

QUODDY SAVOUR SEAFOOD LTD.

SEA URCHIN AND LOBSTER HOLDING FACILITY

ENVIRONMENTAL IMPACT ASSESSMENT

Pennfield, New Brunswick

Prepared for:

Quoddy Savour Seafood Ltd.
% Mr. Bill Robertson
162 Mealey Road
Pennfield, NB
E5H 0B1



QUODDY SAVOUR
SEAFOOD LTD.

5 May 2017

Project No: 17-12375

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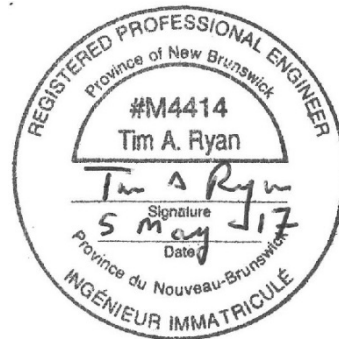
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PROFESSIONAL SEAL:



EXECUTIVE SUMMARY

Quoddy Savour Seafood Ltd. (Quoddy) recently purchased the former Breviro Caviar Inc.'s Pennfield Shortnose Sturgeon Hatchery. That facility was designed to operate using freshwater in its recirculation system, for any filter cleaning, etc. That meant any effluent leaving the facility had a freshwater base.

This project will focus on farming green sea urchins (*Strongylocentrotus droebachiensis*) at a commercial, land based, saltwater recirculating holding tank system (RAS). Sea urchins will come from one of two sources – *de novo* production and/or collected and transported live from the wild to the RAS tanks at the Quoddy Savour Seafood Ltd. facility. Each production lot of urchins will be fed a combination of prepared diets and kelp to enhance the quantity and quality of roe produced. The Quoddy Savour Seafood Ltd. facility has a small processing plant on site. This plant will be used for sea urchin roe extraction, processing, and shipping.

This project will also include using part of the land based, saltwater RAS system to hold live American lobsters (*Homarus americanus*). The inventory will be purchased from licensed fishers and transported live to the RAS tanks. The lobster will be sorted and graded and then placed back into the holding crates. The crates will be held in the saltwater tanks until they are ready to be sold. There will be no feeding of lobsters at this facility. No processing of lobsters will occur at this location, they will be sold live.

This new use of the Quoddy Savour Seafood Ltd. facility will require that it be converted from a freshwater to saltwater recirculation system. This will be done using a phased approach.

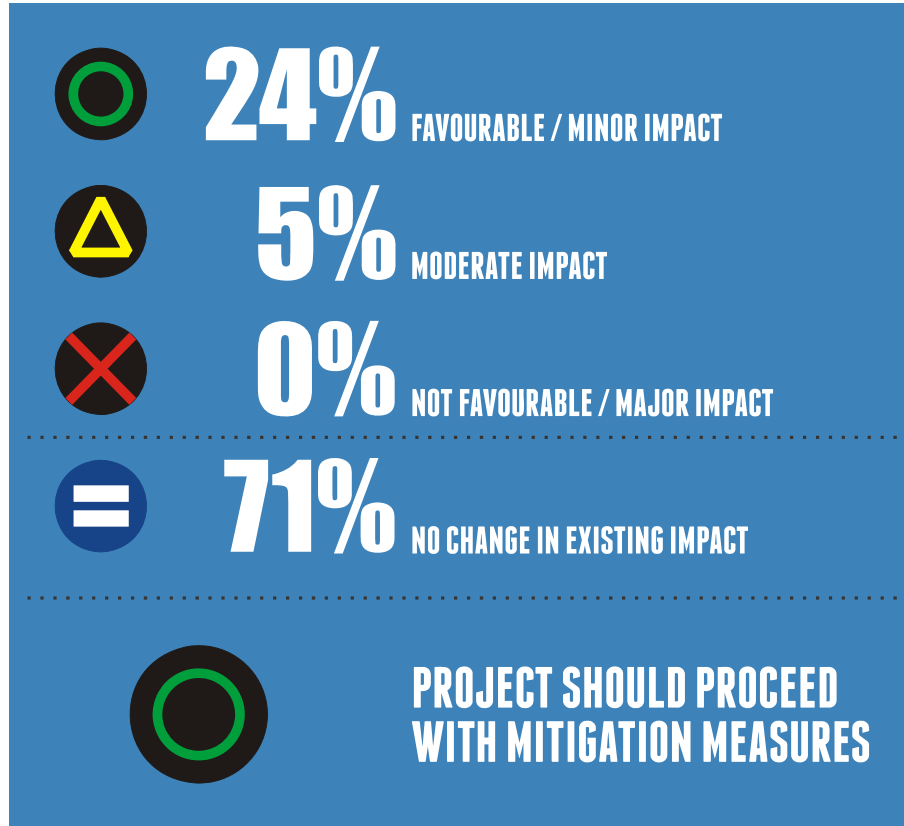
As per the Environmental Impact Assessment Regulation [87-83] of the New Brunswick *Clean Environment Act*, the renewal Project requires EIA review. An EIA is a planning tool used by the proponent and regulatory authorities. The purpose of an EIA is to identify and evaluate the potential impacts that the Project may have on the environment. Best-management practices are also presented to mitigate any identified potential environmental impacts. The New Brunswick Department of the Environment and Local Government (NBDELG) oversees the EIA process.

This EIA document provides a detailed Project description and a narrative on the baseline environment. Components of the existing environment that are described include the physio-chemical environment, the biological environment, and the socio-economic environment. The baseline environmental data was overlain by the three Project phases to recognize potential environmental interactions. Based on that process, 4 Valued Environmental Components (VECs) were identified. The VECs that were assessed in detail include:

- physio-chemical environment:
 - surface water quantity and quality; and
 - groundwater quantity and quality;
- biological environment:
 - terrestrial flora and fauna;
 - aquatic flora and fauna; and

Within this EIA document, a visual impact assessment process analogous to a traffic light was used for characterizing potential environmental impacts.

VEC ASSESSMENT



The EIA process is an open and transparent process. There is a public consultation process that ensures those individuals and / or groups that may be potentially affected by the Project are made aware of the registration, are able to obtain information on the registration, and are able to express any and / or all concerns they may have. This EIA document is available for public comment until June 2, 2017. Comments, questions, and concerns regarding the EIA document can be forwarded to the Environmental Consultant:

Mr. Tim A. Ryan, *M.Eng., P.Eng.*
 Fundy Engineering & Consulting Ltd.
 27 Wellington Row
 Saint John, New Brunswick
 E2L 4S1

📞 506.635.1566
 📠 506.635.0206
 🌐 www.fundyeng.com
 ✉ tim.ryan@fundyeng.com

CONTENTS

EXECUTIVE SUMMARY	i
LIST OF TABLES.....	vi
LIST OF FIGURES.....	vii
1.0 Proponent.....	1
1.1 Proponent Name.....	1
1.2 Proponent Address	1
1.3 Proponent Contact.....	1
1.4 Principal Contact for Purposes of Environmental Impact Assessment.....	1
1.5 Property Ownership	2
2.0 Project Description	3
2.1 Project Name	3
2.2 Project Overview.....	3
2.3 Purpose of this Environmental Impact Assessment	3
2.4 Project Rationale	4
2.5 Project Location	4
2.6 Project Details.....	4
2.6.1 Species Overview	4
2.6.1.1 Green Sea Urchin.....	4
2.6.1.2 American Lobster	5
2.6.2 Facility Overview	6
2.6.2.1 Recirculating Aquaculture System Details	8
2.6.2.2 Processing Facility Details	9
2.6.3 Saltwater Conversion	11
2.6.3.1 Phase 1 – Trucked Saltwater, No Effluent	11
2.6.3.2 Phase 2 – Trucked Saltwater, Freshwater-Based Effluent.....	11
□ HYPERLINK \l "_Toc481153435" 2.6.3.3Phase 3 – Saltwater from Well,	
3.0 Description of the Existing / Baseline Environment.....	15
3.1 Physio-Chemical Environment.....	15
3.1.1 Climate	15
3.1.2 Sound Levels.....	16
3.1.3 Topography	17
3.1.4 Hydrology	18
3.1.5 Geology	18
3.1.5.1 Bedrock	18
3.1.5.2 Surficial.....	19

3.1.6	Hydrogeology	20
3.1.6.1	Use	20
3.1.6.2	Quantity	22
3.1.6.3	Quality	24
3.2	Biological Environment	24
3.2.1	Federal Species At Risk	24
3.2.1.1	Snapshots of Federal Species At Risk Locally Present	26
3.2.2	Provincial Species At Risk	28
3.2.2.1	Snapshots of Provincial Species at Risk Locally Present	31
3.2.3	Other Locally Observed Species	33
3.2.4	Environmentally Significant and Managed Areas	37
3.3	Socio-Economic Environment	38
3.3.1	Demographics and Labour	38
3.3.2	Traditional Uses by Aboriginals and First Nations	39
3.3.3	Historical Land-Use	40
3.3.4	Transportation	44
3.3.5	Recreation and Tourism	45
4.0	Potential Environmental Impacts and Mitigation	46
4.1	Overview of Valued Environmental Component Analysis	46
4.2	Potential Project Impacts on the Environment	47
4.2.1	Valued Environmental Components Assessed	47
4.2.2	Physio-Chemical Environment	48
4.2.2.1	Surface Water Quality	48
4.2.2.1.1	Potential Impacts	48
4.2.2.1.2	Proposed Mitigation	48
4.2.2.1.3	Potential Post-Mitigation Residual and Cumulative Impacts	48
4.2.2.2	Groundwater Quality	49
4.2.2.2.1	Potential Impacts	49
4.2.2.2.2	Proposed Mitigation	49
4.2.2.2.3	Potential Post-Mitigation Residual and Cumulative Impacts	49
4.2.3	Biological Environment	52
4.2.3.1	Terrestrial Flora and Fauna	52
4.2.3.1.1	Potential Impacts	52
4.2.3.1.2	Proposed Mitigation	52
4.2.3.1.3	Potential Post-Mitigation Residual and Cumulative Impacts	53
4.2.3.2	Aquatic Flora and Fauna	53

4.2.3.2.1	Potential Impacts.....	53
4.2.3.2.2	Proposed Mitigation	53
4.2.3.2.3	Potential Post-Mitigation Residual and Cumulative Impacts.....	54
4.2.4	Summary of Potential Environmental Impacts.....	57
5.0	Public Consultation Process.....	59
5.1	Project Registration Public Consultation Process Plan	59
5.1.1	Step 1: Direct Communication with Elected Officials and Service Groups...	60
5.1.2	Step 2: Direct Written Communication with Nearby Residents	60
5.1.3	Step 3: Notifications on the NBDELG Website and at the Head Office....	60
5.1.4	Step 4: Documentation Availability with Stakeholder and NBDELG Offices	60
5.1.5	Step 5: Public Notice Announcement.....	60
5.1.6	Step 6: Local Area Availability of the Registered Document	61
5.1.7	Step 7: Open House and / or Public Meeting	62
5.1.8	Step 8: Documentation of Public Consultation Activities	62
6.0	Project Approval.....	63
6.1	Local / Municipal Approvals	63
6.2	Provincial Approvals	63
6.2.1	Environmental Impact Assessment Approval.....	63
6.2.2	Approval To Operate	64
6.2.3	Commercial Aquaculture License.....	64
6.2.4	Primary Processing Plant Licence.....	65
6.3	Federal Approvals.....	66
6.3.1	Fish Processing Certification	66
7.0	Funding	67
8.0	Signatures	68
9.0	References.....	69
10.0	Report Disclaimers and Disclosures	71

APPENDICES

APPENDIX I:	Service New Brunswick Property Information
APPENDIX II:	Online Well Log System Search Results
APPENDIX III:	Atlantic Canada Conservation Data Centre Reports
APPENDIX IV:	Breviro Approval To Operate
APPENDIX V:	Quoddy Commercial Aquaculture License
APPENDIX VI:	Quoddy Primary Processing Plant Licence

APPENDIX VII: Quoddy Certificate of Registration of a Fish Processing Establishment

TABLES

Table 1. Proposed five-year sea urchin production plan for the Quoddy Facility in Pennfield, New Brunswick.....	9
Table 2. Canadian Food Inspection Agency approved cleaners and sanitizers reference chart for the Quoddy Facility in Pennfield, New Brunswick.....	10
Table 3. Descriptions of the bedrock geology in the vicinity of the Quoddy Facility in Pennfield, New Brunswick.....	18
Table 4. Descriptions of the surficial geology in the vicinity of the Quoddy Facility in Pennfield, New Brunswick.....	19
Table 5. Summary of exceedances, with respect to the CDWQG, for water quality records available within a 1.5 km radius around PID 15160708 in Pennfield, New Brunswick ($n = 12$). Yellow shaded entries indicate that the values do not pose a health concern, while red shaded cells indicate that the values may pose a health concern.	24
Table 6. Terrestrial and aquatic flora and fauna listed as being species at risk under the fSARA and by the COSEWIC that could potentially be affected by the proposed Project in Pennfield, New Brunswick.....	24
Table 7. Terrestrial and aquatic flora and fauna listed as being at risk in New Brunswick under the pSARA that could potentially be affected by the proposed Project in Pennfield, New Brunswick.....	28
Table 8. List of provincially ranked flora and fauna identified by the ACCDC as being observed within 5 km of the Quoddy Facility in Pennfield, New Brunswick.	33
Table 9. The Atlantic Canada Conservation Data Centre's Sub-national (<i>i.e.</i> , provincial) rarity rank (S-rank) of species and S-rank definitions.....	34
Table 10. Southwest New Brunswick population by County and Census Year. Data from Statistics Canada.	38
Table 11. Employment by occupational classification for the southwest economic region of New Brunswick in 2012.....	39
Table 12. Employment by industry for the southwest economic region of New Brunswick in 2012.....	39
Table 13. Fundy Engineering's Valued Environment Component Assessment visual coding method, which is analogous to a traffic light.....	47
Table 14. Assessment of potential impacts of the Quoddy Facility in Pennfield, New Brunswick on surface water quality.....	50
Table 15. Assessment of potential impacts of the Quoddy Facility in Pennfield, New Brunswick on groundwater quality.	51
Table 16. Assessment of potential impacts of the effluent treatment upgrade project at the Quoddy Facility in Pennfield, New Brunswick on terrestrial flora and fauna.	55

Table 17. Assessment of potential impacts of the effluent treatment upgrade project at the Quoddy Facility in Pennfield, New Brunswick on aquatic flora and fauna. 56

Table 18. Summary of the potential impacts for the Quoddy Facility in Pennfield, New Brunswick on selected valued environmental components. 57

FIGURES

Figure 1. Aerial photograph, circa 2016, showing the Quoddy Savour Seafood Ltd. properties in Pennfield, New Brunswick. 2

Figure 2. A green sea urchin (*Strongylocentrotus droebachiensis*) in the Bay of Fundy. 5

Figure 3. Two American lobster (*Homarus americanus*) in the Bay of Fundy, off Grand Manan, New Brunswick. 6

Figure 4. Overview of the former Breviro Facility's freshwater Recirculating Aquaculture System (RAS). For the purposes of the Project, the overall physical layout will not be changed. 7

Figure 5. Overview of the processing facility at the Quoddy Facility in Pennfield, New Brunswick. 10

Figure 6. Overview of water use at the Quoddy Facility in Pennfield, New Brunswick during Phase 1 of the project. 12

Figure 7. Overview of water use at the Quoddy Facility in Pennfield, New Brunswick during Phase 2 of the Project. 13

Figure 8. Overview of water use at the Quoddy Facility in Pennfield, New Brunswick during Phase 3 of the Project. 14

Figure 9. Compilation of mean daily temperatures measured at the Pennfield meteorological station between 1981 and 2010. 16

Figure 10. Compilation of mean daily precipitation measured at the Pennfield meteorological station between 1981 and 2010. 16

Figure 11. Aerial photograph, circa 2016, showing the general topography at the Quoddy Facility in Pennfield, New Brunswick. 17

Figure 12. Bedrock geology map overlaying an aerial photograph, circa 2016, in the vicinity of the Quoddy Facility in Pennfield, New Brunswick. See text for bedrock geology descriptions. 19

Figure 13. Surficial geology map overlaying an aerial photograph, circa 2016, in the vicinity of the Quoddy Facility in Pennfield, New Brunswick. See text for surficial geology descriptions. 20

Figure 14. Groundwater availability map for southwestern, New Brunswick and the surrounding area [*Natural Resources Canada, 2005*]. 21

Figure 15. Potential large groundwater users in the vicinity of the Quoddy Facility in Pennfield, New Brunswick. 22

Figure 16. Aerial photograph showing groundwater wells on file with the NBDELG within a 1.5 km radius around PID 15160708 in Pennfield, New Brunswick. The

well logs and water quality records were obtained for characterizing local groundwater quantity and quality.	23
Figure 17. Compilation of the 38 potable groundwater well records within a 1.5 km radius around PID 15160708 in Pennfield, New Brunswick.	23
Figure 18. Map showing the recorded observations of species listed under the fSARA and by the COSWEIC within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	26
Figure 19. Photographs of species listed under the fSARA and by the COSEWIC that have been observed within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick.	27
Figure 20. Map showing the recorded observations of species listed under the pSARA within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	31
Figure 21. Photographs of species listed under the pSARA that have been observed within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick.	32
Figure 22. Map showing the observed flora species within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	35
Figure 23. Map showing the observed birds within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	35
Figure 24. Map showing observed fishes within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	36
Figure 25. Map showing observed fauna other than birds within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	36
Figure 26. Map showing the environmentally significant areas within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.	37
Figure 27. Historical territory of the Maliseet (<i>i.e.</i> , the Passamaquoddy people and the Wolastoqiyik) in New Brunswick, Quebec, and Maine.	40
Figure 28. Aerial photograph, circa 1976, of the Quoddy Facility properties in Pennfield, New Brunswick.	41
Figure 29. Aerial photograph, circa 1984, of the Quoddy Facility properties in Pennfield, New Brunswick.	42
Figure 30. Aerial photograph, circa 2004, of the Quoddy Facility properties in Pennfield, New Brunswick.	43
Figure 31. Aerial photograph, circa 2011, of the Quoddy Facility properties in Pennfield, New Brunswick.	44
Figure 32. The NBDELG EIA Determination Review process highlighting the public consultation component of the process (<i>i.e.</i> , the grey box).	59
Figure 33. Example of the public notice announcement that will be placed by the Proponent in at least one local newspaper and / or at least one provincial daily newspaper.	61

1.0 PROPONENT

1.1 PROPONENT NAME

The proponent for this Project is Quoddy Savour Seafood Ltd. (*i.e.*, Quoddy).

1.2 PROPONENT ADDRESS

162 Mealey Road
Pennfield, New Brunswick
E5H 0B1

1.3 PROPONENT CONTACT

Mr. W.D. (Bill) Robertson
Chief Development Officer
Quoddy Savour Seafood Ltd.
162 Mealey Road
Pennfield, New Brunswick
E5H 0B1

📞 506.456.2649
🌐 www.quoddyseafood.com
✉ wrobertson@quoddyseafood.com

1.4 PRINCIPAL CONTACT FOR PURPOSES OF ENVIRONMENTAL IMPACT ASSESSMENT

Fundy Engineering & Consulting Ltd. (Fundy Engineering) prepared this Environmental Impact Assessment (EIA) Registration Document. The principal contact at Fundy Engineering with respect to this EIA is:

Mr. Tim A. Ryan, *M.Eng., P.Eng.*
Fundy Engineering & Consulting Ltd.
27 Wellington Row
Saint John, New Brunswick
E2L 4S1

📞 506.635.1566
📞 506.635.0206
🌐 www.fundyeng.com
✉ tim.ryan@fundyeng.com

1.5 PROPERTY OWNERSHIP

The proposed Project will occur on the land parcels identified in the New Brunswick Geomatics Information Centre database as Property Identification (PID) numbers 01228428 and 15160708. Both properties are owned by Quoddy (Figure 1). One of the PIDs is a former fish processing plant (*i.e.*, PID 15160708; 7.75 ha) while the other (*i.e.*, PID 01228428; 5.8 ha) is undeveloped land on the eastern bank of the lower L'Etang River Estuary.



Figure 1. Aerial photograph, circa 2016, showing the Quoddy Savour Seafood Ltd. properties in Pennfield, New Brunswick.

2.0 PROJECT DESCRIPTION

2.1 PROJECT NAME

For the purposes of this EIA, the Project / Quoddy Facility is referred to as:

QUODDY SAVOUR SEAFOOD LTD.
SEA URCHIN AND LOBSTER HOLDING FACILITY

2.2 PROJECT OVERVIEW

The primary purpose of this Project is to establish a vertically integrated supply of green sea urchin (*Strongylocentrotus droebachiensis*) products to the marketplace. This will be done by utilizing the Recirculating Aquaculture System (RAS) infrastructure and the existing processing facility at the former Breviro Caviar Inc. Shortnose Sturgeon Hatchery (*i.e.*, Breviro Facility) in Pennfield, New Brunswick.

Sea urchins will be sourced from wild stock and via *de novo* production (*i.e.*, reared from roe). Sea urchins will be held in the RAS tanks and will be fed a combination of a prepared ration and kelp. Urchin feeding will be done in order to enhance the quantity and quality of the produced roe.

