins and 2 anal fins.
Max. size: 2 m, 96 kg

Atlantic Salmon (*Salmo salar*), iBoF population

Habitat: Fresh water streams in winter then migrates out to Bay
Description: Sides and belly are silvery,
back varies from shades of brown to green and blue.
Adult size: 60 cm, 3 kg
Season of Concern: Spring, summer and fall

Atlantic Bluefin Tina (*Thunnus thynnus*)

Habitat: Mostly pelagic species but can dive to depths of 500 to 100 m. Tolerates a wide thermal range (3 to 30˚C).
Description: Fusiform body, conical head, pointed snout; blue-black dorsal surface, lighter blue sides, and silvery-grey underside; 2 dorsal fins.
Adult size: 400 kg, 270 cm FL
Season of Concern: Summer to late fall

Fin Whale *(Balaenoptera physalus)*

Habitat: Temperate, cool waters. Found in shallow and uneven depths of the Bay of Fundy.
Description: Baleen whale with a long and slender, streamline body; dark grey, white underneath. Narrow, V-shaped head, pointed snout, paired blowholes.
Adult Size: 20-27 m, 70,000 kg
Season of concern: Summer

Harbour Porpoise *(Phocoena phocoena)*

Habitat: Temperate and subarctic waters (<16 °C). Inhabit marine and fresh waters, depths of < 650 m.
Description: Black back, grayish-white sides fading to white underneath
Max. size: 1.7 m, 65 kg

Thorny Skate *(Amblyraja radiata)*

Habitat: Ocean bottoms at depths of 18-1400 m, at temperatures of 0-10˚C.
Description: Dark colored upper body, white under side. A row of 11-19 large thorns runs down the middle of its back and along the tail.
Adult Size: 110 cm, 12.5 kg

Porbeagle *(Lamna nasus)*

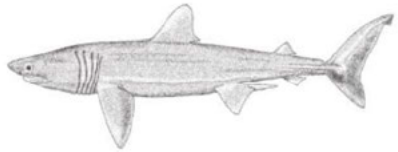
Habitat: Found at depths of 1 m to 700 m though more often on continental shelves. Prefers temperatures 5 – 10˚C.
Description: Large shark with a powerful streamlined body. Grey-bluish black body with a white patch on the back of dorsal fin, white underside. Head is stout, snout is pointed.
Max. size: 3.5 m, 135 kg

Leatherback Sea Turtle (*Dermochelys coriacea*)

Habitat: Offshore and coastal waters, at depth of 2 to 5033 m.
Description: Largest living sea turtle. Lacks a bony shell, instead its carapace is covered by bluish black skin.
Max.size: 2.4 m in length, 3.6 m wide, up to 725 kg
Season of Concern: April to December

Atlantic Wolffish *(Anarhichas lupus)*

Habitat: Bottom dweller, found in cold, deep waters. Prefers rock or hard-clay sediment.
Description: Rounded profile, heavy head, blunt snout, lacking pelvic fins. Body color ranges from slate blue to dull green to purplish brown with vertical, dark brown bars along the sides. Extensive teeth structure
Max. size: 150 cm, 20 kg



Basking Shark *(Cetorhinus maximum)*

Habitat: Prefers shallow coastal waters
Description: Blackish to grey-brown coloring, pointed snout, crescent-shaped caudal fin, elongated gill slits, large mouth with small teeth
Max. size: 15.2 m
Season of Concern: Summer

North Atlantic Right Whale *(Eubalaena glacialis)*

Habitat: Temperate northern waters (in summer)
Description: Large black baleen whale distinguished by the callosities (thick, hard, white bumps) on its head. Broad back, lacks a dorsal fin.
Adult Size: 16-17 m, 63,500 kg
Season of Concern: Summer and fall

American Eel *(Anguilla rostrata)*

Habitat: Found in all freshwater, estuarine, and marine waters that are connected to the Atlantic Ocean.
Description: Elongate and serpentine body with scales. Adults are grey with a white belly, juveniles have a dark back and a yellow, green, or olive-brown belly. A single fin extends from its back around the tail to its belly.
Adult size: 1 m (females), 0.4 m (males)

Harlequin Duck *(Histrionicus histrionicus)*
Habitat: Offshore islands, rocky coastline where surf breaks against rock and ice build-up is minimal.
Description: Small sea duck. Males have slate-blue plumage, chestnut sides, and streaks of white, chestnut and black on head. Females are plain, brownish-grey with patches of white
Adult size: 45cm
Season of Concern: Winter

Red Knot rufa *(Calidrius canutus rufa),*
Tierra del Fuego/Patagonia wintering population
Habitat: (migration) coastal areas with sandflats
Description: Medium size shorebird with sandpiper profile. Non-breeding plumage is plain with white underparts and pale grey back.
Adult size: 23- 25 cm, 135 g
Season of Concern: May/June and July/August

Red-necked Phalarope (*Phalaropus lobatus*)
Habitat: near water surface where there are prey aggregations
Description: (non-breeding plumage) white along the head, throat, breast and underparts with dark upper parts, eye stripe, and crown
Adult size: 18 cm
Season of Concern: April – May and August - October

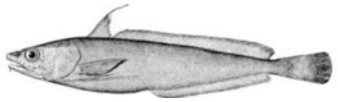
Peregrine Falcon anatum/tundrius (*Falco peregrinus*)
Habitat: cliffs or buildings for nesting, open landscapes for foraging, with nearby waterbodies
Description: (adults) bluish-grey/darker upper parts and pale under parts with dark spotting and barring; (immatures) pale to slate or chocolate brown upper parts, under parts are buffy with blackish streaks
Adult size: (males) 36-49 cm long, 650 g; (females) 45-58 cm long, 950 g

Lesser Yellowlegs (*Tringa flavipes*)
Habitat: uses freshwater and marine shorelines during migration
Description: small, slender shorebird with greyish plumage, a long neck, straight black bill, and long yellow legs
Adult size: 23 – 25 cm, 67-94 g
Season of Concern: Fall and spring

Spiny Dogfish (*Squalus acanthis*)
Habitat: Occurs world-wide from the intertidal to the continental shelf slope, most common at 10-100 m depth. Usually found at temperatures of 5-15˚C.
Description: Small shark, grey-brown on the upper body and whitish on the under side.
Max. size: 112 cm TL (female), 94 cm TL (male)

Leach's Storm-Petrel *(Oceanodroma leucorhoa)*
Habitat: Forages in open ocean waters, breeds on vegetated islands, nests on island with other seabirds.
Description: A small, tube-nosed seabird, dark blackish-brown plumage, long wings, forked tail.
Adult size: 45 g

Killer Whale *(Oricinus orca)*
Habitat: Occur in all oceans; tolerate a wide range of salinity, temperature, and turbidity
Description: Distinctive black and white coloration, tall triangular dorsal fin.
Adult size: 9 m, 6600 kg (males); 7.7 m, 4700 kg (females)



White Hake *(Urophycis tenuis)*
Habitat: Groundfish, prefers depths of 144-358 m and temperatures between 4 and 8˚C.
Description: Elongated body, small barbel at the tip of the lower jaw, 2 dorsal fins. Color ranges from muddy or purple brown on the dorsal side, bronze or golden sides, white or yellow-white belly with small dots.
Max. size: 133-135 cm, 21.5 – 22.3 kg

White Shark (*Carcharodon carcharias*),
Atlantic population
Habitat: Inshore and offshore waters; just below surface to 1100 m depth; off sandy beaches, rocky shores; enters bays, harbours.
Description: Heavy, torpedo-shaped body, grey/black back and white underside, pointed dorsal fin, cone-shaped snout
Adult size: 2 – 6 m length

Lumpfish (*Cyclopterus lumpus*)
Habitat: found in benthic and pelagic environments; seem to prefer temperatures of 5˚C
Description: thick, ball-shaped fish with a sucker on the underside, rounded snout
Max. size: 55 cm

Shortfin Mako (*Isurus oxyrinchus*)
Habitat: Prefers temperatures of 17-22˚C thus likely doesn't reside extensively in Canadian waters.
Description: Dark colored dorsal surface, white underside. Pointed snout, small eyes, U-shaped mouth. First dorsal fin height greater than base length.
Max. size: 4.5 m TL

Newfoundland and Labrador Protected Wildlife

The following species are protected under SARA (*Species at Risk Act*) and / or COSEWIC (Committee on the status of Endangered Wildlife in Canada) and/or the *Newfoundland and Labrador Endangered Species Act* and have been or could be found near aquaculture sites on the south coast of Newfoundland. If any animals shown below are found in distress around aquaculture sites, Canadian Coast Guard should be contacted at 1.800.565.1633. They will provide assistance in how to proceed. Care should always be exercised around wildlife to avoid causing any harm to human or wildlife. Where species specific contact information is provided below, sightings should be reported.