The wild stock of urchins will be sourced from two New Brunswick Bay of Fundy fishers (*i.e.*, S. Lomax and M. Holland) who have part of the Open Quota licenses for the area. In New Brunswick, urchin are fished annually from 1 October to 17 May. Three St. Lawrence River urchin license holders who fish out of Tadoussac, Quebec will also supply Quoddy with wild urchin. Urchins will be sold live and as a processed product to markets in Toronto, Montreal, Boston, and New York. Additionally, processed urchins will be sold overseas, primarily in Asia.

A secondary purpose of this Project is to warehouse live American lobsters (*Homarus americanus*) within the RAS. The live lobster inventory will be purchased from licensed harvesters of Local Fishing Areas (LFAs) 36, 37, and 38 during the fishing seasons (*i.e.*, November through January and April through June). The harvested lobster will be sorted, graded, and placed in holding crates within the RAS until they are ready to be sold live. The lobster will not be fed while being held.

The small on-site processing plant will be used for the sea urchin roe extraction, processing, and shipping. No lobsters will be processed at this location; they will strictly be sold live. Lobster will be sold live to markets in Toronto, Montreal, Boston, and New York. Distribution to those markets will only occur at select times of the year (*i.e.*, November to July) when lobsters are locally available from licensed harvesters.

2.3 PURPOSE OF THIS ENVIRONMENTAL IMPACT ASSESSMENT

The purpose of an Environmental Impact Assessment (EIA) is to identify and evaluate the potential impacts that the proposed Project may have on the environment. As per Schedule A of the Environmental Impact Assessment Regulation [87-83] of the New Brunswick *Clean Environment Act*, the Project triggers EIA review because in the opinion of the NBDELG, “the project (as a whole) is considered a significant modification

to the existing facility and must be registered.” It has been identified by the New Brunswick Department of Agriculture, Aquaculture, and Fisheries, that Quoddy must have an approved EIA before a commercial inland license for lobster and sea urchin will be issued.

This EIA was prepared by Fundy Engineering & Consulting Ltd. (Fundy Engineering) on behalf of Quoddy (% Mr. Bill Robertson). The EIA identifies any potential environmental impacts this Project may pose and presents measures to mitigate those potential environmental impacts. This EIA meets the requirements of the *New Brunswick Department of the Environment and Local Government (NBDELG) [2012] guide to EIAs*.

2.4 PROJECT RATIONALE

Quoddy recently purchased the former Breviro Facility and intends to repurpose it as another aquaculture facility. Because shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*A. oxyrinchus*) are freshwater species, the RAS was designed to operate as a freshwater system. Sea urchins and lobster are both marine organisms. Therefore, in order to rear and / or hold those organisms, Quoddy must convert the existing RAS from freshwater to saltwater.

The Breviro Facility is a brownfield site that has been dormant for several months. This Project represents an opportunity to repurpose an existing aquaculture facility instead of building at a greenfield site.

2.5 PROJECT LOCATION

The Quoddy Facility sits on 13.55 ha of land in Pennfield, New Brunswick (Charlotte County, Pennfield Parish) on two properties located at 162 and 169 Mealey Road (Figure 1). Pennfield belongs to the Pennfield Local Service District (LSD). Geographic coordinates for the centre of the property are approximately 45 ° 06 ' 49.17 " N and 66 ° 45 ' 34.92 " W. The site is about 0.8 km south of NB Route 2, 1.3 km west of Pennfield Corner, and 1.5 km north of Justasons Corner.

2.6 PROJECT DETAILS

2.6.1 Species Overview

2.6.1.1 Green Sea Urchin

The green sea urchin is a marine benthic invertebrate with a circumpolar distribution, ranging into the Arctic regions of both the Atlantic and Pacific oceans and found on the east coast of North America as far south as Cape Cod. They live mostly in shallow waters, with a preference for rocky bottom in areas that are not subject to extreme wave action; however, they have been found at depths of more than 1 000 m.

Green sea urchins are covered in short, sharp, movable spines (Figure 2). They can be pale green or greenish tinged with purple or brown on their spines. They move using their spines and hundreds of miniature tube 'feet' located under their body, which have tiny suction cups to grip surfaces. Their circular mouth, also located on its underside,

has five teeth. As they crawl along the ocean floor, they scrape fine algae off of hard substrate with their teeth, and also feed on kelp and other seaweeds.



Figure 2. A green sea urchin (*Strongylocentrotus droebachiensis*) in the Bay of Fundy.

Green sea urchins are commercially fished for their roe (*i.e.*, gonads) on both of Canada's east and west coasts. The majority of the urchins harvested are exported to Asia. The fishery is generally conducted during winter when roe quality and quantity tends to be the highest.

2.6.1.2 American Lobster

The American lobster is a marine benthic invertebrate that lives in the Atlantic Ocean, specifically in the waters between Cape Hatteras in North Carolina and the Strait of Belle Isle between Labrador and Newfoundland. The American lobster is generally found in waters < 50 m deep, but has been observed at depths > 500 m. The largest populations are found in the Gulf of Maine and in Canadian waters around Nova Scotia and in the southern Gulf of St. Lawrence. Lobsters are harvested across their entire range.

Like other crustaceans, the American lobster has a hard exoskeleton, or shell. It is brown to olive green and may be flecked with red, orange, or black (Figure 3). It is long-lived and can grow to lengths of 60 cm and weigh over 18 kg. It has a total of five pairs of walking legs, including the great claws, or chelipeds, as well as two pair of antennae, an abdomen bearing feathery appendages known as pleopods, and a tail with a central

telson and four fins called uropods. American lobsters are nocturnal, hiding under rocks or in crevices most of the day, and foraging at night.



Figure 3. Two American lobster (*Homarus americanus*) in the Bay of Fundy, off Grand Manan, New Brunswick.

2.6.2 Facility Overview

As previously noted, the primary purpose of this Project is to establish a vertically integrated supply of green sea urchin products to the marketplace, and the secondary purpose of this Project is to warehouse live American lobsters. This will be done by repurposing the former Breviro Facility's RAS (Figure 4). Additional Project details are provided below.

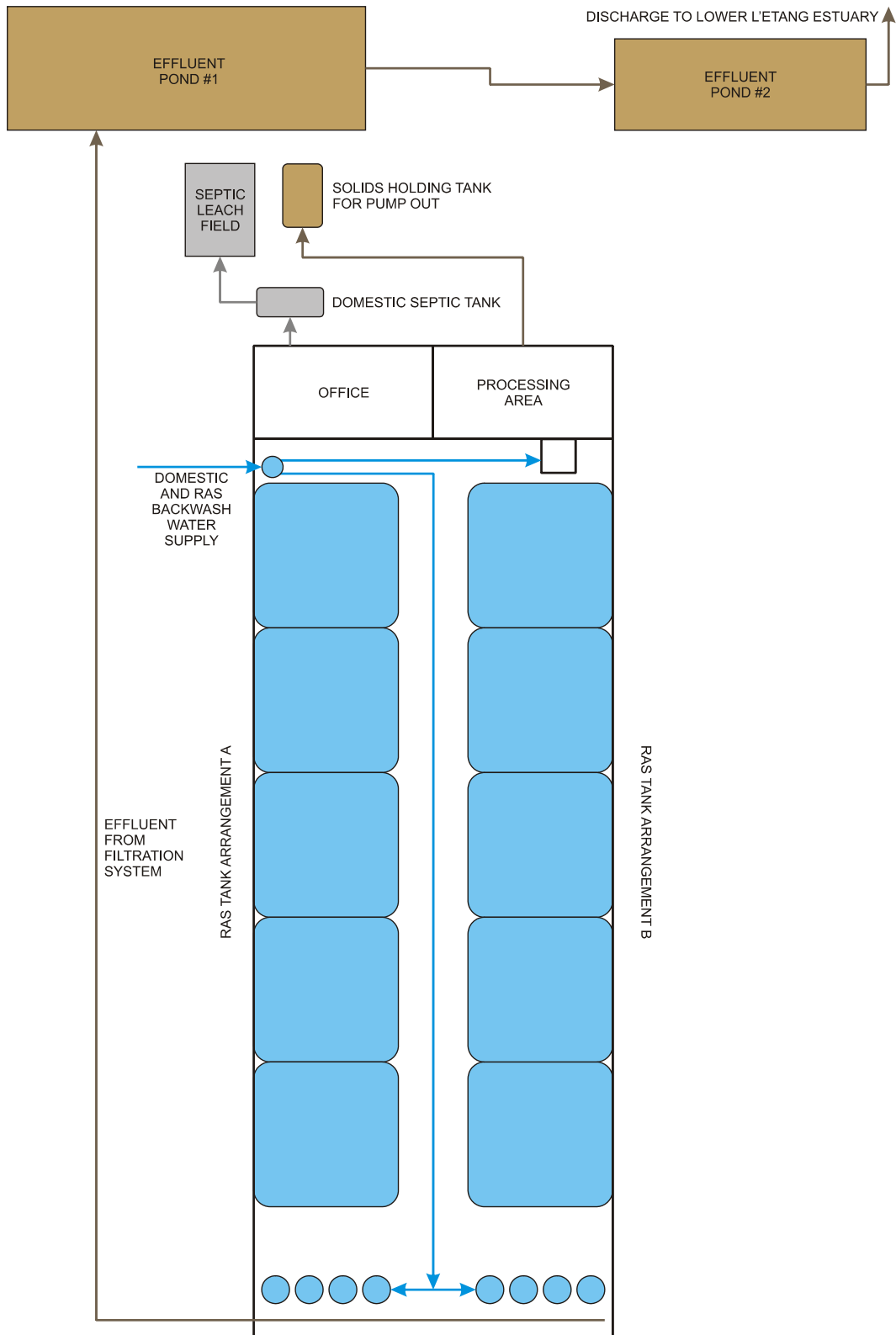


Figure 4. Overview of the former Breviro Facility's freshwater Recirculating Aquaculture System (RAS). For the purposes of the Project, the overall physical layout will not be changed.

2.6.2.1 Recirculating Aquaculture System Details

The RAS infrastructure consists of two separate tank arrangements that can be operated independently. Each system comprises a row of five 160 m³ concrete tanks and a water reconditioning system (Figure 4). The water reconditioning system utilizes mechanical filtration (*i.e.*, FAIVRE drum filters fitted with 60 micron screens) for the removal of particulate organic matter. Kjaldnes media moving bed bioreactor bio-filters are used to remove ammonia and CO₂ while cone saturators are used to supply oxygen to the system. Quoddy intends to install an ultraviolet disinfection system on the return supply line as a general disinfection treatment for the process water.

The water quality within the RAS system will be maintained by the water reconditioning system and will be monitored by Quoddy staff. Temperature in the RAS is expected to range between 4 °C to 12 °C. At some point in the future, a water chiller may be added should the water temperatures exceed 12 °C. The pH within the RAS is anticipated to be relatively stable at between 6.5 and 8.0. While bio-filtration in saltwater systems is typically 35 % less efficient in removing ammonia than an equivalent freshwater system, the existing bio-filtration system exceeds the capacity required by Quoddy. That is because of the low intensity of feed that will be used for the sea urchins. Ammonia will be measured, but it is not expected to exceed 0.03 mg · L⁻¹. Dissolved oxygen will be maintained at between 8 ppm and 10 ppm by using cone saturators. Salinity in the system will be maintained at 28 ppt to 32 ppt. No disease treatments are planned for use within the RAS because urchin and lobster are not typically susceptible to disease while being held.

Quoddy plans on increasing the quantity of sea urchin and lobster biomass housed within the RAS over time as the facility transitions through the three Project phases described below (*i.e.*, Section 2.6.3). Table 1 outlines the tentative five year production plan summary for sea urchins.

Table 1. Proposed five-year sea urchin production plan for the Quoddy Facility in Pennfield, New Brunswick.

MONTH		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
		1	2	3	4	5	6	7	8	9	10	11	12
YEAR	1												
UNITS		0	0	0	0	0	0	0	0	200,000	180,000	160,000	106,200
BIOMASS (kg)		0	0	0	0	0	0	0	0	9,990	9,360	8,592	5,703
DENSITY (kg/m ³)										15	14	13	9
HARVEST (kg)		0	0	0	0	0	0	0	0	0	0	0	4,262
YIELD SOLD (kg)		0	0	0	0	0	0	0	0	0	0	0	796
FEED USE (kg)		0	0	0	0	0	0	0	0	402	402	402	402
YEAR	2	13	14	15	16	17	18	19	20	21	22	23	24
UNITS		1,252,800	1,105,000	1,008,752	879,952	781,152	685,000	730,909	776,818	945,909	795,000	733,119	623,119
BIOMASS (kg)		13,825	10,516	9,800	6,992	4,207	1,713	6,920	13,289	23,669	17,190	16,252	12,211
DENSITY (kg/m ³)		21	16	15	11	6	3	11	20	36	26	25	19
HARVEST (kg)		4,262	4,262	0	2,751	2,751	2,751	5,000	10,000	5,000	0	0	4,529
YIELD SOLD (kg)		796	796	0	514	514	514	550	1,100	550	0	0	846
FEED USE (kg)		399	448	448	448	49	49	49	49	647	647	647	647
YEAR	3	25	26	27	28	29	30	31	32	33	34	35	36
UNITS		5,778,119	5,257,500	4,816,099	4,323,299	3,980,499	3,637,500	3,465,909	3,294,318	3,265,909	2,970,000	2,763,119	2,508,119
BIOMASS (kg)		27,780	25,259	25,822	22,604	19,123	16,000	21,600	29,684	40,769	34,290	33,112	28,591
DENSITY (kg/m ³)		31	28	28	25	21	18	24	33	45	38	36	31
HARVEST (kg)		4,529	4,529	0	4,316	4,316	4,316	5,000	10,000	5,000	1,500	1,500	6,029
YIELD SOLD (kg)		846	846	0	806	806	806	550	1,100	550	328	328	1,174
FEED USE (kg)		713	713	874	963	365	365	365	365	963	963	963	963
YEAR	4	37	38	39	40	41	42	43	44	45	46	47	48
UNITS		7,403,119	6,732,500	6,117,458	5,474,658	4,981,858	4,487,500	4,165,909	3,844,318	3,674,409	3,276,375	2,982,238	2,620,784
BIOMASS (kg)		43,680	48,509	51,895	51,427	49,196	45,750	49,600	57,184	65,279	52,673	46,165	35,284
DENSITY (kg/m ³)		48	53	57	57	54	50	55	63	72	58	51	39
HARVEST (kg)		4,529	4,529	1,500	4,340	4,340	4,340	5,000	10,000	5,000	7,625	7,625	13,663
YIELD SOLD (kg)		846	846	328	811	811	811	550	1,100	550	1,669	1,669	2,797
FEED USE (kg)		1,215	1,182	1,343	1,433	835	835	835	835	1,433	1,433	1,433	1,433
YEAR	5	49	50	51	52	53	54	55	56	57	58	59	60
UNITS		7,511,455	6,834,625	6,117,458	5,474,658	4,981,858	4,487,500	4,165,909	3,844,318	3,774,409	3,366,375	3,066,587	2,677,016
BIOMASS (kg)		50,141	54,636	51,895	51,427	49,196	45,750	49,600	57,184	70,274	57,353	50,695	38,304
DENSITY (kg/m ³)		55	60	57	57	54	50	55	63	77	63	56	42
HARVEST (kg)		6,038	6,038	7,625	4,340	4,340	4,340	5,000	10,000	5,000	7,625	7,625	13,663
YIELD SOLD (kg)		1,128	1,128	1,669	811	811	811	550	1,100	550	1,669	1,669	2,797
FEED USE (kg)		1,282	1,182	1,343	1,433	835	835	835	835	1,433	1,433	1,433	1,533

2.6.2.2 Processing Facility Details

The small on-site processing plant will be used for the sea urchin roe extraction, processing, and shipping (Figure 5). That processing plant, as described in Section 6.2.4 and Section 6.3.1, was recently recertified to process fresh, frozen, or semi-preserved seafood.

All organic wastes resulting from the urchin processing plant and any routine urchin / lobster mortality and / or significant animal mortality resulting from an RAS failure event, will be composted off-site. All material to be composted will be collected on-site, stored in the on-site cooler, and shipped to the composting facility (*i.e.*, Cardwell Farms Compost Products Ltd.) located in Penobsquis, New Brunswick.

Chemicals used at the Quoddy Facility will be exclusively for cleaning. Those chemicals, which are listed in Table 2, were included in Quoddy's Quality Management Plan that was submitted to the Canadian Food Inspection Agency for review and subsequent approval. The processing plant will be kept clean and sanitized using only products that have been verified as acceptable for use in food processing environments (*n.b.*, all of

those products identified for use are manufactured by *Sani Marc Group*). Technical data sheets for these materials, specifying that they are *approved for use in food and beverage plants*, are available on-site. There is a designated chemical storage room on-site as noted in the processing facility floor plan (Figure 5).

Table 2. Canadian Food Inspection Agency approved cleaners and sanitizers reference chart for the Quoddy Facility in Pennfield, New Brunswick.

Product	Use	Contact Time	Concentration
Chloragel	A viscous chlorinated alkaline degreaser that is used for daily cleaning	5 minutes to 30 minutes.	Medium cleaning - 1:20 (5%) Heavy cleaning - 1:10 (10%)
Germac*	A general purpose quaternary amine sanitizer that is used following cleaning	Minimum of 10 minutes before rinsing	General equipment sanitizing - 1:500 (2 mL/L; 200 ppm) Periodic heavy sanitizing of tougher or high-profile surfaces, such as cooler floors, followed by thorough rinsing - 1:160 (6 mL/L; 600 ppm).
Alubrite	A mix of mineral acids, cleaners, and corrosion inhibitor that is used for period removal of chlorinated hard water films and metal oxidation	1 minute to 5 minutes.	1:10 (10%)

*If used at a measured concentration of ≤ 2 mL/L (200ppm), Germac, as per the label, can be left on without rinsing to provide long-term sanitizing while surfaces are dry

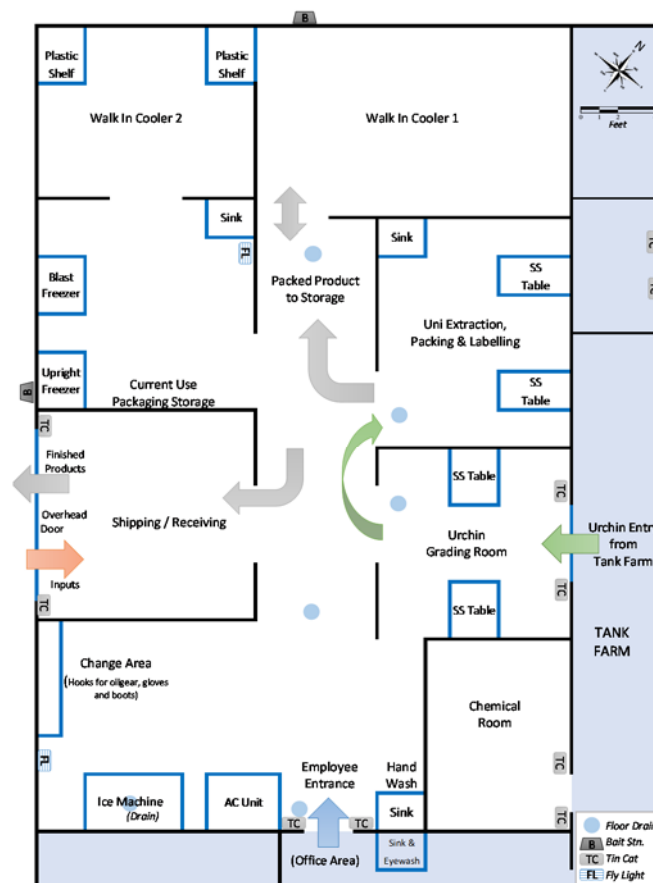


Figure 5. Overview of the packaging processing facility at the Quoddy Facility in Pennfield, New Brunswick.

2.6.3 Saltwater Conversion

As noted above, the existing freshwater RAS must be converted to a saltwater RAS in order to rear and hold sea urchin and hold lobster. In order to expedite the Project, Quoddy proposes to do the conversion through a phased approach as described in the Sections below. It is anticipated that additional approvals may be required as the Project advances. Those approvals would be identified as conditions to the EIA approval.

2.6.3.1 Phase 1 – Trucked Saltwater, No Effluent

Initially, Quoddy will supply saltwater to the RAS by using sea water transported to the site by truck. Because the overall biomass (*i.e.*, urchins and lobster) will be minimal, there will be no immediate need to remove generated solids from the RAS. Instead, the process saltwater will flow through the bio-filters and be directly returned to the RAS tanks. Therefore, the Quoddy Facility will operate at zero discharge during this Phase of the Project (Figure 6).

2.6.3.2 Phase 2 – Trucked Saltwater, Freshwater-Based Effluent

During Phase 2 of the project, Quoddy will continue to supply saltwater to the RAS by using sea water transported to the site by truck; however, as the overall biomass in the RAS (*i.e.*, urchins and lobster) will have increased, it will be necessary to remove generated solids from the RAS in order to maintain optimal water quality. To accomplish this, the process water during Phase 2 will flow through the drum filters, bio-filters, and then returned to the RAS tanks. Effluent, which is ultimately directed to the two settling ponds, will be created when the drum filters are backwashed to clean them of the solids removed from the process water. During Phase 2 all backwash water will be freshwater; no salt water effluent will be created. Therefore, no salt water will leave the Facility (Figure 7).