Acadian Redfish (*Sebastes fasciatus*)
Habitat: Smaller fishes live in shallow waters and adults are found in deeper waters.
Description: Spiny-rayed with distinctive flame-red colouring and fan of bony spines.
Adult size: 60 cm in length.

American Eel (*Anguilla rostrata*)
Habitat: Uses all salinities during life stage, found in all freshwaters that are accessible to the Atlantic Ocean.
Description: Elongated, grey with cream colour belly.
Adult size: Male: 0.4 m; Female: 1.0 m.
Contact: Provincial Biologist – 1.709.637.2043

American Plaice (*Hippoglossoides platessoides*)
Habitat: Juveniles prefer finer sediment to partially or fully bury themselves while adults are less stringent.
Description: Laterally flattened. The eyed side is typically red to grayish brown and the blind side is white. Small head with a relatively large mouth.
Adult size: 61 cm in length.

Atlantic Bluefin Tuna (*Thunnus thynnus*)
Habitat: Seasonal migrants and occurs in the area during its summer feeding migration.
Description: Large, stout but fusiform body. Dorsal surface is dark blue to black, shading to lighter blue on the sides and silvery grey below.
Adult size: 270 cm fork length and 400 kg or more.

Atlantic Cod – Laurentian North (*Gadus morhua*)
Habitat: Migrates inshore to their feeding grounds.
Description: Brown to green or grey with spots on dorsal surface, pale underside. Distinctive chin barbell, 3 dorsal and 2 anal fins.
Adult Size: 2 m and 96 kg

Atlantic Salmon – South NL (*Salmo salar*)
Habitat: Requires rivers or streams that are generally clear, cool, and well-oxygenated, but undertakes lengthy feeding migrations in the North Atlantic Ocean as older juveniles and adults
Description: Fusiform body shape.
Adult size: 100 + cm in length.

Atlantic Wolffish (*Anarhichas lupus*)
Habitat: Bottom dwellers, prefer rock or hard clay.
Description: Rounded profile, heavy head, blunt snout. Colour ranges from slate blue to dull green to purplish brown with vertical, dark brown bars along the sides. Extensive teeth structure.
Adult size: 150 cm in length and 20 kg.

Blue Whale (*Balaenoptera musculus*)
Habitat: Off the south coast of Newfoundland.
Description: Largest animal on earth, coloured dark and light grey, smallish dorsal fin and pointed pectoral flippers.
Adult size: 30 m in length and 181 MT.
Contact: Whale Release and Strandings group 1.888.895.3003

Fin Whale (*Balaenoptera physalus*)
Habitat: Temperate, deep, cool waters.
Description: Long, slender body, V-shaped head, paired blowholes, asymmetrical colouring.
Adult size: 20 to 27 m in length and 70 MT.
Contact: Whale Release and Strandings group 1.888.895.3003

Leatherback Sea Turtle (*Dermochelys coriacea*)
Habitat: Can be found close to shore and at times in relatively shallow waters to feed on jellyfish aggregations in late summer.
Description: Largest living sea turtle. Lacks a bony shell, its carapace is covered in bluish black skin.
Adult size: 2.4 m in length, 3.6 m wide, 725 kg.
Contact: Whale Release and Strandings group 1.888.895.3003

North Atlantic Right Whale (*Eubalaena glacialis*)
Habitat: Temperate northern waters in summer.
Description: Large black baleen whale distinguished by the callosities (thick, hard, white bumps) on its head.
Adult size: 16 to 17 m in length, 64 MT.
Contact: Whale Release and Strandings group 1.888.895.3003

Northern Wolffish (*Anarhichas denticulatus*)
Habitat: Inhabits cold waters usually between 2- 5°C and mainly at depths of 400-1000 metres. Prefers rocky or muddy sea floor.
Description: Thick and heavy set, with a large head, small sharp teeth with grey to dark chocolate colour appearance.
Adult size: 1.4 m in length and 20 kg.