2.6.3.3 Phase 3 – Saltwater from Well, Saltwater-Based Effluent

The salt water supply to the RAS in Phase 3 of the project will be changed from sea water delivered by truck, to saltwater drawn from a salt water well. Quoddy will be drilling a salt water well, and building a short pipeline connecting the salt water well to the RAS to facilitate this change. Preliminary discussions with a hydrogeologist has indicated that saltwater well(s) should be located on the waterfront property (PID #1228428) (Figure 1) and not on the aquaculture facility property in order to avoid any possible impact on the groundwater quality in the area. It is anticipated that these wells should have a capacity of a minimum of $40 \text{ L} \cdot \text{min}^{-1}$ and a maximum of $80 \text{ L} \cdot \text{min}^{-1}$.

Also during Phase 3, Quoddy intends to convert the backwash water for the drum filters from freshwater to saltwater. As this will create salt water effluent, this change will require that an assessment of the existing settling ponds be undertaken to ensure they are impermeable and that saltwater will not leach into the ground. The water leaving the settling ponds will continue to discharge into the Lower L'Etang River Estuary, no changes will be necessary (Figure 8).

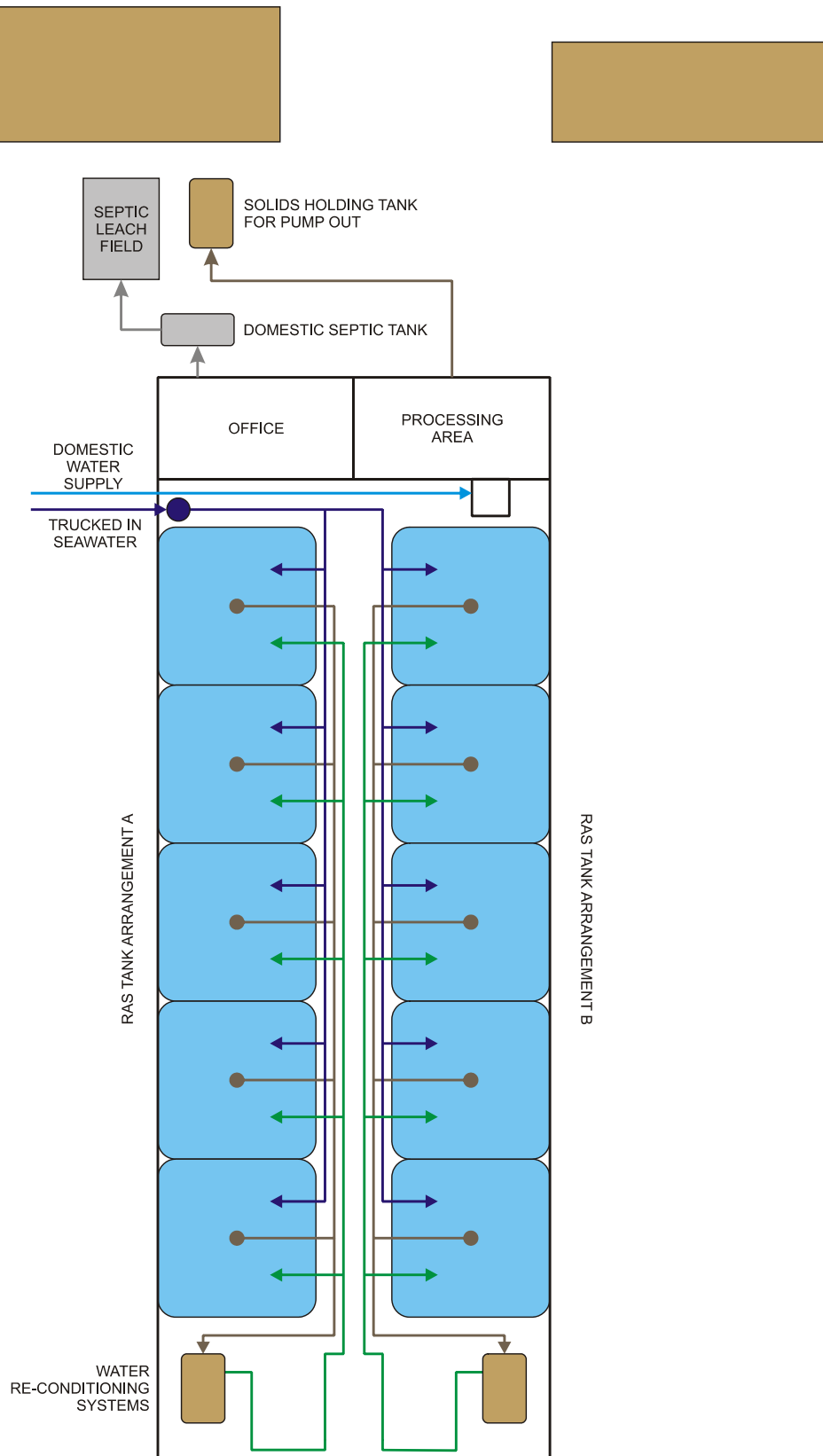


Figure 6. Overview of water use at the Quoddy Facility in Pennfield, New Brunswick during Phase 1 of the project.

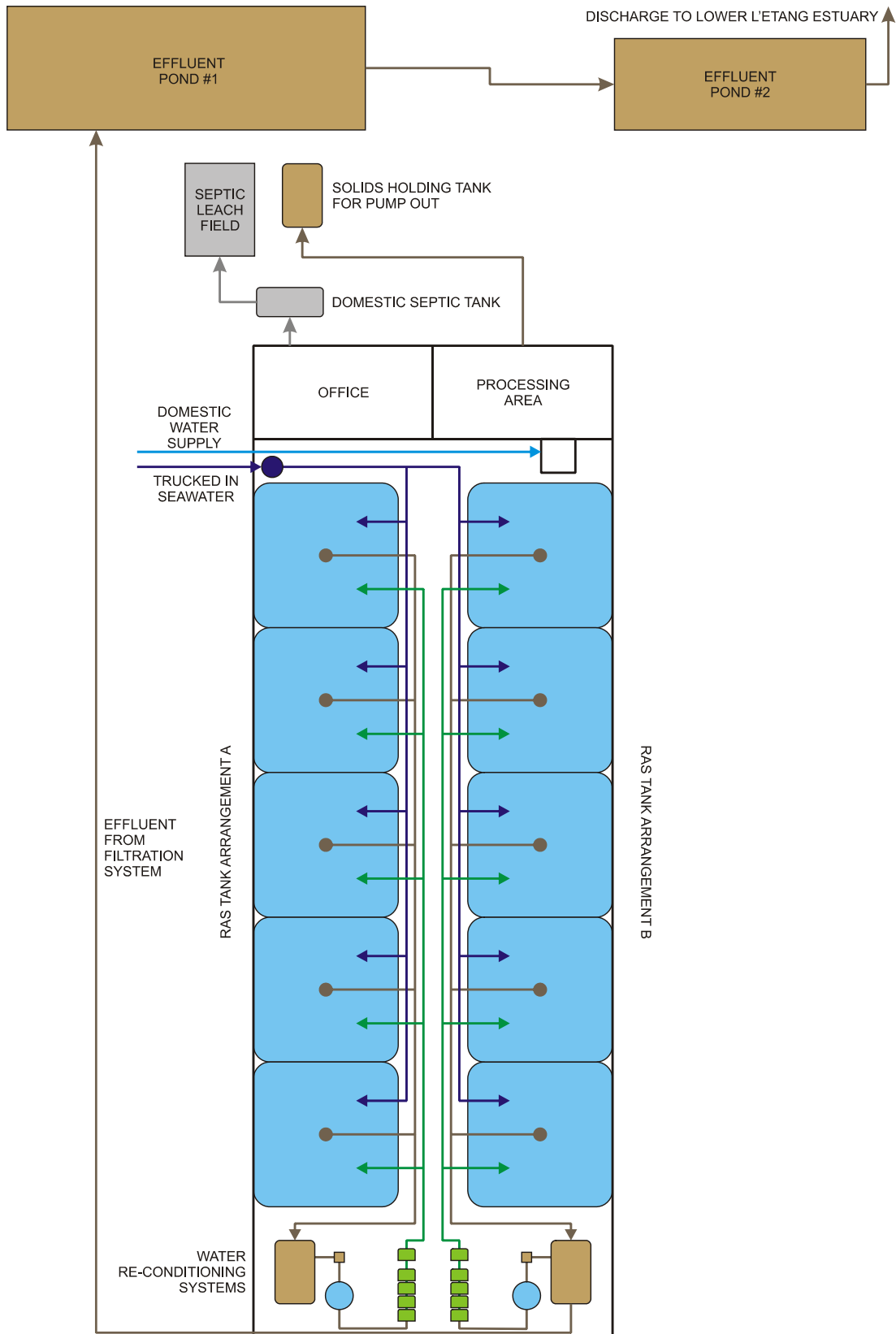


Figure 7. Overview of water use at the Quoddy Facility in Pennfield, New Brunswick during Phase 2 of the Project.

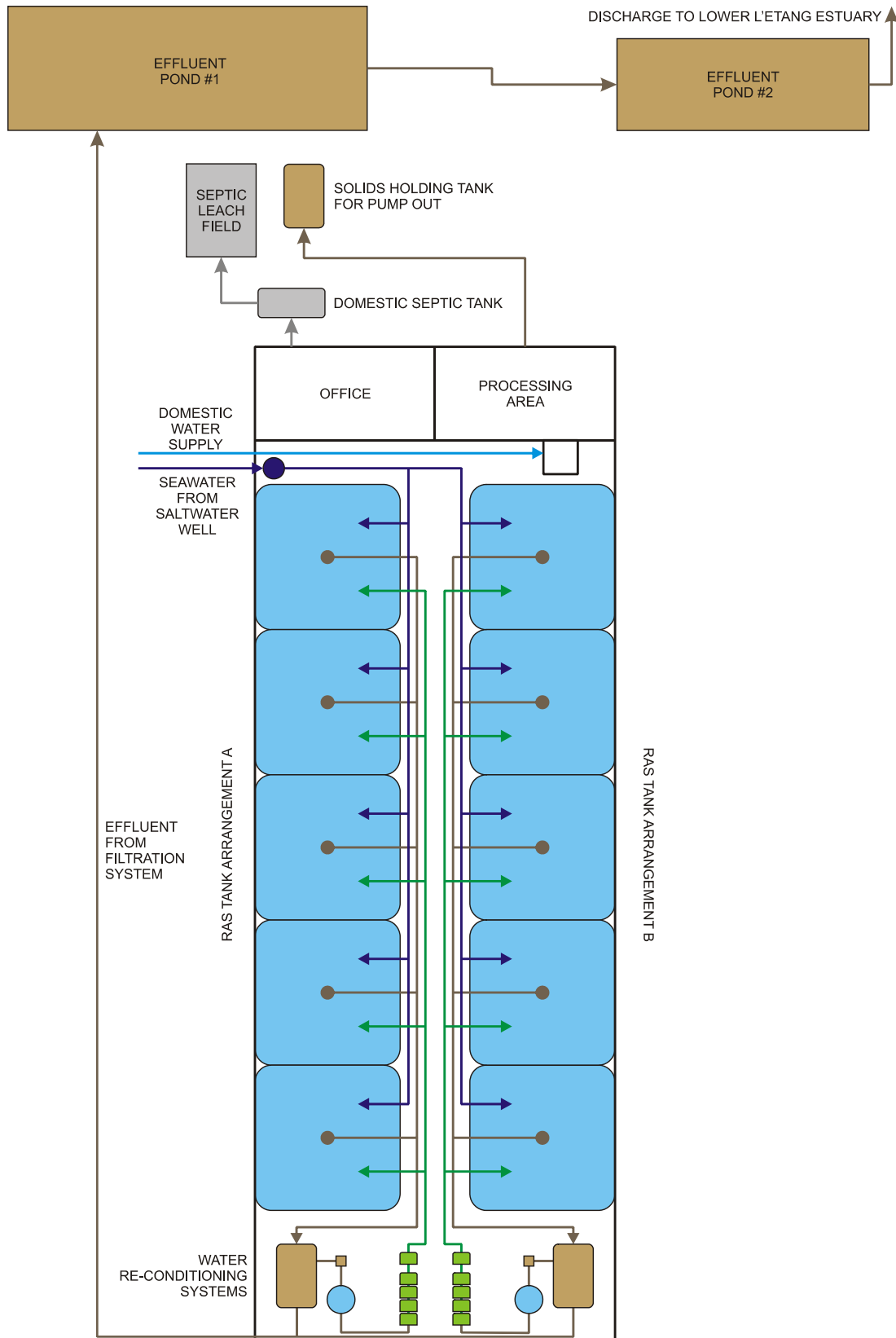


Figure 8. Overview of water use at the Quoddy Facility in Pennfield, New Brunswick during Phase 3 of the Project.

3.0 DESCRIPTION OF THE EXISTING / BASELINE ENVIRONMENT

This section describes the existing environment, pre-Project, at and in the vicinity of the Quoddy Facility in Pennfield, NB. The information contained in this section is considered to be baseline information for this Project and can be used for comparison to post-Project data to assess any potential impacts. Within this section, “regional” refers to the Region 10 Service Commission Southwest New Brunswick, which includes the rural, suburban, and urban centres around the Quoddy Facility. Those areas include, but are not limited to the three towns (*i.e.*, Saint Andrews, St. George, and St. Stephen), four villages (*i.e.*, McAdam, Blacks Harbour, Grand Manan, and Harvey), and 20 local service districts (*e.g.*, Lepreau, Saint George, Pennfield, *etc.*). Where specifically defined, the term “local” refers to the Quoddy Facility site proper and the area immediately surrounding the site (*i.e.*, a 500 m buffer with a particular focus on Pennfield).

3.1 PHYSIO-CHEMICAL ENVIRONMENT

3.1.1 Climate

Pennfield exists within the Fundy Coast ecoregion of New Brunswick [*Hinds*, 2000]. According to the Köppen-Geiger climate classification, the region is characterized by a humid continental climate [*Peel et al.*, 2007]. The Bay of Fundy, which is a large heat sink that never fully freezes or warms (*i.e.*, temperatures average between 8 °C and 12 °C), influences the climate by generally providing cool summers and mild winters compared to inland locations.

Monthly climate data between 1981 and 2010 are available for the meteorological station in Pennfield (*n.b.*, this is the most recent ‘climate normal’ period). That station is located at latitude 45°06’00.0”N, longitude 66°44’00.0”W, and at an elevation of 22.90 m. During that period, the mean annual temperature was 5.2°C ± 3.40 °C (Figure 9) with a monthly daily minimum of - 7.1 °C ± 2.30 °C in January to a monthly daily maximum of 15.6 °C ± 0.9 °C in July [*Environment Canada*, 2016]. The extreme minimum mean daily temperature of - 36.5 °C was measured on 18 January 1982. In contrast, the extreme maximum mean daily temperature of 37.2 °C was measured on 22 May 1977.

Precipitation (*i.e.*, rain, drizzle, freezing drizzle, hail, snow, *etc.*) is generally well distributed throughout all months and the majority (> 86 %) falls in the form of rain. Mean annual precipitation between 1981 and 2010 (Figure 10) was 1 430 mm with a mean monthly low of 98 mm in August to a mean monthly high of 140 mm in November [*Environment Canada*, 2016]. The most extreme daily rainfall of 111.0 mm was measured on 15 August 1981. The greatest snowfall of 38.0 cm was recorded on 16 January 2000. Snow depth, during the seven months with snowfall, averages 60 cm and almost 190 days each year experience some form of precipitation.

During the winter months, the prevailing winds are northwesterly and westerly (*i.e.*, they blow from the northwest or west) [*Wicklund and Langmaid*, 1953]. Southwesterly and westerly winds prevail during the summer months.

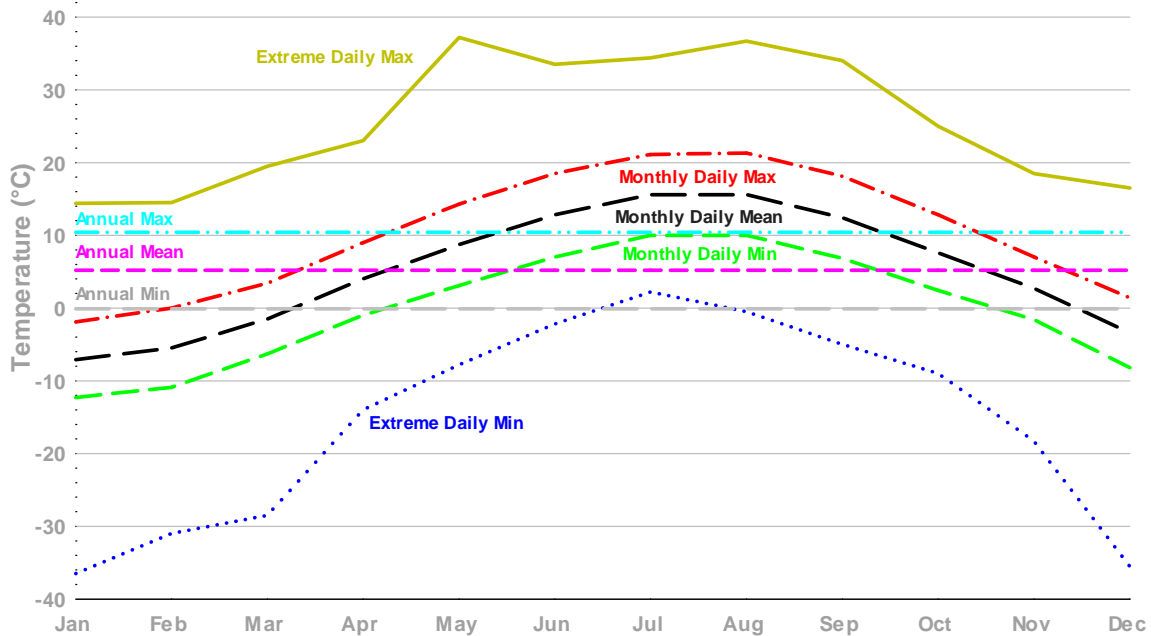


Figure 9. Compilation of mean daily temperatures measured at the Penfield meteorological station between 1981 and 2010.

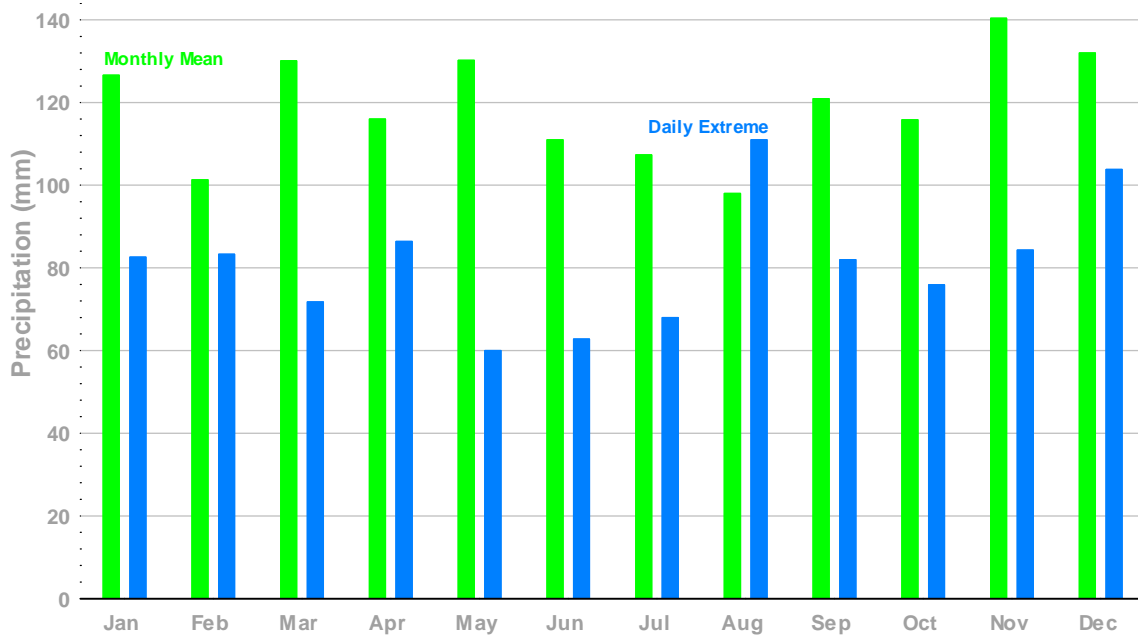


Figure 10. Compilation of mean daily precipitation measured at the Penfield meteorological station between 1981 and 2010.

3.1.2 Sound Levels

The Penfield LSD has pockets of light and heavy industrialized areas (e.g., the Lake Utopia Paper Mill, futureNETS, Northern Harvest, etc.). Residential development in the area is sparse and interspersed amongst timberland and agricultural lands (i.e., primarily

for growing blueberries). Ambient sound levels in the area are considered typical of a rural setting.

3.1.3 Topography

Pennfield is located within the Highland Foothills of New Brunswick [Pronk and Allard, 2003], which is an area of moderate relief. More specifically, Pennfield falls within the Musquash Lowlands [Allard, 2007a], which is adjacent to the Bay of Fundy. Local relief seldom exceeds 90 m Above Mean Sea Level (AMSL). The landscape was significantly modified by glacial and meltwater processes whereby sand and gravel deposits in the form of eskers, kames, melt-water channels, and drumlinized and fluted landforms are common. St. George was the terminus of the large glacial meltwater deltas. The Pennfield-Utopia Delta Complex is located to the southeast [Allard, 2007b]. Portions of the area were inundated by marine incursion following deglaciation. The area is characterized by abundant glacial melt-water channels, wide modern flood plains, peat bogs, and wetlands filled with sand, gravel, and organic deposits.