Porbeagle (*Lamna nasus*)
Habitat: Pelagic, epipelagic, or littoral, found far from land in ocean basins and close inshore.
Description: Streamlined body, dark grey - bluish black back and white underneath. Stout head and large eyes.
Adult size: 3 m in length.
Contact: NL shark sightings DFO -1.844.400.7870

Thorny Skate (*Amblyraja radiata*)
Habitat: Found on sand, gravel, mud and broken shells.
Description: Disk spade to heart-shaped, corners rounded, rounded snout, tail 1.0-1.1 times its body length, and a single dominant mid-dorsal row of 11-19 large thorns.
Adult size: 110 cm in length.

White Shark (*Carcharodon carcharias*)
Habitat: Breakers off sandy beaches, rocky shores, and readily enters enclosed bays and estuaries.
Description: Heavy spindle-shaped body with sharp coloured contrast between its backside and underside
Adult size: 3.8 to 6 m in length.
Contact: NL shark sightings DFO -1.844.400.7870

Spotted Wolffish (*Anarhicas minor*)
Habitat: Arctic and Atlantic Ocean, 200-750 m on the continental shelf or deep trenches.
Description: Large head and rounded snout, yellow, grey, or brown with dark spots.
Adult size: Max. size 150 cm weighing up to 22 kg.

Lumpfish *(Cyclopterus lumpus)*
Habitat: Prefer hard rocky bottom with lots of vegetation in cold water.
Description: Short, stubby, with a small mouth and slightly rounded tail.
Adult size: Max. size: 60 cm, weighing up to 10kg.

Harbour Porpoise (*Phocoena phocoena*)
Habitat: Found primarily over continental shelves, and occasionally in deeper waters
Description: Robust body, dark grey fins and flipper, light grey sides, and whiter underside.
Adults size: 1.9 m in length and 76 kg.
Contact: Local DFO Office – 1-709-885-2520

Loggerhead Sea Turtle (*Caretta caretta*)
Habitat: Atlantic, Pacific, and Indian Oceans
Description: head and carapace are reddish-brown, flippers are chestnut brown, the bridge, plastron, underside of throat, flippers and tail are yellow
Adult size: 200 to 350 pounds
Contact: Whale Release and Strandings group – 1.888.895.3003

Harlequin Duck (*Histrionicus histrionicus*)
Habitat: Turbulent mountain streams in summer, rocky coastal waters in winter.
Description: Males have slate-blue plumage, chestnut sides, streaks of white, chestnut, and black on head. Females are plain, brownish grey with patches of white.
Adult size: 45 cm in length.
Contact: Provincial Biologist – 1.709.637.2026

Piping Plover (*Charadrius melodus melodus*)
Habitat: Nests and forages for on ocean beaches, sand spits, or barrier beaches.
Description: Small, thrush-sized shorebird primarily the colour of dry sand with distinctive black markings, a white rump, and bright orange legs.
Adult size: 18 cm in length.
Contact: Provincial Biologist – 1.709.637.2026

Red Knot (*Calidris canutus rufa*)
Habitat: Use coastal mudflats, salt marshes, sandy estuaries, and sand flats during their fall migration
Description: Medium-sized shorebird. Long bill, long legs, long tapered wings with elongated body.
Adult size: 25 cm in length.
Contact: Provincial Biologist – 1.709.637.2026

Nova Scotia Protected Wildlife

The following species are protected under SARA (Species at Risk Act) and/or COSEWIC (Committee on the status of Endangered Wildlife in Canada). Of the protected species found in Nova Scotia and the Atlantic Ocean, these either have (recently) been observed in the area of NS's aquaculture sites or they are likely to be found in the area of the aquaculture sites due to their environmental preferences. If any of these animals are found in distress around the aquaculture sites, Canadian Coast Guard should be contacted at **1-800-565-1633**. If any of these animals are observed, care should be exercised to avoid causing them any harm.