The Facility exists in a topographically flat area adjacent to Trainors Cove of the L'Etang River Estuary. Elevations on the shore-side property range from about 30 m at the highest point down to sea level (Figure 11). Elevations on the other property range between 5 m and 10 m AMSL.



Figure 11. Aerial photograph, circa 2016, showing the general topography at the Quoddy Facility in Pennfield, New Brunswick.

3.1.4 Hydrology

As noted by *Allard* [2007a], drainage patterns in Pennfield are deranged, which is a result of the intense glacial activity and post-glacial submergence and emergence. The landscape is moderately to well-drained; however, poor drainage exists where broad depressions are scoured directly into bedrock.

The Quoddy Facility is within the L'Etang River watershed. Review of the watercourse and wetland mapping from the NBDELG's GeoNB online Geographical Information System (GIS) tool shows that there are no mapped streams or wetlands within either of the Quoddy properties. No water quality data were available for watercourses in the area.

3.1.5 Geology

3.1.5.1 Bedrock

Bedrock geology is described in Table 3 and shown in Figure 12. Underlying the majority of the area are felsic tuffs from the Leavitts Head Formation and felsic intrusive rocks from the Ragged Falls Granitoids Formation, both of which belong to the New River Granitoid Suite [*McLeod et al.*, 2005; *McLeod*, 2005]. Bedrock is Neoproterozoic in age. Layers found in the Leavitts Head Formation are pink to grey and are fine grained. That Formation is intruded by minor amounts of diabase and red felsic dykes, both of which are likely Silurian in age. Typically, layers of the Ragged Falls Formation are red to pink and contain medium- to coarse-grained, quartz-eye granite that is commonly transitional to rhyolite (*i.e.*, rich in quartz and alkali feldspar with subordinate plagioclase, biotite, and hornblende). That Formation is intruded by abundant diabase and amphibolite dykes and by lesser amounts of felsic dykes, all of which are likely Silurian in age.

Table 3. Descriptions of the bedrock geology in the vicinity of the Quoddy Facility in Pennfield, New Brunswick.

Code	Age	Group	Formation	Description
ZRF _{fi}	Neoproterozoic	New River Granitoid Suite	Ragged Falls Granitoids – felsic intrusive rocks	Red to pink, medium- to coarse-grained, quartz-eye granite commonly transitional to rhyolite
ZLE _{ft}	Neoproterozoic	New River Granitoid Suite	Leavitts Head Formation – felsic tuff	Pink to grey, fine-grained, felsic crystal tuff, felsic flows, and granite dykes

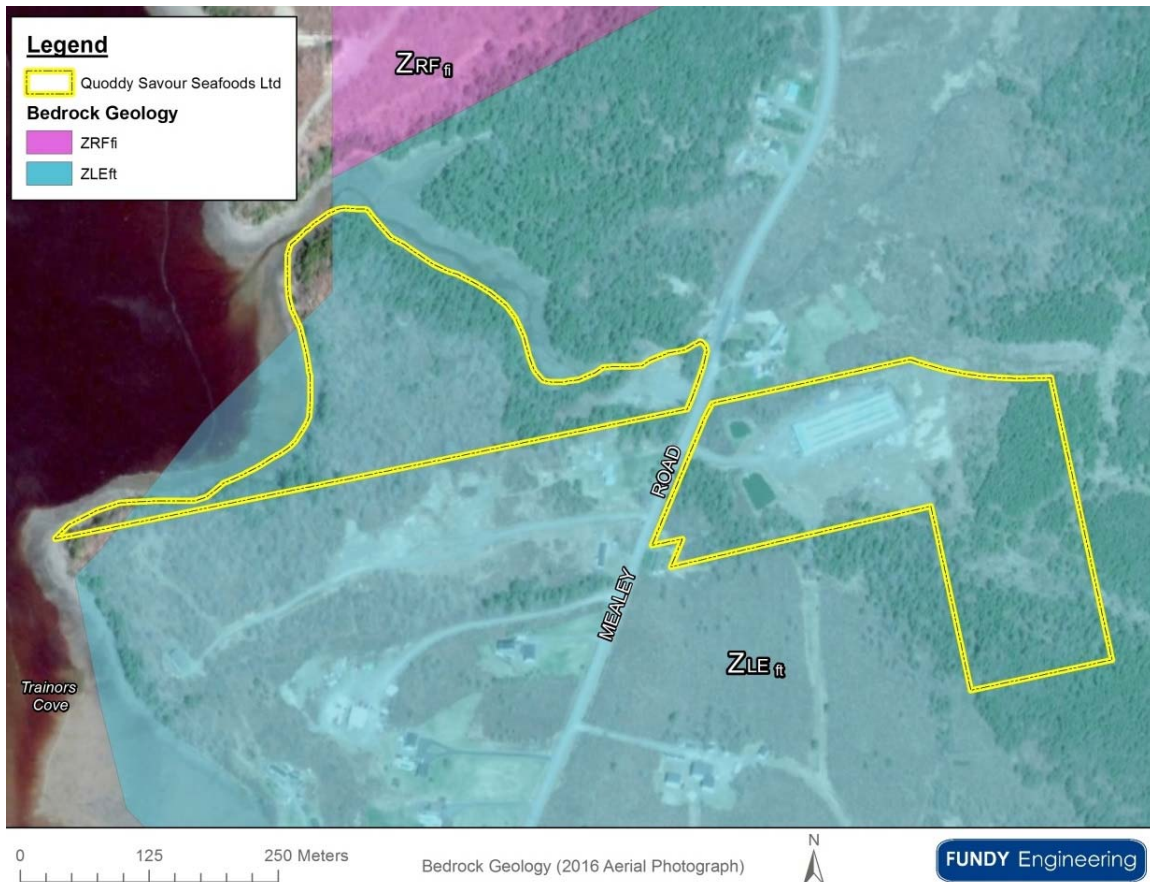


Figure 12. Bedrock geology map overlaying an aerial photograph, circa 2016, in the vicinity of the Quoddy Facility in Pennfield, New Brunswick. See text for bedrock geology descriptions.

3.1.5.2 Surficial

Surficial geology of the local area is described in Table 4 and shown in Figure 13. The Pennfield area is generally overlain by Late Wisconsinan and / or early Holocene sediments [Rampton, 1984]. Those blankets and veneers of marine sediments are typically 0.5 m to 3 m thick and are generally comprised of sand, silt, and some gravel and clay. The materials were deposited in shallow marine water, locally deep, which submerged coastal areas and sections of many valleys during and following Late Wisconsinan deglaciation.

Table 4. Descriptions of the surficial geology in the vicinity of the Quoddy Facility in Pennfield, New Brunswick.

Code	Age	Description
Wb	Late Wisconsinan and / or Early Holocene	Marine sediments of sand, silt, gravel, and clay; deposited in shallow marine water, locally deep, which submerged coastal areas and sections of many valleys during and following Late Wisconsinan deglaciation; blankets and plains of sand, silt, some gravel and clay are generally 0.5 m to 3 m thick



Figure 13. Surficial geology map overlaying an aerial photograph, circa 2016, in the vicinity of the Quoddy Facility in Pennfield, New Brunswick. See text for surficial geology descriptions.

3.1.6 Hydrogeology

3.1.6.1 Use

Approximately 64 % of New Brunswick's population is reliant on groundwater for supplying domestic freshwater [*Natural Resources Canada, 2005*]. Individual water well owners in the province depend on small aquifers, typically composed of thin glacial sand and gravel deposits, to supply their potable water. Regional groundwater availability maps exist for most of Canada and are generalizations of large quantities of data collected for a region [*Natural Resources Canada, 2005*]. In Pennfield, aquifers are typically able to supply a flow rate $< 24 \text{ L} \cdot \text{min}^{-1}$ (Figure 14); however, localized groundwater availability can only be determined through on-site investigations.

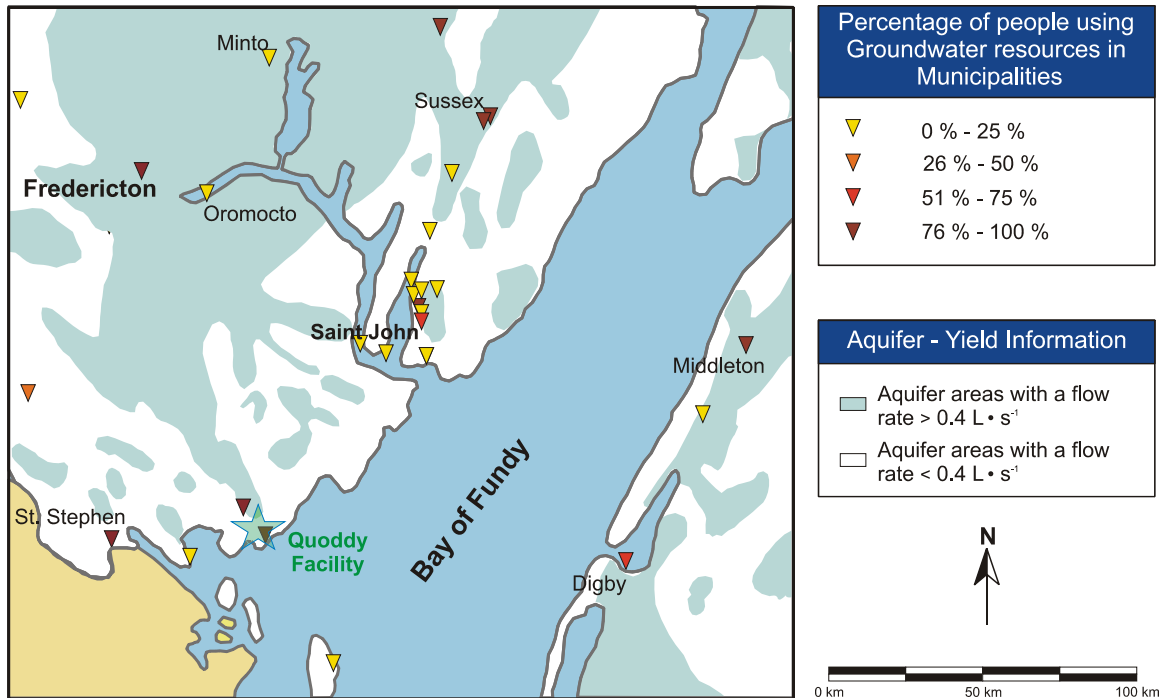


Figure 14. Groundwater availability map for southwestern, New Brunswick and the surrounding area [Natural Resources Canada, 2005].

Residential, commercial, and industrial properties in Pennfield and surrounding areas are mostly reliant on groundwater for supplying potable water and / or process water. There are several potential large groundwater users in the area (Figure 15). For example, there are two aquaculture net washing facilities (*i.e.*, Northern Harvest and futureNETS), four aquaculture operations (*i.e.*, Brunswick Aquaculture, Seeley Trout Farm, and Kelly Cove Salmon Ltd.), several commercial operations (*e.g.*, Comeaus, *etc.*), and agricultural / horticultural operations (*e.g.*, Misty Blue Farms, *etc.*). Pennfield is also a well-known blueberry growing area. It is not known if local growers use groundwater during the growing season to irrigate their fields. Although there are many pits and quarries in the area, there does not appear to be any impacts to surrounding water supplies as a result of those operations.

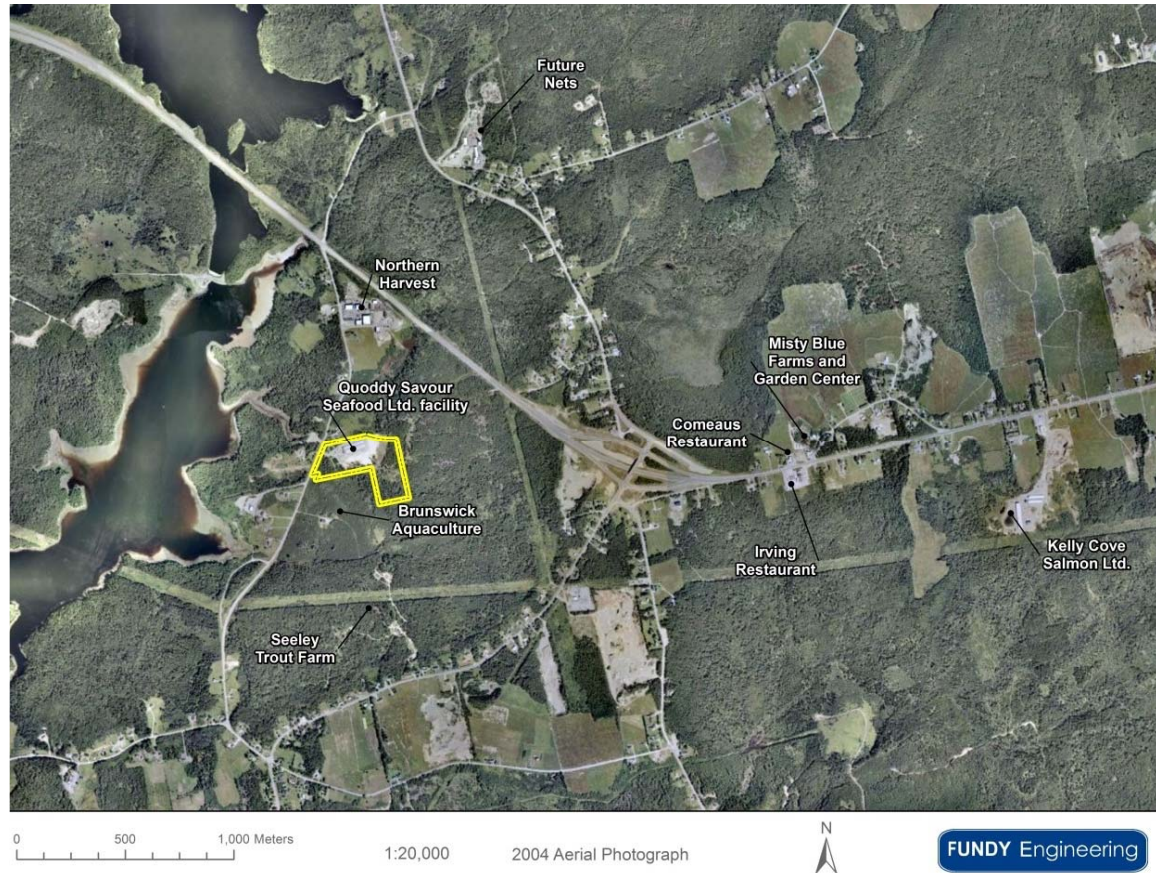


Figure 15. Potential large groundwater users in the vicinity of the Quoddy Facility in Pennfield, New Brunswick.

3.1.6.2 Quantity

A potable groundwater well records search returned 38 well logs from the NBDELG's Online Well Log System (OWLS) for a 1.5 km radius around PID 15160708 (Figure 16). Refer to Appendix II for a copy of the OWLS records search. Those data were used for characterizing the local groundwater quantity.

Based on the records, the average well depth is $72.4 \text{ m} \pm 42.495 \text{ m}$ ($n = 35$; Figure 17). Depths range from as shallow as 11.9 m to as deep as 186.0 m. Casing length for this group of wells ranges from 6.1 m to 45.7 m and averages $18.7 \text{ m} \pm 12.12 \text{ m}$ ($n = 31$). According to the well logs, where data are available, bedrock is found at a depth of $30.9 \text{ m} \pm 41.82 \text{ m}$ ($n = 14$; the majority of wells are installed in unconsolidated materials). The shallowest depth that bedrock was encountered is 3.7 m and the greatest depth is 167.6 m. The average safe yield for the 33 wells with available data, as estimated by the well driller(s), is $122.4 \text{ L} \cdot \text{min}^{-1} \pm 251.00 \text{ L} \cdot \text{min}^{-1}$. The safe yield is estimated to be as low as $2.3 \text{ L} \cdot \text{min}^{-1}$ and as great as $1\,365 \text{ L} \cdot \text{min}^{-1}$ from individual wells. Static water levels are generally $9.8 \text{ m} \pm 6.05 \text{ m}$ below the top of casing and typically range from 0.6 m to 24.4 m ($n = 18$).



Figure 16. Aerial photograph showing groundwater wells on file with the NBDELG within a 1.5 km radius around PID 15160708 in Pennfield, New Brunswick. The well logs and water quality records were obtained for characterizing local groundwater quantity and quality.

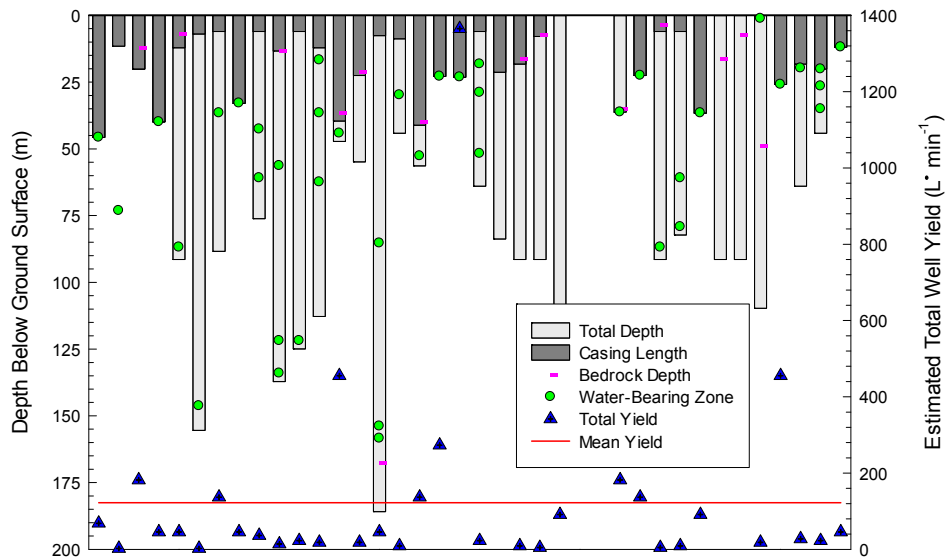


Figure 17. Compilation of the 38 potable groundwater well records within a 1.5 km radius around PID 15160708 in Pennfield, New Brunswick.

3.1.6.3 Quality

Fundy Engineering reviewed water chemistry records (*i.e.*, microbiology, general chemistry, and trace metals) available for potable water wells within a 1.5 km radius around PID 15160708. A total of 12 water quality records were obtained from the NBDELG groundwater well database for microbiology, general chemistry, and trace metals. Those data were subsequently compared to the CDWQGs. A summary of the exceedances with respect to the CDWQGs is provided in Table 5.

Table 5. Summary of exceedances, with respect to the CDWQG, for water quality records available within a 1.5 km radius around PID 15160708 in Pennfield, New Brunswick ($n = 12$). Yellow shaded entries indicate that the values **do not** pose a health concern, while red shaded cells indicate that the values **may** pose a health concern.

	Parameter	<i>n</i>
Microbiological Exceedances	Total Coliforms	4
	Chloride	1
	Iron	2
General Chemistry Exceedances	Hardness	1
	Manganese	4
	Turbidity	5
Trace Metal Exceedances	Uranium	1

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Federal Species At Risk

Federally listed species at risk that exist in New Brunswick and could potentially be impacted by the Project are noted in Table 6. Those terrestrial and aquatic species identified under the federal *Species At Risk Act* (fSARA) and by the Committee On Status of Endangered Wildlife In Canada (COSEWIC) as being at risk in New Brunswick are listed. Listing of a species in Table 6 does not indicate that it is either present or absent at the Project site. Presence and absence information is provided below. The order of risk level under the fSARA and by the COSEWIC is as follows: special concern; threatened; endangered; extirpated; and extinct.

Table 6. Terrestrial and aquatic flora and fauna listed as being species at risk under the fSARA and by the COSEWIC that could potentially be affected by the proposed Project in Pennfield, New Brunswick.