American Eel (*Anguilla rostrata*)
Habitat: Uses all salinities during life stage, found in all freshwaters that are accessible to the Atlantic Ocean.
Description: Elongated, grey with cream colour belly.
Max Size: Male: 0.4 m; Female: 1.0 m

Atlantic Cod (*Gadus morhua*)
Habitat: Shoreline to continental shelf in Northeast Atlantic
Description: Brown to green or grey with spots on dorsal surface, pale underside. Distinctive chin barb. 3 dorsal fins and 2 anal fins
Max Size: 2 m; 96 kg

Atlantic Wolffish (*Anarhichas lupus*)
Habitat: All around Nova Scotia. Deep, rocky continental shelf. Periodically found on sandy or muddy bottom.
Description: Rounded profile, heavy head, blunt snout, lacking pelvic fins. Colour ranges from slate blue to dull green to purplish brown with vertical, dark brown bars along the sides. Extensive teeth structure
Max Size: 150 cm, 20 kg

Blue Whale (*Balaenoptera musculus*)
Habitat: North shore of the Gulf of St Lawrence and off Eastern Nova Scotia during spring, summer, and fall.
Description: Tapered, elongated body, pleated grooves in the skin of the neck, small dorsal fin, mottled dark blue and grey.
Max Size: 30 m, 181 MT

Atlantic Bluefin Tuna (*Thunnus thynnus*)
Habitat: Seasonal migrant and occurs in the area during its summer feeding migration.
Description: Large, stout but fusiform body. Dorsal surface is dark blue to black, shading to lighter blue on the sides and silvery grey below.
Max Size: 270 cm fork length and 400 kg or more

Atlantic Salmon – NS (*Salmo salar*)
Habitat: Throughout the inner Bay of Fundy following anadromous migration
Description: Sides and belly are silvery, back varies from shades of brown to green and blue
Max Size: 60 cm, 3 kg

Basking Shark (*Cetorhinus maximus*)
Habitat: Prefers temperatures of 8 to 14.5 °C and is often seen close to land and near surface as it slowly feed on plankton.
Description: Cavernous jaw and obvious gill slits. Colours range from dark brown to black or blue dorsally and fade to a dull white on the underside.
Max Size: 15+ m

Fin Whale (*Balaenoptera physalus*)
Habitat: Temperate, deep, cool waters.
Description: Long, slender body, V-shaped head, paired blowholes, asymmetrical colouring.
Max Size: 20 to 27 m in length and 70 MT.

Harbour Porpoise (*Phocoena phocoena*)
Habitat: Found primarily over continental shelves, and occasionally in deeper waters
Description: Robust body, dark grey fins and flipper, grey sides, and whiter underside.
Max Size: 1.9 m in length and 76 kg.

Lumpfish *(Cyclopterus lumpus)*
Habitat: Prefer hard rocky bottom with lots of vegetation in cold water.
Description: Short, stubby, with a small mouth and slightly rounded tail.
Max Size: 60 cm, weighing up to 10kg.

Porbeagle (*Lamna nasus*)
Habitat: Pelagic, epipelagic, or littoral, found far from land in ocean basins and close inshore.
Description: Streamlined body, dark grey - bluish black back and white underneath. Stout head and large eyes.
Max Size: 3 m in length

Striped Bass (*Morone saxatilis*)
Habitat: Anadramous species spawns in freshwater, moves to coastal brackish or salt water to feed and mature. Found along the Atlantic Coast.
Description: Dark olive green back with pale silver striped sides and white belly
Max Size: 1.8 m

Barrow's Goldeneye (*Buscephala islandica*)
Habitat: Coastal waters throughout Atlantic Ocean
Description: Medium sized sea duck. High, rounded head is black with white patch under eye. Males are black and white; females are greyish brown and white.
Max Size: 53 cm, 1 kg

Leatherback Sea Turtle (*Dermochelys coriacea*)
Habitat: Can be found close to shore and at times in relatively shallow waters to feed on jellyfish aggregations in late summer.
Description: Largest living sea turtle. Lacks a bony shell, its carapace is covered in bluish black skin.
Max Size: 2.4 m in length, 3.6 m wide, 725 kg.

North Atlantic Right Whale (*Eubalaena glacialis*)
Habitat: Temperate northern waters in summer.
Description: Large black baleen whale distinguished by the callosities (thick, hard, white bumps) on its head.
Max size: 16 to 17 m in length, 64 MT.

Shortfin Mako *(Isurus oxyrinchus)*
Habitat: Prefers water temperatures between 17-22°C so it is unlikely to be found outside of summer in Canadian waters.
Description: Cylindrical shape with a vertically elongated tail. Metallic blue coloration dorsally and white on its underside.
Max Size: 4 m in length

White Shark (*Carcharodon carcharias*)
Habitat: Breakers off sandy beaches, rocky shores, and readily enters enclosed bays and estuaries.
Description: Heavy spindle-shaped body with sharp colour contrast between its backside and underside.
Max Size: 3.8 to 6 m in length

Harlequin Duck (*Histrionicus histrionicus*)
Habitat: Turbulent mountain streams in summer, rocky coastal waters in winter.
Description: Males have slate-blue plumage, chestnut sides, streaks of white, chestnut, and black on head. Females are plain, brownish grey with patches of white.
Max size: 45 cm in length.

Red Knot (*Calidris canutus rufa*)
Habitat: Migrate from Canadian Arctic to South America in July and August. Migration stops can include tidal sandflats and mudflats along the gulf of St Lawrence and Bay of Fundy.
Description: Shorebird with long straight bill, small head, and long legs. Brownish red face, neck, chest, and underparts. White stripe on upper part of wings.
Max Size: 26 cm in length.

Roseate Tern (*Sterna dougallii*)
Habitat: Occurs in large colonies on coasts and islands.
Description: Medium sized seabird with long forked tail. White with black head cap and bill.
Max Size: 40 cm, 130 g

Leach's Storm-petrel (*Oceanodroma leucorhoa*)
Habitat: Forages over the continental shelf during the breeding season, moving into open oceanic waters to feed on small fish and crustacea.
Description: Tube nosed with blackish-brown plumage, long wings angled at the carpal joint, and forked tail. Distinctive white rump
Max Size: 21 cm in length, 48 cm wingspan

Lesser Yellowlegs (*Tringa flavipes*)
Habitat: Utilizes intertidal habitat during migration south.
Description: Medium sized shorebird with yellow legs. Bill is short, slim, straight, and dark. Breast is streaked and flanks are finely marked with short bars.
Max size: 27 cm in length, 64 cm wingspan

Piping Plover (*Charadrius melodus melodus*)
Habitat: Nest and feed primarily on coastal sand or gravel beaches and sand flats. Found all along the southern shore of Nova Scotia
Description: Grey/brown sides and back, white under. Black spots around neck, on forehead, and at beak tip.
Max Size: 19 cm, 48 g

Red-necked Phalarope (*Phalaropus labatus*)
Habitat: Spends much of its nonbreeding season at sea.
Description: Small shorebird with red and orange on sides and base of its neck during breeding season. Non breeding plumage is white along the head, throat, breast and underparts, with dark upper parts, eye stripe, and crown.
Max Size: 20 cm in length

Short-eared Owl (*Asio flammeus*)
Habitat: Tundra, coastal barrens, sand dunes, field, and bog areas.
Description: Medium-sized, puffy white and brown owl with short ear tufts and yellow eyes.
Adult size: 43 cm, 475 g.

Thorny Skate *(Amblyraja radiata)*
Habitat: Ocean bottoms at depths of 18-1200 m, at temperatures of 0-10˚C.
Description: Dark colored upper body, white under side. A row of 11-19 large thorns runs down the middle of its back and along the tail.
Adult Size: 110 cm, 12.5 kg

Peregrine Falcon anatum/tundrius (*Falco peregrinus*)
Habitat: cliffs or buildings for nesting, open landscapes for foraging, with nearby waterbodies
Description: (adults) bluish-grey/darker upper parts and pale under parts with dark spotting and barring; (immatures) pale to slate or chocolate brown upper parts, under parts are buffy with blackish streaks
Adult size: (males) 36-49 cm long, 650 g; (females) 45-58 cm long, 950 g

Spiny Dogfish (*Squalus acanthis*)
Habitat: Occurs world-wide from the intertidal to the continenta shelf slope, most common at 10-100 m depth. Usually found a temperatures of 5-15˚C.
Description: Small shark, grey-brown on the upper body and whitish on the under side.
Max. size: 112 cm TL (female), 94 cm TL (male)

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