Common Name	Scientific Name	fSARA Status	COSEWIC Status
<u>Vascular Plants, Mosses, and Lichens</u>			
Boreal felt lichen	<i>Erioderma pedicellatum</i>	Endangered	Endangered
Vole ears lichen	<i>Erioderma mollissimum</i>	Endangered	Endangered
Prototype quillwort	<i>Isoetes prototypus</i>	Special concern	Special concern
Butternut	<i>Juglans cinerea</i>	Endangered	Endangered
Beach pinweed	<i>Lechea maritime</i>	Special concern	Special concern
Furbish's lousewort	<i>Pedicularis furishiae</i>	Endangered	Endangered
Anticosti aster	<i>Symphyotrichum anticostense</i>	Threatened	Threatened

Common Name	Scientific Name	fSARA Status	COSEWIC Status
Gulf of St. Lawrence aster	<i>Symphyotrichum laurentianum</i>	Threatened	Threatened
Bathurst aster	<i>Symphyotrichum subulatum</i>	Special concern	Special concern
Molluscs			
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	Extirpated	Extirpated
Brook floater	<i>Alasmidonta varicosa</i>	Special concern	Special concern
Yellow lampmussel	<i>Lampsilis cariosa</i>	Special concern	Special concern
Reptiles			
Snapping turtle	<i>Chelydra serpentina</i>	Special concern	Special concern
Wood turtle	<i>Glyptemys insculpta</i>	Threatened	Threatened
Birds			
Short-eared owl	<i>Asio flammeus</i>	Special concern	Special concern
Barrow's goldeneye	<i>Bucephala islandica</i>	Special concern	Special concern
Red knot <i>rufa</i> subspecies	<i>Calidris canutus rufa</i>	Endangered	Endangered
Eastern whip-poor-will	<i>Caprimulgus vociferus</i>	Threatened	Threatened
Canada warbler	<i>Cardellina</i>	Threatened	Threatened
Bicknell's thrush	<i>Catharus bicknelli</i>	Threatened	Threatened
Chimney swift	<i>Chaetura pelagica</i>	Threatened	Threatened
Piping plover <i>melodus</i> subspecies	<i>Charadrius melodus melodus</i>	Endangered	Endangered
Common nighthawk	<i>Chordeiles minor</i>	Threatened	Threatened
Olive-sided flycatcher	<i>Contopus cooperi</i>	Threatened	Threatened
Yellow rail	<i>Coturnicops noveboracensis</i>	Special concern	Special concern
Rusty blackbird	<i>Euphagus carolinus</i>	Special concern	Special concern
Peregrine falcon	<i>Falco peregrinus anatum / tundrius</i>	Special concern	Special concern
Harlequin duck	<i>Histrionicus histrionicus</i>	Special concern	Special concern
Least bittern	<i>Ixobrychus exilis</i>	Threatened	Threatened
Eskimo curlew	<i>Numenius borealis</i>	Endangered	Endangered
Roseate tern	<i>Sterna dougallii</i>	Endangered	Endangered
Arthropods			
Cobblestone tiger beetle	<i>Cicindela marginipennis</i>	Endangered	Endangered
Maritime ringlet	<i>Coenonympha nipisiquit</i>	Endangered	Endangered
Monarch butterfly	<i>Danaus plexippus</i>	Special concern	Special concern
Pygmy snaketail	<i>Ophiogomphus howei</i>	Special concern	Special concern
Fishes			
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Special concern	Special concern
Rainbow smelt (Lake Utopia)	<i>Osmerus mordax</i>	Threatened	Threatened
Atlantic salmon (IBOF pop.)	<i>Salmo salar</i>	Endangered	Endangered
Terrestrial Mammals			
Little brown bat	<i>Myotis lucifugus</i>	Endangered	Endangered
Northern bat	<i>Myotis septentrionalis</i>	Endangered	Endangered
Tri-colored bat	<i>Perimyotis subflavus</i>	Endangered	Endangered

The Atlantic Canada Conservation Data Centre (ACCDC) databases were queried for known observation data of federally protected species within a 5 km radius of the Project site (*i.e.*, refer to Appendix III). According to the ACCDC data, six species listed under the fSARA and by the COSEWIC have been observed (Figure 18).

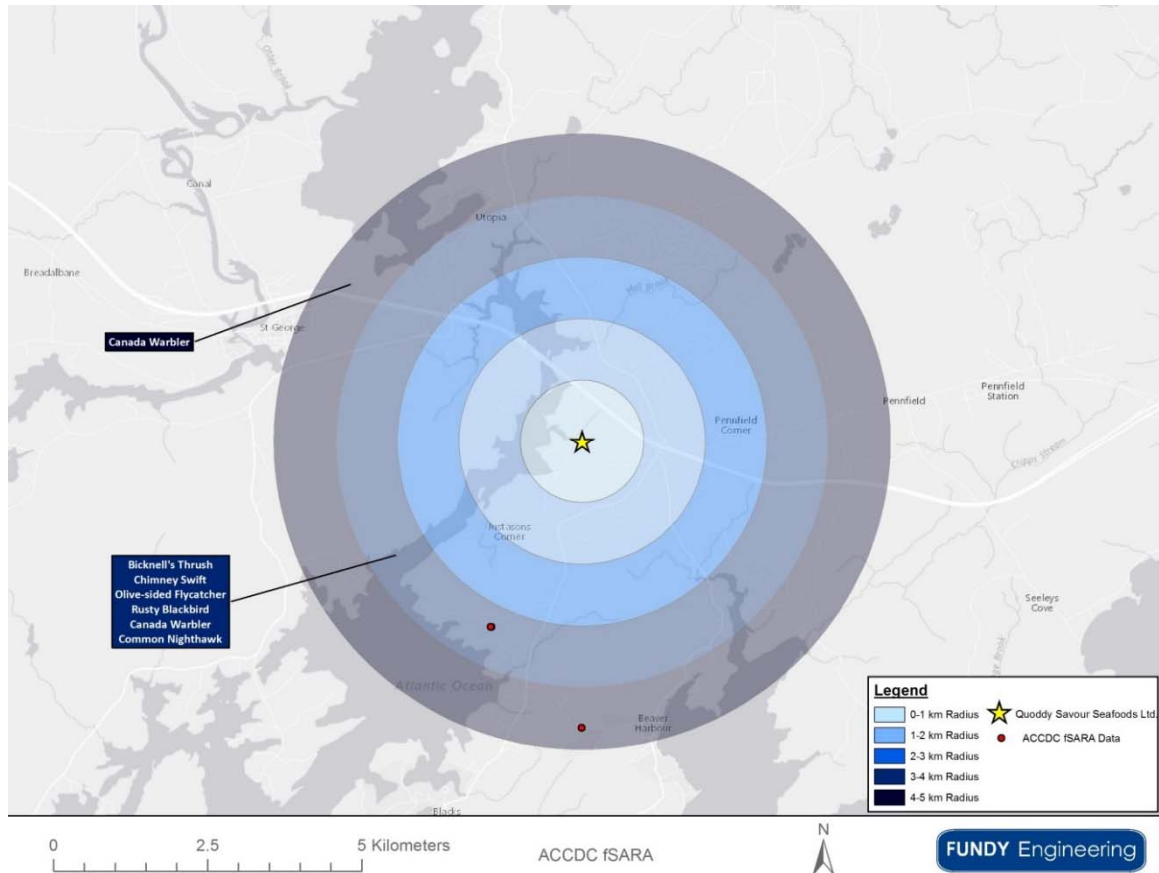


Figure 18. Map showing the recorded observations of species listed under the fSARA and by the COSWEIC within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

3.2.1.1 Snapshots of Federal Species At Risk Locally Present

Detailed information provided below on the protected species was obtained from the species profiles on the fSARA [SARA, 2016] and COSWEIC [COSEWIC, 2016] websites.

The chimney swift is a medium-sized (*i.e.*, 12 cm to 15 cm), sooty gray bird with very long, slender wings and very short legs. There are no subspecies of the chimney swift, but like all swifts, it is incapable of perching and can only cling vertically to surfaces (Figure 19). They build nests of twigs stuck together with saliva, in chimneys and other vertical surfaces in dim, enclosed areas including air vents, wells, hollow trees, and caves. They forage overall urban and suburban areas, rivers, lakes, forest, and fields in search of flying insects. Although the global population of chimney swifts is relatively healthy, they have been impacted in Atlantic Canada due to severe storm events and the reduction in nesting habitat (*i.e.*, chimneys are not as prevalent as they once were).

This has caused them to be listed as threatened under the fSARA and by the COSEWIC (Table 6).



Figure 19. Photographs of species listed under the fSARA and by the COSEWIC that have been observed within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick.

The rusty blackbird (Figure 19) is a thrush-sized passerine with narrow and pointed wings, and a slightly rounded tail that is almost as long as the wings. *Euphagus carolinus* has pale yellow eyes and a slightly curved black bill. They nest in the forest and favour the shores of wet areas, such as slow-moving streams, peat bogs, marshes, swamps, beaver ponds, and pasture edges. In Canada, the rusty blackbird occurs in all provinces and territories, and is believed to have declined by approximately 85 % since the mid-1960s due to habitat alteration. As a result, they are listed as a species of special concern under the fSARA and by the COSEWIC (Table 6).

The common nighthawk, a medium-sized bird with long, narrow, pointed wings and a slightly notched long tail, is ranked as a threatened species under the fSARA and by the COSEWIC (Table 6). While in flight, their distinguishing feature is a wide white stripe across the long feathers at the edge of their wings. They nest in a wide variety of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. They are also known to inhabit mixed and coniferous forests. Causes of population decline are unknown, but it may be partly attributed to the decline of their main food source (*i.e.*, insects).

Bicknell's thrush (Figure 19) was only recently considered a separate species from the gray-cheeked thrush. Bicknell's is a small migratory bird (~ 16 cm long and weighing 30 g) found in the Maritimes, Quebec, New England, and New York. Of concern is they have one of the most restricted breeding and wintering ranges of any North American bird. Throughout the Maritimes, it is estimated that there are only between 1 000 and 3 000 individuals. These birds migrate to the Caribbean where they overwinter by

travelling the eastern seaboard. Surveys completed in New Brunswick show that numbers of these birds are declining at a rate of about 16 % per year. As a result, Bicknell's Thrush is considered threatened by COSEWIC and under the fSARA (Table 6).

The Canada warbler is a small (12 cm to 15 cm), brightly coloured songbird (Figure 19). Their numbers have plummeted in the majority of their nesting areas. Although most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer, it is found in a variety of forest types. It also prefers riparian shrub forests on slopes and in ravines and in old-growth forests with canopy openings and a high density of shrubs, as well as in regenerating forest stands. Because their habitat is being lost and degraded, their numbers continue to be vulnerable to decline and hence the reasoning for their threatened ranking under the fSARA and by the COSEWIC (Table 6).

The olive-sided flycatcher (Figure 19) is a small (*i.e.*, 18 cm to 20 cm long), but stout songbird ranked as a threatened species under the fSARA and by the COSEWIC (Table 6). They breed in scattered locations throughout most coniferous and mixed forests of Canada. Considerable declines in population have occurred due to habitat loss and alteration. These birds are most often found in open areas containing tall live trees or snags for perching. Those vantage points are required to suit their foraging habits. Open areas used comprise forest clearings, forest edges located near natural openings, such as rivers and swamps, logged areas, burned forest, or open areas within old-growth forests.

3.2.2 Provincial Species At Risk

Provincially listed species at risk that exist in New Brunswick and could potentially be impacted by the Project are noted in Table 7. Those terrestrial and aquatic species identified under the provincial *Species At Risk Act* (fSARA) as being at risk in New Brunswick are listed. Listing of a species in Table 7 does not indicate that it is either present or absent at the Project site. Presence and absence information is provided below. The order of risk level under the pSARA is as follows: special concern; threatened; endangered; and extirpated.

Table 7. Terrestrial and aquatic flora and fauna listed as being at risk in New Brunswick under the pSARA that could potentially be affected by the proposed Project in Pennfield, New Brunswick.

Common Name	Scientific Name	pSARA Status
<u>Vascular Plants, Mosses, and Lichens</u>		
Blue felt lichen	<i>Degelia plumbea</i>	Species of special concern
Parker's pipewort	<i>Eriocaulon parkeri</i>	Endangered
Vole ears lichen	<i>Erioderma mollissimum</i>	Endangered
Boreal felt lichen Atlantic population	<i>Erioderma pedicellata</i>	Endangered
Prototype quillwort	<i>Isoetes prototypus</i>	Endangered
Butternut	<i>Juglans cinerea</i>	Endangered
Beach pinweed	<i>Lechea maritima</i>	Species of special concern
Southern twayblade	<i>Listera australis</i>	Endangered
Furbish's lousewort	<i>Pedicularis furbishiae</i>	Endangered

Common Name	Scientific Name	pSARA Status
Van Brunt's Jacob's-ladder	<i>Polemonium vanbruntiae</i>	Threatened
Pinedrops	<i>Pterospora andromedea</i>	Endangered
Anticosti aster	<i>Symphyotrichum anticostense</i>	Endangered
Gulf of St. Lawrence aster	<i>Symphyotrichum laurentianum</i>	Endangered
Bathurst aster Bathurst population	<i>Symphyotrichum subulatum</i>	Endangered
Molluscs		
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	Extirpated
Brook floater	<i>Alasmidonta varicosa</i>	Species of special concern
Yellow lampmussel	<i>Lampsilis cariosa</i>	Species of special concern
Reptiles		
Loggerhead sea turtle	<i>Caretta caretta</i>	Endangered
Snapping turtle	<i>Chelydra serpentina</i>	Species of special concern
Leatherback sea turtle Atlantic population	<i>Dermochelys coriacea</i>	Endangered
Wood turtle	<i>Glyptemys insculpta</i>	Threatened
Birds		
Short-eared owl	<i>Asio flammeus</i>	Species of special concern
Barrow's goldeneye Eastern population	<i>Bucephala islandica</i>	Species of special concern
Red knot <i>rufa</i> subspecies	<i>Calidris canutus rufa</i>	Endangered
Whip-poor-will	<i>Caprimulgus vociferus</i>	Threatened
Bicknell's thrush	<i>Catharus bicknelli</i>	Threatened
Chimney swift	<i>Chaetura pelagica</i>	Threatened
Piping Plover <i>melodus</i> subspecies	<i>Charadrius melodus melodus</i>	Endangered
Common nighthawk	<i>Chordeiles minor</i>	Threatened
Olive-sided flycatcher	<i>Contopus cooperi</i>	Threatened
Eastern wood-pewee	<i>Contopus virens</i>	Species of special concern
Yellow rail	<i>Coturnicops noveboracensis</i>	Species of special concern
Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened
Rusty blackbird	<i>Euphagus carolinus</i>	Species of special concern
Peregrine falcon <i>anatum</i> / <i>tundrius</i>	<i>Falco peregrinus anatum/tundrius</i>	Endangered
Bald eagle	<i>Haliaeetus leucocephalus</i>	Endangered
Barn swallow	<i>Hirundo rustica</i>	Threatened
Harlequin duck Eastern population	<i>Histrionicus histrionicus</i>	Endangered
Wood thrush	<i>Hylocichla mustelina</i>	Threatened
Least bittern	<i>Ixobrychus exilis</i>	Threatened
Eskimo curlew	<i>Numenius borealis</i>	Endangered
Horned grebe Western population	<i>Podiceps auritus</i>	Species of special concern
Roseate tern	<i>Sterna dougallii</i>	Endangered
Eastern meadowlark	<i>Sturnella magna</i>	Threatened
Canada warbler	<i>Wilsonia canadensis</i>	Threatened
Arthropods		
Cobblestone tiger beetle	<i>Cicindela marginipennis</i>	Endangered

Common Name	Scientific Name	pSARA Status
Maritime ringlet	<i>Coenonympha nipisiquit</i>	Endangered
Monarch	<i>Danaus plexippus</i>	Species of special concern
Skillet clubtail	<i>Gomphus ventricosus</i>	Endangered
Pygmy snaketail	<i>Omphiogomphus howei</i>	Species of special concern
Fishes		
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Species of special concern
Atlantic sturgeon Maritimes populations	<i>Acipenser oxyrinchus</i>	Threatened
Thorny skate	<i>Amblyraja radiata</i>	Species of special concern
Atlantic wolffish	<i>Anarhichas lupus</i>	Species of special concern
American eel	<i>Anguilla rostrata</i>	Threatened
Cusk	<i>Brosme brosme</i>	Endangered
White shark Atlantic population	<i>Carcharodon carcharias</i>	Endangered
Atlantic cod Laurentian south population	<i>Gadus morhua</i>	Endangered
Atlantic cod southern population	<i>Gadus morhua</i>	Endangered
American plaice Maritime population	<i>Hippoglossoides platessoides</i>	Threatened
Mako shortfin Atlantic population	<i>Isurus oxyrinchus</i>	Threatened
Porbeagle	<i>Lamna nasus</i>	Endangered
Winter skate southern Gulf of St. Lawrence population	<i>Leucoraja ocellata</i>	Endangered
Winter skate Georges Bank-Western Scotian Shelf-pop.	<i>Leucoraja ocellata</i>	Species of special concern
Smooth skate Laurentian-Scotian population	<i>Malacoraja senta</i>	Species of special concern
Striped bass Bay of Fundy population	<i>Morone saxatilis</i>	Endangered
Striped bass southern Gulf of St. Lawrence population	<i>Morone saxatilis</i>	Species of special concern
Rainbow smelt Lake Utopia large-bodied population	<i>Osmerus mordax</i>	Threatened
Rainbow smelt Lake Utopia small-bodied population	<i>Osmerus mordax</i>	Threatened
Blue shark Atlantic population	<i>Prionace glauca</i>	Species of special concern
Atlantic salmon Inner Bay of Fundy population	<i>Salmo salar</i>	Endangered
Atlantic salmon Outer Bay of Fundy population	<i>Salmo salar</i>	Endangered
Atlantic salmon Gaspé-S. Gulf of St. Lawrence pop.	<i>Salmo salar</i>	Species of special concern
Acadian redfish Atlantic population	<i>Sebastes fasciatus</i>	Threatened
Spiny dogfish Atlantic population	<i>Squalus acanthias</i>	Species of special concern
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	Endangered
Mammals		
Blue whale - Atlantic population	<i>Balaenoptera musculus</i>	Endangered
Fin whale Atlantic population	<i>Balaenoptera physalus</i>	Species of special concern
Gray wolf	<i>Canis lupus</i>	Extirpated
North Atlantic right whale	<i>Eubalaena glacialis</i>	Endangered
Wolverine	<i>Gulo gulo</i>	Extirpated
Canada lynx	<i>Lynx canadensis</i>	Endangered
Little brown <i>Myotis</i>	<i>Myotis lucifugus</i>	Endangered
Northern <i>Myotis</i>	<i>Myotis septentrionalis</i>	Endangered
Atlantic walrus	<i>Odobenus rosmarus rosmarus</i>	Extirpated
Tri-colored bat	<i>Perimyotis subflavus</i>	Endangered

Common Name	Scientific Name	pSARA Status
Harbour porpoise Northwest Atlantic population	<i>Phocoena phocoena</i>	Species of special concern
Woodland caribou	<i>Rangifer tarandus caribou</i>	Extirpated

The ACCDC databases were queried for known observation data of provincially protected species within a 5 km radius of the Project site (*i.e.*, refer to Appendix III). According to the ACCDC data, 10 species listed under the pSARA have been observed (Figure 20).

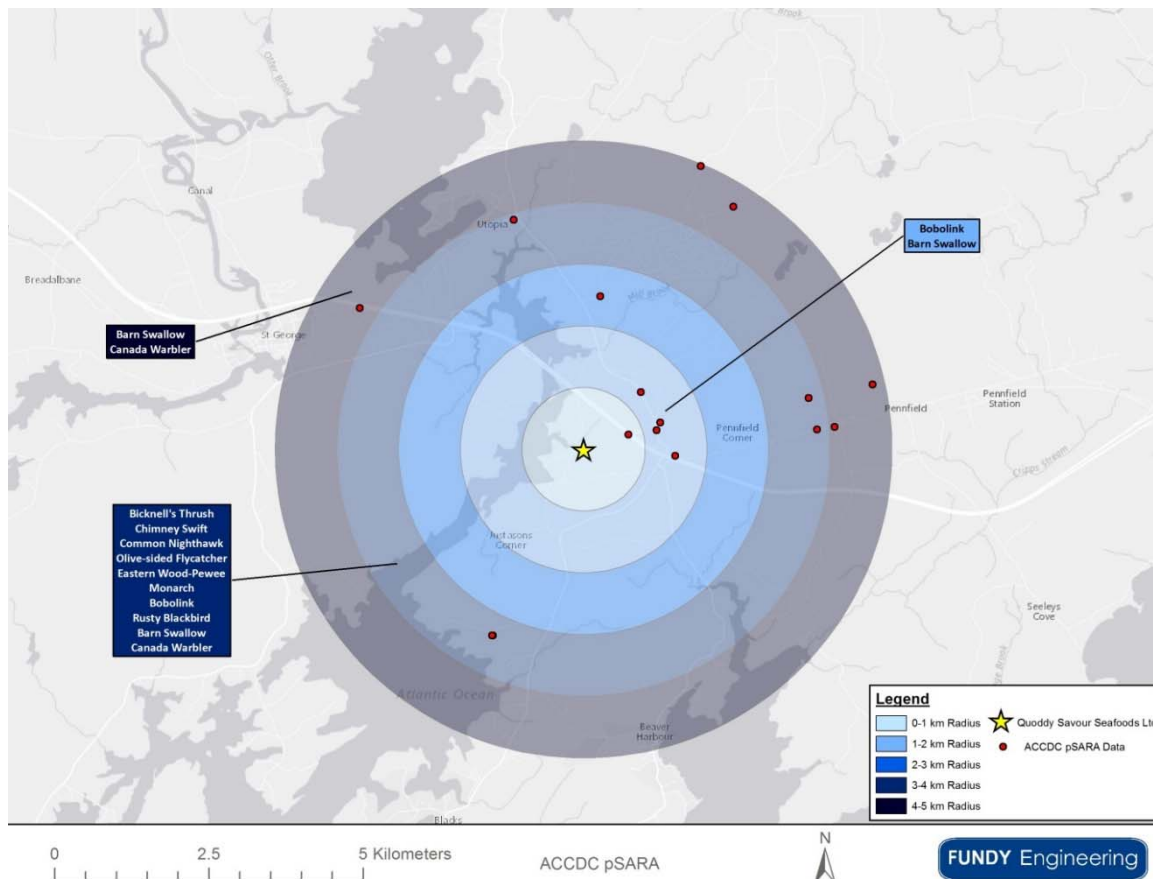


Figure 20. Map showing the recorded observations of species listed under the pSARA within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

3.2.2.1 Snapshots of Provincial Species at Risk Locally Present

Those 10 species listed under the pSARA that have been observed within 5 km of the Quoddy Facility in Pennfield, New Brunswick are shown in Figure 21. Descriptions of those species are also provided if not previously described in Section 3.2.1.1. Detailed information provided below on the protected species was obtained from the species profiles on the fSARA [SARA, 2016], COSWEIC [COSEWIC, 2016], and regulatory agency websites.



Figure 21. Photographs of species listed under the pSARA that have been observed within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick.

The bobolink (Figure 21) is a small bird that averages 18 cm long, has a wingspan of about 29 cm, and weighs approximately 40 g. Male bobolinks have a distinctive plumage during the breeding season, which includes a black and white rump and a black and yellow nape. Their winter plumage, yellow and brown, is similar to that of the female. Bobolinks feed mainly on insects during the summer and switch to grains during migration periods. They are ground nesters. Since the mid-1900s, bobolinks have experienced an average annual decline of 3.8 %. The loss of these birds is primarily caused by changes in land-use, but it is suspected that some decline is attributed to winter kill. Under the pSARA, the bobolink is listed as being a threatened species (Table 7).

The barn swallow (Figure 21) is the most widespread swallow species in the world. The population of over 190 million individuals globally is considered stable. Because there have been considerable declines in the presence for the past several decades, the barn swallow is species is listed as threatened under the pSARA (Table 7). It is a distinctive passerine that has blue upperparts, a long, deeply forked tail that is curved, and pointed wings. This 17 cm to 19 cm long bird is commonly found in open areas with low vegetation, such as pasture, meadows, and farmland. They build a cup nest from mud pellets in barns or other similar structures and feeds on insects caught while in flight.

The eastern wood-pewee is a small forest flycatcher that grows to about 15 cm long (Figure 21). It was once thought to be a single species of the olive-sided flycatcher, but was later identified as a separate species. Adults are generally greyish-olive on their upper parts and pale on the under parts with pale bars on their wings. Males and females are similar in appearance. They have a distinctive, clear, three-part song, usually heard as “pee-ah-wee”. It is generally found in the mid-canopy layer of forest clearings and at the edges of deciduous and mixed forests. Its habitat is threatened through various land-use activities, which is why it is listed as a species of special concern under the pSARA (Table 7).

The monarch butterfly is considered a species of special concern under the pSARA and by the COSEWIC (Table 7). The caterpillars are striped yellow, black, and white, the chrysalis is gold-green, and the butterfly is bright orange with heavy black veins (Figure 21). The eastern population, found throughout Atlantic Canada, is the largest of the populations (*i.e.*, outnumbering the western and central groups). The population is estimated in the tens of millions; however, the population can have drastic ups and downs each year depending on the climate. This species tends to be present wherever milkweed (*Asclepius sp.*) and wildflowers, such as goldenrod (*Solidago sp.*), asters (*Aster sp.*), and purple loosestrife (*Lythrum salicaria*), exist.

3.2.3 Other Locally Observed Species

ACCDC databases were also queried for known observation data of provincially ranked flora and fauna within a 5 km radius of the Project site. Those species identified in the sections above are not included here. The full list of the flora ($n = 4$ unique species) and fauna ($n = 25$ unique species) within 5 km of the site is provided in Table 8 and the ACCDC report can be found in Appendix III. Interpretation of the ACCDC S-rank system is provided in Table 9.

A visual representation of the 4 observed flora species is provided in Figure 22. Similarly, a visual representation of the 25 observed fauna species is provided in Figure 23 through Figure 25.

Table 8. List of provincially ranked flora and fauna identified by the ACCDC as being observed within 5 km of the Quoddy Facility in Pennfield, New Brunswick.

Common Name	Scientific Name	S-rank	NB GS Rank
Flora			
Canada serviceberry	<i>Amelanchier canadensis</i>	S3	Secure
Toothed flatsedge	<i>Cyperus dentatus</i>	S3	Secure
Nodding Ladies'-Tresses	<i>Spiranthes cernua</i>	S2S3	Undetermined
Disguised St John's-wort	<i>Hypericum dissimulatum</i>	S2	Sensitive
Fauna			
Lake Utopia Dwarf Smelt	<i>Osmerus mordax sp. 1</i>	S1	Sensitive
Cougar - Eastern pop	<i>Puma concolor pop. 1</i>	SU	Undetermined
Upland sandpiper	<i>Bartramia longicauda</i>	S1B	Sensitive
Turkey vulture	<i>Cathartes aura</i>	S3B	Secure
Killdeer	<i>Charadrius vociferus</i>	S3B	Sensitive
Willow flycatcher	<i>Empidonax traillii</i>	S1S2B	Sensitive
Indigo bunting	<i>Passerina cyanea</i>	S3B	Secure
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	S3S4B	Sensitive
Eastern kingbird	<i>Tyrannus tyrannus</i>	S3S4B	Sensitive
Vesper sparrow	<i>Pooecetes gramineus</i>	S2B	May be at risk
Bank swallow	<i>Riparia riparia</i>	S3B	Sensitive
Brown thrasher	<i>Toxostoma rufum</i>	S2B	Sensitive
Pine Siskin	<i>Carduelis pinus</i>	S3	Secure
Spotted Sandpiper	<i>Actitis macularius</i>	S3S4B	Secure
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	S3B	Sensitive
Blackpoll Warbler	<i>Dendroica striata</i>	S3S4B	Secure
Cape May Warbler	<i>Dendroica tigrina</i>	S3B	Secure
Horned Lark	<i>Eremophila alpestris</i>	S1B	May be at risk
American Coot	<i>Fulica americana</i>	S1S2B	Sensitive

Common Name	Scientific Name	S-rank	NB GS Rank
Wilson's Snipe	<i>Gallinago delicata</i>	S3S4B	Secure
Red-breasted Merganser	<i>Mergus serrator</i>	S3B	Secure
Northern Mockingbird	<i>Mimus polyglottos</i>	S2B	Sensitive
Brown-headed Cowbird	<i>Molothrus ater</i>	S3B	May be at risk
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	S2S3B	Sensitive
Common Eider	<i>Somateria mollissima</i>	S3B	Secure

Table 9. The Atlantic Canada Conservation Data Centre's Sub-national (*i.e.*, provincial) rarity rank (S-rank) of species and S-rank definitions.

ACCDC S-rank	Definition
S1	Extremely rare: may be especially vulnerable to extirpation; typically five or fewer occurrences or very few remaining individuals.
S2	Rare: may be vulnerable to extirpation due to rarity or other factors; six to 20 occurrences or few remaining individuals.
S3	Uncommon: found only in a restricted range, even if abundant at some locations; 21 to 100 occurrences.
S4	Usually widespread, fairly common: apparently secure with many occurrences, but of longer-term concern (<i>e.g.</i> , watch list); 100 + occurrences).
S5	Abundant: widespread and secure under present conditions.
S#S#	Numeric range rank: a range between two consecutive ranks for a species / community; denotes uncertainty about the exact rarity (<i>e.g.</i> , S1S2).
SH	Historical: previously occurred in the province but may have been overlooked during the past 20 years to 70 years; presence is suspected and will likely be rediscovered.
SU	Unrankable: possibly in peril, but status is uncertain; need more information.
SX	Extinct / Extirpated: believed to be extirpated from its former range.
S?	Unranked: not yet ranked.
SA	Accidental: accidental or casual, infrequent and far outside usual range; includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds, or even thousands of miles outside their usual range.
SE	Exotic: an exotic established in the province (<i>e.g.</i> , Purple Loosestrife or Coltsfoot); may be native in nearby regions.
SE#	Exotic numeric: an established exotic that has been assigned a rank.
SP	Potential: potentially occurs, but no occurrences have been reported.
SR	Reported: no persuasive documentation (<i>e.g.</i> , misidentified specimen).
SRF	Reported falsely: erroneously reported and the error has persisted in the literature.
SZ	Zero: not of practical conservation concern because there are no definable occurrences, although the species is native and appears regularly; an SZ rank is generally used for occasional long distance migrants.

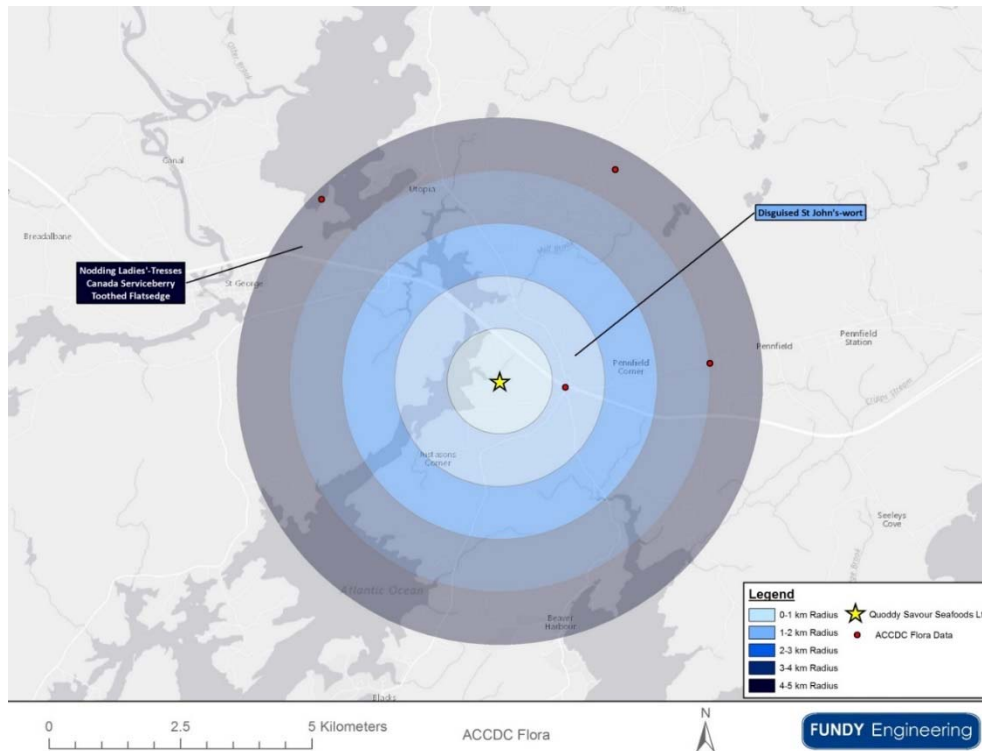


Figure 22. Map showing the observed flora species within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

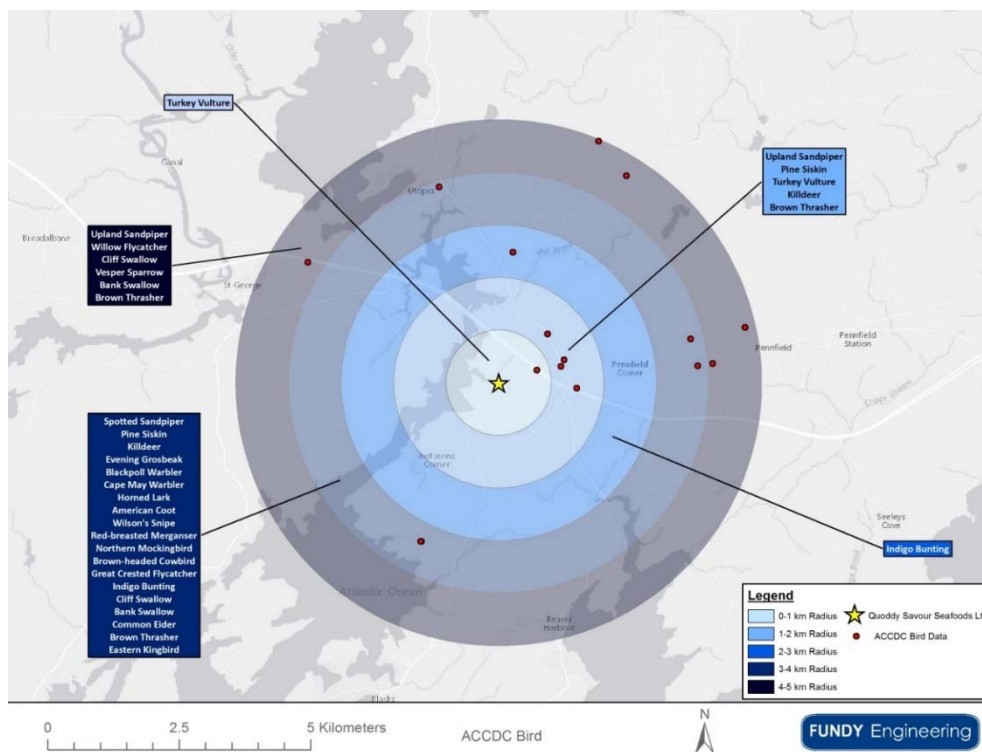


Figure 23. Map showing the observed birds within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

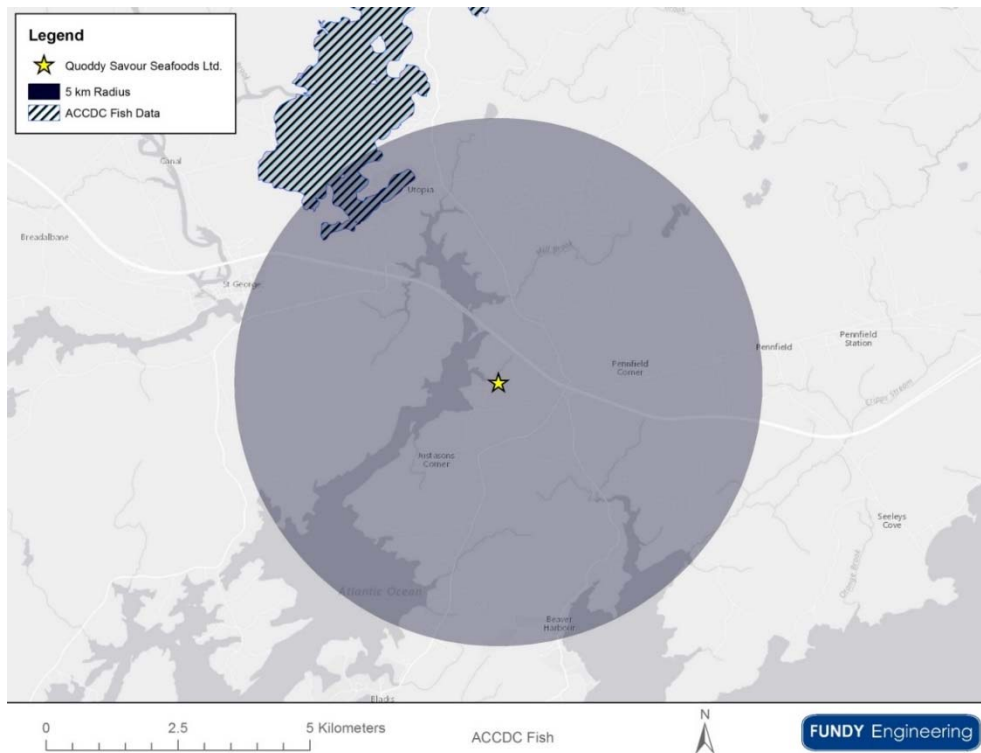


Figure 24. Map showing observed fishes within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

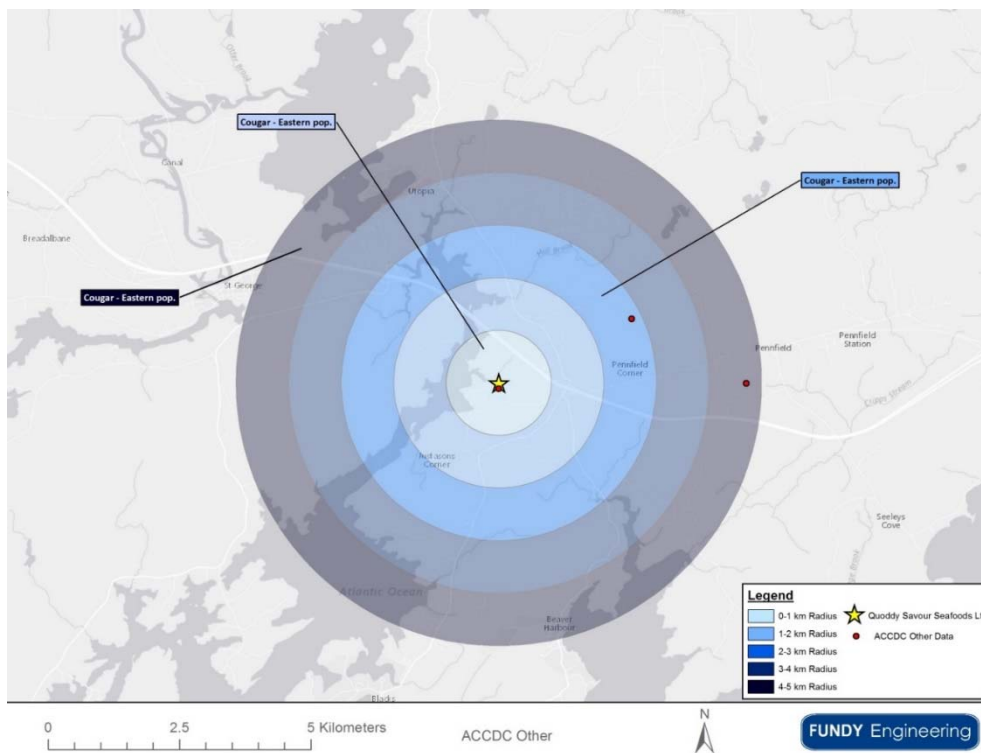


Figure 25. Map showing observed fauna other than birds within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

3.2.4 Environmentally Significant and Managed Areas

The ACCDC query yielded three Environmentally Significant Areas (ESAs) within 5 km of the Quoddy Facility (Figure 26), including:

- L'Etang Estuary ESA;
- Pennfield Ridge ESA; and
- Beaver Harbour Shoreline ESA.

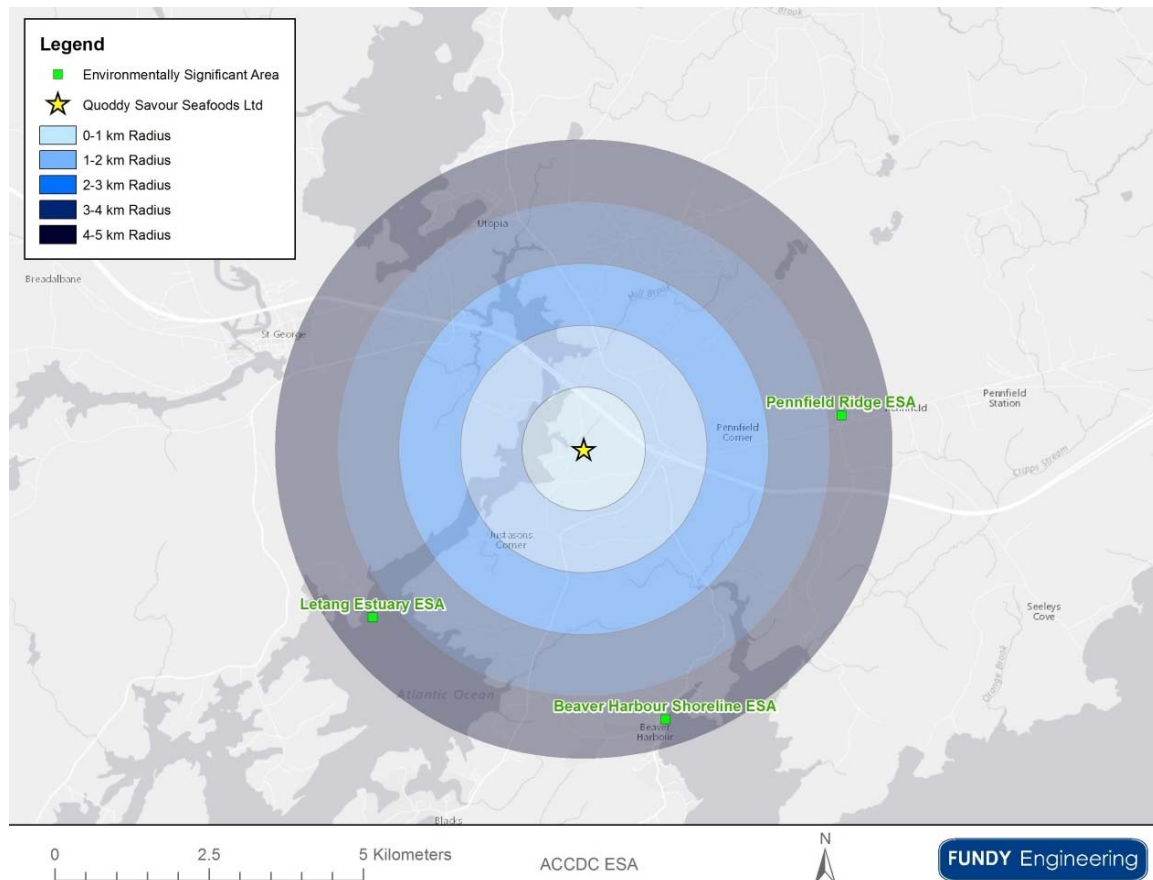


Figure 26. Map showing the environmentally significant areas within a 5 km radius of the Quoddy Facility in Pennfield, New Brunswick. Data obtained from the ACCDC.

A sheltered harbour with islands, pocket beaches, and tombolos (*i.e.*, sandbar) at the mouth of the L'Etang River forms the L'Etang Estuary ESA. Due to limited freshwater inflow, the harbour's waters are similar to those of the Bay of Fundy, and have been historically significant for feeding and staging of migrating seabirds.

At Pennfield Ridge, Highway 1 crosses a wide plain that represents the upper surface of a large, Late Wisconsinian glacio-marine delta. South of the highway, low ridges parallel to the seaward face of the delta are beaches built when the sea level stood higher.

The Beaver Harbour Shoreline ESA is an embayed rocky coastline with high, jagged rocky cliffs which reflect the northeasterly strike and steeply dipping strata of the erosion

resistant Precambrian Coldbrook volcanics. Cambrian grey sandstone, black slate and green mafic volcanic rocks are predominant.

3.3 SOCIO-ECONOMIC ENVIRONMENT

3.3.1 Demographics and Labour

Pennfield is located within the southwest economic region of New Brunswick, which encompasses Charlotte, Kings, and St. John Counties (*i.e.*, 12 % of New Brunswick's land area). The region is home to about 172 764 people (2011 Census) [NBDPETL, 2013]. Charlotte County, of which Pennfield belongs, is made up of small towns, villages, and local service districts and contains about 16 % of the region's population (Table 10). In 2011, females comprised 52 % of the population and > 95 % of the population identified English as their mother tongue.

Although over 40 % of the population in the southwest economic region is part of the core-working age, older cohorts have been increasing while the population of youth has been declining. The proportion of the population in the southwest economic region with no certificate, diploma, or degree (*i.e.*, 16 %) is lower than the New Brunswick average (*i.e.*, 21 %) and is the lowest of all regions.

Table 10. Southwest New Brunswick population by County and Census Year. Data from Statistics Canada.

County / Region	Area (km ²)	1991	1996	2001	2006	2011	1991 to 2006 % Change
St. John County	1 462	81 460	79 305	76 407	74 621	76 550	- 6
Charlotte County	3 424	26 610	27 335	27 366	26 898	26 549	- 0.2
Kings County	3 482	62 120	64 720	64 208	65 824	69 665	12
Southwest economic	8 368	170 190	171 360	167 981	167 343	172 764	1.5
New Brunswick	72 908	723 900	738 135	729 498	729 997	75 1171	3.8

The southwest economic region has a relatively balanced economy [NBDPETL, 2013]. Over one quarter of employment in the region is within the sales and service occupations (Table 11). Employment by industry is presented in Table 12 and shows that after the public sector is accounted for, the majority of individuals are employed in the services-producing sector. Some of the most significant private sector industries in the southwest economic region are trade, manufacturing, and construction.

In 2006, the median total income for individuals in the region was \$30 945, which was slightly higher than the New Brunswick average of \$28 353 [NBDPETL, 2013]. The average family income (*i.e.*, couple families with or without children and lone-parent families) in the region was \$68 231, which is also higher than the New Brunswick average of \$63 913.

Table 11. Employment by occupational classification for the southwest economic region of New Brunswick in 2012.

Occupational Classification	Number of Employees	Percentage of Total Employees
Sales and service	21 700	25.6
Business, finance, and administrative	15 300	18.0
Trades, transport, and equipment operators and related	14 500	17.1
Management	6 900	8.1
Health	6 700	7.9
Social science, education, government services, and religion	6 600	7.8
Natural and applied sciences and related	6 000	7.1
Processing, manufacturing, and utilities	3 400	4.0
Primary industry	2 700	3.2
Arts, culture, recreation, and sport	1 200	1.4
TOTAL	85 000	100

Table 12. Employment by industry for the southwest economic region of New Brunswick in 2012.

Industry Sector	Number of Employees	Percentage of Total Employees
Public services	22 100	26.0
All other services-producing services	20 740	24.4
Trade	12 410	14.6
Accommodation and food services	5 270	6.2
Business, building, and other support services	4 930	5.8
All other goods-producing services	5 270	6.2
Manufacturing	7 650	9.0
Construction	6 715	7.9
TOTAL	85 000	100

Some of the largest employers in the southwest economic region are [NBDPETL, 2013]:

- Horizon Health Network;
- Anglophone South School District;
- Bell Aliant;
- Irving Oil;
- J.D. Irving, Limited;
- Wyndham Worldwide Canada; and
- City of Saint John.

3.3.2 Traditional Uses by Aboriginals and First Nations

Little is known regarding the traditional use of the Project site by Aboriginals and First Nations. The Passamaquoddy people occupied the coastal regions along the Bay of Fundy and the Gulf of Maine and the shores of the St. Croix River and its tributaries while the Wolastoqiyik occupied more northern and inland areas (Figure 27). Since both cultures lacked a written history, not much is known prior to the arrival of Europeans.

The Passamaquoddy people were forced off their lands repeatedly by the Europeans during the sixteenth century and were eventually confined to the Indian Township Reservation in Maine. It is believed the Maliseet were pushed north towards Fredericton. According to New Brunswick census statistics, there were only 1 116 natives identified as residing in the Province in 1851 [Webster, 1930].

It is unknown if the Maliseet used the lands the Quoddy Facility occupies. The nearest designated First Nations lands are two small islands (*i.e.*, Goat Island and Indian Island) that form the Brothers Indian Reserve No. 18 and located within the Kennebecasis River approximately 55 km northeast of the Project site.

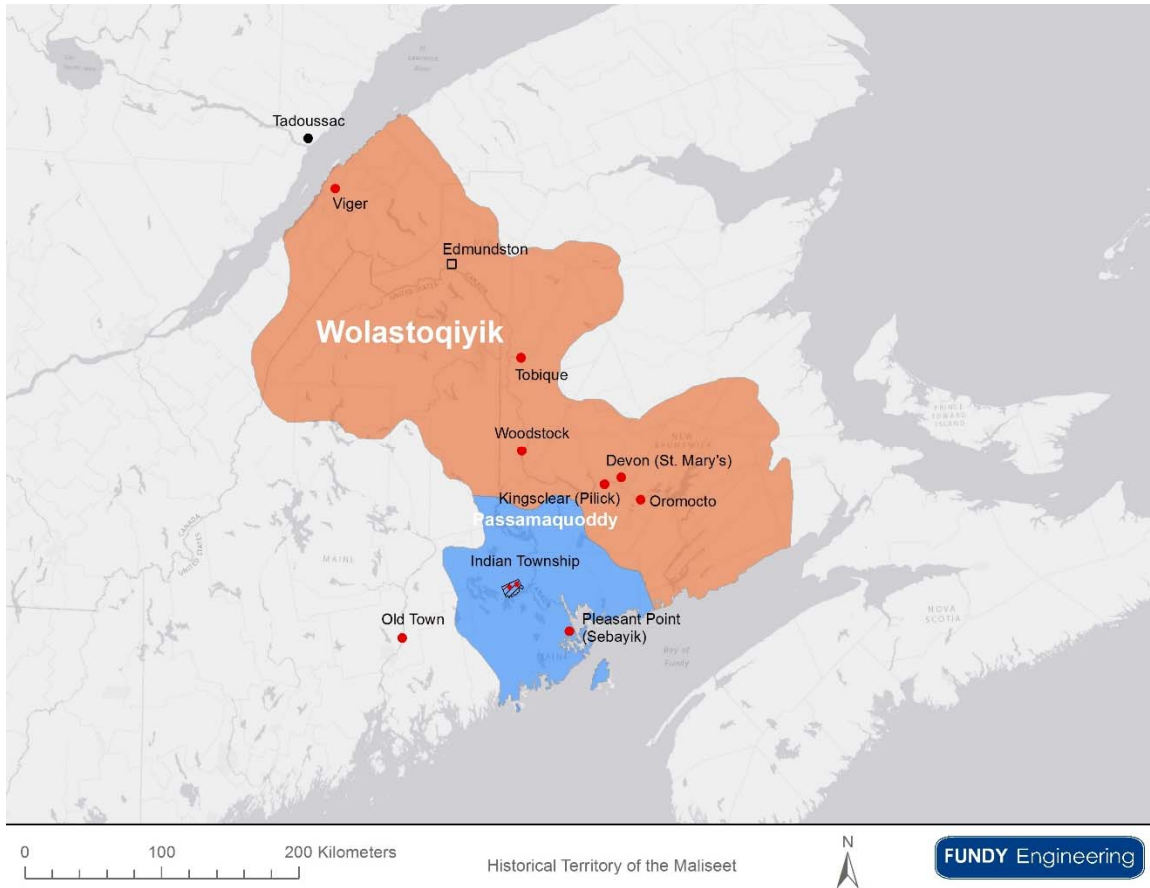


Figure 27. Historical territory of the Maliseet (*i.e.*, the Passamaquoddy people and the Wolastoqiyik) in New Brunswick, Quebec, and Maine.

3.3.3 Historical Land-Use

According to a review of historical aerial photographs, the site was a vacant property prior to being developed in the early 2000s. Prior to that, the site was undeveloped forested lands as shown in Figure 28. Aerial photographs of Figure 29 through Figure 31 show changes over time.



Figure 28. Aerial photograph, circa 1976, of the Quoddy Facility properties in Pennfield, New Brunswick.



Figure 29. Aerial photograph, circa 1984, of the Quoddy Facility properties in Pennfield, New Brunswick.



Figure 30. Aerial photograph, circa 2004, of the Quoddy Facility properties in Pennfield, New Brunswick.



Figure 31. Aerial photograph, circa 2011, of the Quoddy Facility properties in Pennfield, New Brunswick.

3.3.4 Transportation

The Quoddy Facility is located off of Mealey Road in Pennfield. Connections from the four-lane divided Route 1 Gateway highway (*i.e.*, NB Route 1) are at exit 60 via NB Route 176. Route 1 is maintained by Transfield Dexter Gateway Services Ltd. NB Route 176 is a two-lane asphalt road that is maintained by the Province.

3.3.5 Recreation and Tourism

The Quoddy Facility site is a private and secure facility. It is not part of any International, National, Provincial, or Municipal park. It does not comprise a migratory bird sanctuary, ecological reserve, wildlife management area, wildlife refuge, or game sanctuary. The site is not protected environmentally in any manner (*i.e.*, protected watershed, wellfield protection zone, and/or protected natural area). This was confirmed through information reviewed within the ACCDC databases and mapping available from the New Brunswick Department of Natural Resources, and the NBDELG.

4.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

4.1 OVERVIEW OF VALUED ENVIRONMENTAL COMPONENT ANALYSIS

Fundy Engineering employs a visual method of impact level when assessing VECs through the EIA process. Our proven method (Table 13) is a way for reviewers (*i.e.*, Regulator(s), stakeholders, and the general public) to quickly and easily review the impacts without having to understand a complex environmental assessment process. In the analysis of Project impacts on the environment, there are several terms that must be considered.





Project impact green lights are considered those activities that may yield short-term impacts. Those impacts would be experienced for a brief period of the Project (*i.e.*, a day or week during a Project Stage). For example, a green light may be applied to sound emissions if a pile driver were to be used for a one week period over a year-long construction period where the only loud activity anticipated is the driving of piles. Green lights are also applied to activities that have a positive outcome. Creating long-term employment through the development of a recreational facility, for example, would be a positive impact that would be assigned a green light in our analysis. If the impact is not entirely positive, then mitigation measures are likely required for green lights.

Project yellow lights are considered to be those activities that extend between the short-term and long-term. Impacts considered long-term are those that may be experienced for a prolonged period of time, such as during the entire duration of the Project. With yellow lights, long-term impacts are not permanent (*i.e.*, they are reversible and with as environmental protection methods are improved, the impact may be further reduced). An example of a yellow light would be increased erosion along a linear corridor resulting from the clearing and grubbing of a forest. The impact is reversible (*i.e.*, replanting of vegetation to return to pre-impact conditions) or can be mitigated (*i.e.*, through the implementation of best-management practices, such as silt fences and sedimentation basins). Mitigation measures are required for yellow lights.

Red lights are applied when long-term impacts are considered to be permanent. That is they may cause irreversible change in the environment. An example would be a large and persistent oil spill to a major drinking water aquifer. After halting the spill, considerable effort may be required to remediate the contamination. During remediation, which would likely be prolonged, a new source of drinking water would be required. Red lights require that mitigation measures be developed.

When there is no anticipated change to the component as a result of the project, a blue light is applied. Blue lights do not require mitigation because there is no change.

Table 13. Fundy Engineering's Valued Environment Component Assessment visual coding method, which is analogous to a traffic light.

Assessment Symbol	Description
	<u><i>Favourable or little to no impact:</i></u> criteria receiving this impact level have no significant problems associated with them; they are green lights for the Project.
	<u><i>Potential impacts that may require some degree of mitigation:</i></u> criteria receiving this impact level do not appear to have significant problems associated with them; they are yellow lights for the Project and should be approached with caution.
	<u><i>Not favorable or a major impact:</i></u> criteria receiving this impact level rating would be difficult to implement; they are red lights for the Project.
	<u><i>No change in existing impact:</i></u> criteria receiving this impact level have no additional potential impact from the Project than already currently exists.

Residual effects are also considered in the assessment of potential project environmental impacts. A residual effect is any measurable or demonstrable environmental impact that remains following the implementation of mitigation measures. Each Project activity, component, and associated mitigation measure is assessed on different attributes of the potential for environmental impact (*i.e.*, intensity, spatiotemporal extent, frequency, and reversibility). The potential for residual effects is described for each VEC below. In the instance where a residual effect is expected to occur, the potential impact is further assessed to determine whether any cumulative effects may arise through the interaction between the Project-specific impacts and similar effects from past, present, and / or reasonably foreseeable activities.

4.2 POTENTIAL PROJECT IMPACTS ON THE ENVIRONMENT

4.2.1 Valued Environmental Components Assessed

Fundy Engineering's Project Team, based on previous environmental impact assessment experience and professional judgment, assessed potential interactions between the project outlined above in Section 2.0, and all of the environmental components described in Section 3.0. Through that exercise, it was determined that there are 4 environmental components that require detailed assessment with respect to the project (*i.e.*, those with a potential Project interaction). Those environmental components are identified below as Valued (socially, economically, culturally and / or scientifically) Environmental Components (VECs).

The following VECs were assessed for the Quoddy Facility project in Pennfield, New Brunswick:

- physio-chemical environment:
 - surface water quality; and
 - groundwater quality; and
- biological environment:
 - terrestrial flora and fauna; and
 - aquatic flora and fauna.

The identified VECs were assessed with consideration given to risks associated with the switchover of the facility from a freshwater to saltwater system, using the phased approach outlined in the description of the Project above. The assessment of the VECs listed above is described in detail in the sections that follow.

4.2.2 *Physio-Chemical Environment*

4.2.2.1 *Surface Water Quality*

The Quoddy Facility is located within the L'Etang River watershed and as the Facility begins to utilize saltwater, the Project has the potential to impact surface water. Therefore, surface water quality was selected as a VEC. The following potential impacts were assessed for the Project:

- surface water quality (*i.e.*, general chemistry and trace metals).

4.2.2.1.1 *Potential Impacts*

The potential impacts to surface water exclusively would occur due to a spill of saltwater into the natural environment. Due to this green lights were applied to Phase 1 and Phase 2 of the Project as the potential for a release of saltwater in large volumes is low (Table 14). Depending on the nature of a mishap, error, and / or unforeseen event, there is a possibility that the impact to a surface water feature could be long-lasting (*i.e.*, the loss of integrity of a saltwater pipeline, or of a saltwater filled effluent pond). Therefore, a yellow light was applied during Phase 3 of the Project.

4.2.2.1.2 *Proposed Mitigation*

The mitigation measures listed below should be employed to minimize the chance of activities related to the Project from affecting surface water environs through the introduction of saltwater to freshwater based systems.

- Regular maintenance and inspection of equipment (*e.g.*, pipeline, pumps, effluent ponds, *etc.*) on site should be performed to minimize the risk of spills of saltwater based fluids that pose a threat to surface water systems.
- The transfer of saltwater from trucks to the facility during Phase 1 and Phase 2 of the Project should take place over an impermeable ground cover (*i.e.*, concrete pad or asphalt) to minimize the impact of any minor spills.
- The placement, drilling, and commissioning of the saltwater well in Phase 3 of this Project should be overseen by a hydrogeologist and a certified well driller.

4.2.2.1.3 *Potential Post-Mitigation Residual and Cumulative Impacts*

No residual and cumulative effects are likely to occur to the surface water so long as the mitigation measures provided here are followed.

4.2.2.2 Groundwater Quality

Groundwater was identified as a VEC because surface water and groundwater systems used for domestic water supplies in the area can have strong communication networks. The specific potential impacts assessed were:

- groundwater quality (*i.e.*, microbiology, general chemistry, and trace metals).

4.2.2.2.1 Potential Impacts

Results of the groundwater quality impact assessment are provided in Table 15. The potential impacts to groundwater water exclusively would occur due to a spill of saltwater into the natural environment. Due to this green lights were applied to Phase 1 and Phase 2 of the Project as the potential for a release of saltwater in large volumes is low. Depending on the nature of a mishap, error, and / or unforeseen event, there is a possibility that the impact to a surface water feature could be long-lasting (*i.e.*, the loss of integrity of a saltwater pipeline, or of a saltwater filled effluent pond). Therefore, a yellow light was applied during Phase 3 of the Project.

4.2.2.2.2 Proposed Mitigation




The mitigation measures listed below should be employed to minimize the chance of Project activities from impacting the groundwater regime by eliminating the potential pathways where saltwater may enter the system (*n.b.*, the mitigation measures are nearly identical to those provided for surface water protection and is because the two systems are often interconnected).

- Regular maintenance and inspection of equipment (*e.g.*, pipeline, pumps, effluent ponds, *etc.*) on site should be performed to minimize the risk of spills of saltwater based fluids that pose a threat to surface water systems.
- The transfer of saltwater from trucks to the facility during Phase 1 and Phase 2 of the Project should take place over an impermeable ground cover (*i.e.*, concrete pad or asphalt) to minimize the impact of any minor spills.
- The placement, drilling, and commissioning of the saltwater well in Phase 3 of this Project should be overseen by a hydrogeologist and a certified well driller.

4.2.2.2.3 Potential Post-Mitigation Residual and Cumulative Impacts

If a spill migrates to the groundwater system, the potential impacts could be long lasting because groundwater environments are complex and often difficult to remediate. This is an extremely remote possibility because of the stringent environmental protection measures used on-site that will be set forth in the Project-specific Environmental Protection Plan (EPP).

Table 14. Assessment of potential impacts of the Quoddy Facility in Pennfield, New Brunswick on surface water quality.

Potential Impact	Phase 1: Trucked saltwater, no effluent			Phase 2: Trucked saltwater, freshwater based effluent			Phase 3: Saltwater from well, saltwater based effluent		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Surface water quality (<i>i.e.</i> , due to a saltwater spill)		1 - 2	A, B		1 - 2	A, B		1 - 3	A, D, E

COMMENTS

1 – A distance of > 30 m separates the Quoddy Facility and the nearest watercourse.

2 – There is a potential that saltwater, through their release during a spill event, could be introduced to surface water systems.

3 – Depending on the mishap, error, and / or unforeseen event, (*i.e.*, the failure of an effluent pond) there is a possibility the impact could be long-lasting and could yield any one or all of the potential impacts identified.

MITIGATING MEASURES

A – Regular maintenance and inspection of equipment (*e.g.*, pipeline, pumps, effluent ponds, *etc.*) on site should be performed to minimize the risk of spills of saltwater based fluids that pose a threat to surface water systems.




B – The transfer of saltwater from trucks to the facility during Phase 1 and Phase 2 of the Project should take place over an impermeable ground cover (*i.e.*, concrete pad or asphalt) to minimize the impact of any minor spills.

C – The placement, drilling, and commissioning of the saltwater well in Phase 3 of this Project should be overseen by a hydrogeologist and a certified well driller.

D – All Project personnel should be briefed on the potential impacts that the Project could have on surface water quality.

E – Emergency response / contingency plans should be designed to prevent any major and / or sustained environmental damage during any errors, mishaps, and / or unforeseen events.

Table 15. Assessment of potential impacts of the Quoddy Facility in Pennfield, New Brunswick on groundwater quality.

Potential Impact	Phase 1: Trucked saltwater, no effluent			Phase 2: Trucked saltwater, freshwater based effluent			Phase 3: Saltwater from well, saltwater based effluent		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Groundwater quality (<i>i.e.</i> , change in general chemistry, trace metals)		1 - 2	A, B		1 - 2	A, B		1 - 3	A, D, E

COMMENTS

1 – A distance of > 30 m separates the Quoddy Facility and the nearest watercourse.

2 – There is a potential that saltwater, through their release during a spill event, could be introduced to ground water systems.

3 – Depending on the mishap, error, and / or unforeseen event, (*i.e.*, the failure of an effluent pond) there is a possibility the impact could be long-lasting and could yield any one or all of the potential impacts identified.

MITIGATING MEASURES

A – Regular maintenance and inspection of equipment (*e.g.*, pipeline, pumps, effluent ponds, *etc.*) on site should be performed to minimize the risk of spills of saltwater based fluids that pose a threat to ground water systems.

B – The transfer of saltwater from trucks to the facility during Phase 1 and Phase 2 of the Project should take place over an impermeable ground cover (*i.e.*, concrete pad or asphalt) to minimize the impact of any minor spills.

C – The placement, drilling, and commissioning of the saltwater well in Phase 3 of this Project should be overseen by a hydrogeologist and a certified well driller.

D – All Project personnel should be briefed on the potential impacts that the Project could have on ground water quality.

E – Emergency response / contingency plans should be designed to prevent any major and / or sustained environmental damage during any errors, mishaps, and / or unforeseen events.

4.2.3 Biological Environment

4.2.3.1 Terrestrial Flora and Fauna

Based on information obtained from the ACCDC, some COSEWIC and SARA ranked species of terrestrial fauna do exist within a 5 km radial buffer surrounding the Project site (*i.e.*, refer to Section 3.2 for a description of the species, Appendix III for the ACCDC data report, and Table 7 for a listing and Figure 18, Figure 22, Figure 23, and Figure 25 for distribution maps). The following potential impacts were evaluated with respect to terrestrial flora and fauna:

- species of special conservation concern (*i.e.*, those listed under SARA and by the COSEWIC);
- existing vegetation and habitat;
- plant associations and biodiversity;
- wildlife species (*i.e.*, birds, animals, and mammals) and habitat (direct and indirect);
- wildlife species and habitat fragmentation; and
- natural wildlife migration patterns (*i.e.*, migratory birds) / nesting / food chains.

4.2.3.1.1 Potential Impacts

The impact assessment for terrestrial flora and fauna is summarized in Table 16. There is expected to be very little change between now and throughout the various project stages. As a result, no change lights were applied to the majority of potential impacts ($n = 15$). Green lights were given to three potential impacts related to species of special conservation concern, which are particularly susceptible to environmental impacts.

4.2.3.1.2 Proposed Mitigation

The mitigation measures listed below should be employed to minimize the probability of activities related to the Project from affecting surrounding terrestrial flora and fauna.

- Project personnel should properly dispose of food scraps and garbage in the appropriate receptacles.
- Waste stored on-site should be stowed in an appropriate manner and will be transported to an appropriate disposal facility on a regular basis.
- Project personnel should be advised, prior to working on the Project site, to not feed or harass nuisance wildlife (*e.g.*, pigeons, sea gulls, rodents, *etc.*).
- No attempt should be made to chase, catch, divert, follow, or otherwise harass wildlife by vehicle or on foot.
- If injured or diseased wildlife are encountered, then the Department of Natural Resources and the Canadian Wildlife Service should be contacted to determine the appropriate course of action.
- If deceased animals are encountered, they should be removed and disposed of, as soon as possible, in consultation the Department of Natural Resources and the Canadian Wildlife Service.

- If an active nest, den, *etc.* is encountered, it should be immediately reported to the Project manager / supervisor(s) who should ensure that a no-disturbance buffer zone is established.
- No Project personnel should deposit or permit to be deposited oil, oil wastes, or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds.

4.2.3.1.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to occur to terrestrial flora and fauna over the duration of the construction and operation of the Project assuming the above mitigation measures are implemented.

4.2.3.2 Aquatic Flora and Fauna

Watercourses nearby to the Project site, and the flora and fauna occupying them, may be negatively impacted by the Project if a spill of saltwater were to occur on the project site (*i.e.*, the loss of integrity of a saltwater pipeline, or of a saltwater filled effluent pond). Therefore there is potential for the Project to have a negative impact on the aquatic flora and fauna contained within those watercourses. The following potential impacts to aquatic flora and fauna were considered:

- species of special conservation concern (*i.e.*, those listed under SARA and by the COSEWIC);
- existing vegetation and habitat;
- plant associations and biodiversity;
- wildlife species (*e.g.*, fishes, mammals, *etc.*) and habitat (direct and indirect);
- wildlife species and habitat fragmentation; and
- natural wildlife migration patterns (*i.e.*, anadromous fishes) / food chains.

4.2.3.2.1 Potential Impacts

The impact assessment for aquatic flora and fauna is summarized in Table 17. There is not likely to be any change between now, and the end of the three phases of the project. Therefore, the majority of the potential impacts assessed were given no change lights ($n = 15$). Green lights were applied to three potential impacts. Any identified potential impacts are easily mitigated.

4.2.3.2.2 Proposed Mitigation

The environmental protection measures provided below should be implemented by all Project personnel to minimize the potential impact on aquatic flora and fauna.



















- Regular maintenance and inspection of equipment (*e.g.*, pipeline, pumps, effluent ponds, *etc.*) on site should be performed to minimize the risk of spills of saltwater based fluids that pose a threat to surface water systems.
- The transfer of saltwater from trucks to the facility during Phase 1 and Phase 2 of the Project should take place over an impermeable ground cover (*i.e.*, concrete pad or asphalt) to minimize the impact of any minor spills.

- The placement, drilling, and commissioning of the saltwater well in Phase 3 of this Project should be overseen by a hydrogeologist and a certified well driller.

4.2.3.2.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to occur to aquatic flora and fauna over the duration of the Project assuming the above mitigation measures are implemented.

Table 16. Assessment of potential impacts of the effluent treatment upgrade project at the Quoddy Facility in Pennfield, New Brunswick on terrestrial flora and fauna.

Potential Impact	Phase 1: Trucked saltwater, no effluent			Phase 2: Trucked saltwater, freshwater based effluent			Phase 3: Saltwater from well, saltwater based effluent		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
SARA, COSWEIC and / or ACCDC listed species		1, 2	A, B, C		1, 2	A, B, C		1, 2	A, B, C
Existing vegetation and habitat									
Plant associations and biodiversity									
Wildlife species and habitat									
Wildlife species and habitat fragmentation									
Natural wildlife migration, nesting and food chains									

COMMENTS

1 – No terrestrial flora and fauna species of special concern are believed to exist on the Project site; however, ACCDC records suggest that some flying transient / vagrant / migrant species of special conservation concern, such as the common nighthawk or the chimney swift, or rare species do exist within a 5 km radius of the site. Therefore, there is a possibility that they could pass through the site on occasion.

2 – Depending on the mishap, error, and / or unforeseen event, there is a possibility the impact could be long-lasting and could extend off-site to affect a species of special conservation concern.



















MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on terrestrial flora and fauna.

B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues

C – Emergency response and contingency plans should be designed to prevent any sustained environmental damage during any errors, mishaps, and / or unforeseen events.

Table 17. Assessment of potential impacts of the effluent treatment upgrade project at the Quoddy Facility in Pennfield, New Brunswick on aquatic flora and fauna.

Potential Impact	Phase 1: Trucked saltwater, no effluent			Phase 2: Trucked saltwater, freshwater based effluent			Phase 3: Saltwater from well, saltwater based effluent		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
SARA, COSWEIC and / or ACCDC listed species		1, 2, 3	A, B, C		1, 2, 3	A, B, C		1, 4	A, B, C
Existing vegetation and habitat									
Plant associations and biodiversity									
Aquatic species and habitat									
Aquatic species and habitat fragmentation									
Natural fish migration, spawning, and food chains									

COMMENTS

1 – For this Project, nothing is being constructed or operated within 30 m of any fish-bearing watercourse.

2 – The long-term operation of the Project is expected to have little to no impact on any aquatic flora and fauna.

3 – If there is a mishap, error, and / or unforeseen event that may have the potential to impact aquatic flora and fauna, it is likely that it will be mitigated before it reaches a watercourse because of the distance between the Quoddy Facility and any named or unnamed watercourse..

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on aquatic flora and fauna.


B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues.

C – Emergency response and contingency plans should be designed to prevent any sustained environmental damage during any errors, mishaps, and / or unforeseen events.

4.2.4 Summary of Potential Environmental Impacts

As described above, 4 VECs were assessed for potential impacts to the environment by the proposed Quoddy Savour Seafood Ltd. facility project. An overall VEC impact assessment summary is provided in Table 18. The results indicate that in many instances, there are no changes anticipated as a result of this Project.

Table 18. Summary of the potential impacts for the Quoddy Facility in Pennfield, New Brunswick on selected valued environmental components.

VEC	Number of Lights For Phase 1 / 2 / 3				Overall VEC Impact Assessment*
	Green	Yellow	Red	No Change	
PHYSIO-CHEMICAL ENVIRONMENT					
Surface water quantity and quality	2	1	0	0	
Groundwater quantity and quality	2	1	0	0	
BIOLOGICAL ENVIRONMENT					
Terrestrial flora and fauna	3	0	0	15	
Aquatic flora and fauna	3	0	0	15	
TOTALS	10	2	0	30	

NOTES: *No change lights are excluded from the determination of the overall VEC impact; the coloured light that received the greatest number of assignments in the environmental assessment determines the ultimate VEC impact

All told, 42 specific possible impacts were assessed (Table 18). As an ultimate overall VEC potential impact assessment (*i.e.*, based on the summation of all possible impacts for the 4 VECs), the proposed Project is expected to have little to no impact on the environment, especially in light of the mitigation measures developed. **Therefore, the Project should proceed as detailed within this EIA document.**

Although the ultimate VEC yielded a green light, the majority of the yellow lights were applied to potential impacts during Phase 3 (Table 18).

A Project-specific EPP will be developed. The EPP will be an important component to the overall Project because it will dictate the importance of Best-Management Practices (BMPs) that shall be undertaken by all those associated with the Project to ensure environmental protection. The EPP will provide a practical means for conveying BMPs to Quoddy for ensuring the implementation of the outlined standards and regulations throughout the entire Project. It will be a dynamic document to be used by Project personnel in the field and at the corporate level for ensuring commitments made in the EIA are implemented and monitored.

More specifically, the purpose of the EPP will be to:

- outline Quoddy's commitments to minimize potential Project environmental impacts, including commitments made during the regulatory review process of the EIA;
- comply with conditions and requirements of an "EIA Approval", if and when issued;

- comply with the conditions of any authorization(s), license(s), and / or permit(s) issued to complete the project; and
- provide a summary of environmental issues and protection measures to be implemented during the Project.

The EPP will be developed in accordance with applicable federal and provincial environmental protection legislation and regulations. Quoddy will continue to take a proactive approach toward creating a safe and secure work environment and maintain a system to manage environmental effects of the Project.

5.0 PUBLIC CONSULTATION PROCESS

5.1 PROJECT REGISTRATION PUBLIC CONSULTATION PROCESS PLAN

It is the Proponent's responsibility to demonstrate that the potentially affected public and other stakeholders are given the opportunity to actively participate in the EIA review process. Fundy Engineering has developed an organized information dissemination program, whereby relevant, sufficient, and credible information is presented.

The public consultation plan for this Project was developed in accordance with the process described in Appendix C of *A Guide to Environmental Impact Assessment in New Brunswick* [NBDELG, 2012]. The step-wise process proposed for the public consultation plan for this EIA is described in detail below. Our process satisfies the component of the NBDELG EIA Determination Review Summary highlighted in Figure 32.

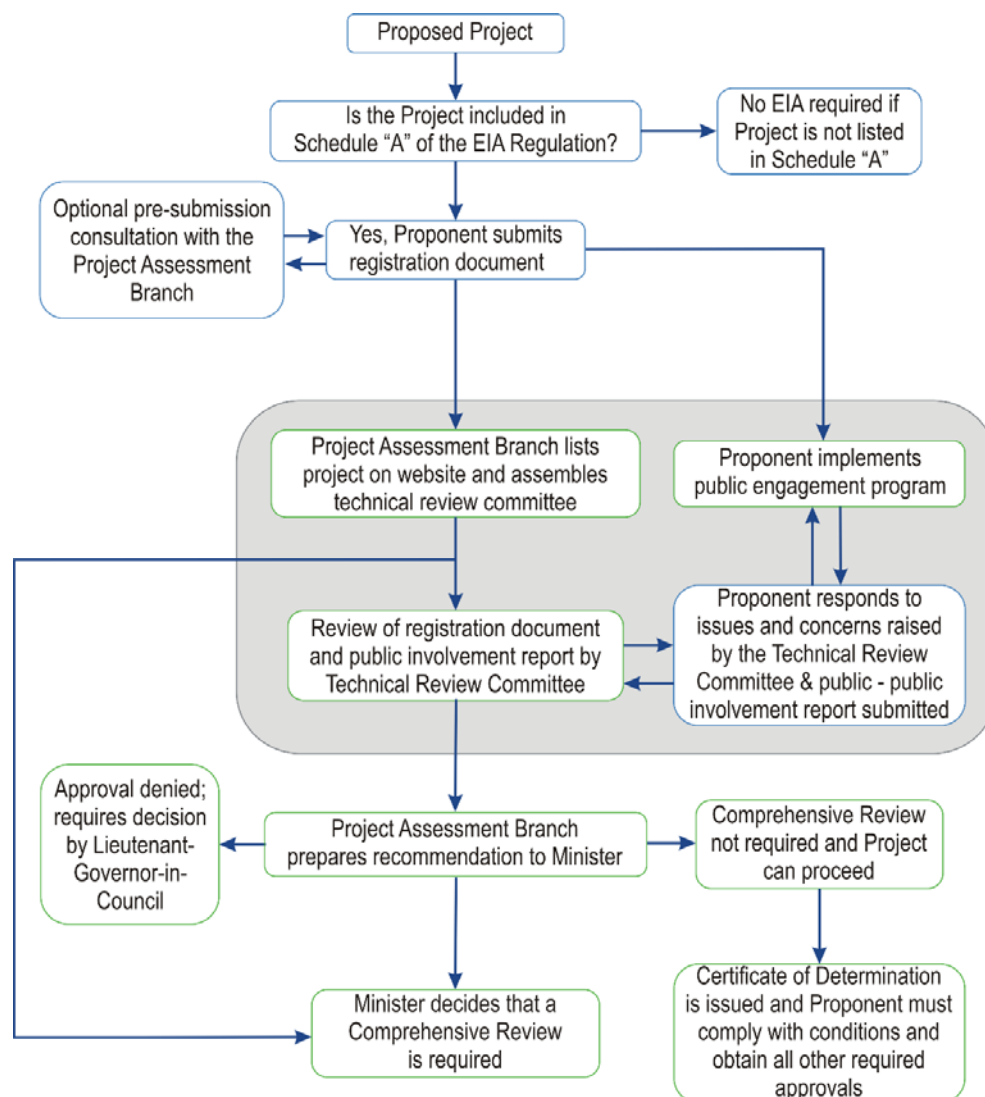


Figure 32. The NBDELG EIA Determination Review process highlighting the public consultation component of the process (*i.e.*, the grey box).

The public will be informed of this Project and the EIA registration document will be made available for review. Comments regarding the document will be collected and addressed as part of this process (*i.e.*, there is a two way flow of information between the proponent and the public with opportunities for the public to express their views).

5.1.1 Step 1: Direct Communication with Elected Officials and Service Groups

Formal notification of the Project registration document (*i.e.*, in the form of an information letter) will be sent to elected officials (*i.e.*, Southwest New Brunswick MP, Fundy–The Isles–Saint John West MLA, Pennfield LSD Representative(s), St. George Mayor and Deputy Mayor and Town Councillors), local service groups and community groups, environmental groups (*i.e.*, Eastern Charlotte Waterways Inc., the Fundy Bay Keeper / Conservation Council of New Brunswick), and other key stakeholder groups. Direct communication will enable those individuals and groups to become more familiar with the Project, ask questions, and / or raise any and all concerns.

5.1.2 Step 2: Direct Written Communication with Nearby Residents

A limited mail out comprising a project information sheet will be sent to local residents and businesses (*i.e.*, those included within the 2.5 km radius of the Facility).

5.1.3 Step 3: Notifications on the NBDELG Website and at the Head Office

The NBDELG shall place notice of the EIA registration on its website (*i.e.*, http://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html) and shall have the EIA document available for public review at the Project Assessment Branch head office located on the second floor of 20 McGloin Street in Fredericton, New Brunswick. To satisfy this requirement, Quoddy will provide an electronic version of the registration document (*i.e.*, as a PDF document) and two hard copies to the NBDELG.

5.1.4 Step 4: Documentation Availability with Stakeholder and NBDELG Offices

Copies of the Project registration document, and any subsequent submissions made in response to issues raised by the Technical Review Committee (TRC), will be made available to any interested member of the public, stakeholder group, and / or Aboriginal group. A copy of the EIA document along with any subsequent revision will be placed at the Saint John NBDELG regional office at 8 Castle Street and at the St. Stephen NBDELG district office at 41 King Street where it will be made available to the public.

5.1.5 Step 5: Public Notice Announcement

As required, a public notice will be placed in at least one local newspaper that has general circulation in Charlotte County and / or at least one provincial daily newspaper (*i.e.*, *Telegraph Journal*). The standard notice for an EIA registration document, which will be used for publicly announcing the proposed Project is presented in Figure 33.

NOTICE

Registration of Undertaking Environmental Impact Assessment Regulation Clean Environment Act, Opportunity for Public Comment

On 5 May, 2017, Quoddy Savour Seafood Ltd. submitted for registration the following activity with the Department of Environment and Local Government in accordance with Section 5(1) and Schedule "A" of the Environmental Impact Assessment Regulation: "Environmental Impact Assessment: Quoddy Savour Seafood Ltd. Sea Urchin and Lobster Facility".

This Environmental Impact Assessment examines the conversion of an existing freshwater recirculating aquaculture system to a saltwater recirculating aquaculture system in Pennfield, New Brunswick. The conversion is being done in order to farm green sea urchins (*Strongylocentrotus droebachiensis*) and warehouse American lobster (*Homarus americanus*). The Environmental Impact Assessment is required because the conversion is considered a significant modification to the existing facility. Overall, this Project will yield positive socio-economic impacts to the local area.

The Proponent's registration document can be examined at:

St. George Town Office 1 School Street St. George, NB	Fundy Engineering 27 Wellington Row Saint John, NB	
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and at:

NBDELG District Office 41 King Street St. Stephen, NB	NBDELG Regional Office 8 Castle Street Saint John, NB	NBDELG Head Office 20 McGloin Street, 2 nd floor Fredericton, NB
---	---	---

Any comments should be submitted directly to the Proponent at:

Quoddy Savour Seafood Ltd.
% Fundy Engineering
27 Wellington Row
Saint John, N.B., E2L 4S1
tim.ryan@fundyeng.com

Receipt of comments is requested on or before 2 June, 2017. Additional information about the proposal and the public involvement process is available at:

http://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment.html

Notice placed by: Quoddy Savour Seafood Ltd.

Figure 33. Example of the public notice announcement that will be placed by the Proponent in at least one local newspaper and / or at least one provincial daily newspaper.

5.1.6 Step 6: Local Area Availability of the Registered Document

Copies of the Project registration document, and any subsequent submissions made in response to issues raised by the TRC, will be made available in at least two locations local to the Project. Locations proposed for viewing the document locally include the Regional NBDELG Office (*i.e.*, 8 Castle Street in Saint John), the District NBDELG Office (*i.e.*, 41 King Street, St. Stephen), the St. George Town Office (*i.e.*, 1 School Street), and Fundy Engineering's Saint John office (*i.e.*, 27 Wellington Row). A copy of the Project registration document and any subsequent information will be made available to any member of the public, stakeholder, and / or Aboriginal group upon request.

5.1.7 Step 7: Open House and / or Public Meeting

There is no requirement, under a Determination Review, to host an open house and / or public meeting.

5.1.8 Step 8: Documentation of Public Consultation Activities

The NBDELG Minister (*i.e.*, the Honourable Serge Rousselle, Q.C.) will only provide an EIA determination once sufficient information has been received. This includes documentation of public and stakeholder concerns and Proponent responses. Within 60 days of registering the proposed Project, a report documenting the above public consultation process will be submitted to the NBDELG. In addition, this report will be made available for public review. The report will:

- describe the public consultation activities including copies of newspaper notices, and letters distributed;
- include copies of any and all correspondence received from and sent to stakeholders and the general public;
- describe any issues or concerns received during the public consultation program, which includes the names and affiliations of the person(s) providing the comments;
- indicate how those issues and concerns were, or will be, considered and / or addressed; and
- describe any proposed future public consultation with respect to the Project.

Quoddy will adhere to the report requirements listed above. Given the Registration date of 5 May, 2017, the deadline of 2 June, 2017 for public comments, the report documenting the public consultation process will be released prior 7 July, 2017.

6.0 PROJECT APPROVAL

6.1 LOCAL / MUNICIPAL APPROVALS

The Project is located within the Pennfield Local Service District, which is administered by the Pennfield Planning Area. It is not believed that there are any local approvals required for the Project to proceed; however, the Development Officer / Building Inspector with the Southwest New Brunswick Service Commission should be contacted to confirm.

Contact information for the Southwest New Brunswick Service Commission is as follows:

SNBSC
5749 Route 3, Lawrence Station
PO Box 70
St. Stephen, NB
E3L 2W9

📞 506.466.7830
📠 506.466.7833
🌐 <http://www.snb-sc.ca/>
✉ info@snb-sc.ca

6.2 PROVINCIAL APPROVALS

6.2.1 *Environmental Impact Assessment Approval*

As previously noted, the purpose of an EIA is to identify and evaluate the potential impacts that the proposed Project will have on the environment. The EIA also identifies and presents measures to mitigate those potential environmental impacts. Sector Specific Guidelines reviewed included those for Aquaculture Facilities, Wastewater Treatment Projects, and Waterworks and Water Supply Projects.

A copy of the *Clean Environment Act* can be found at:

<<http://laws.gnb.ca/en/showfulldoc/cs/C-6//20130718>>;

a copy of the EIA Regulation can be found at:

<<http://laws.gnb.ca/en/showfulldoc/cr/87-83//20130718>>; and

a copy of the Sector Guidelines can be found at:

<http://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/sector_guidelines.html>.

Contact information for the NBDELG's Environmental Assessment Section of the Sustainable Development and Impact Evaluation Branch is as follows:

NBDELG
 Environmental Assessment
 Sustainable Development and Impact Evaluation
 PO Box 6000
 Fredericton, NB
 E3B 5H1

☎ 506.444.5382
 📠 506.453.2627
 🌐 www.gnb.ca/environment
 ✉ eia-eie@gnb.ca

6.2.2 Approval To Operate

As per the Water Quality Regulation [82-126] of the New Brunswick *Clean Environment Act*, a Class 5 Approval To Operate (ATO) was issued to Brevrio Caviar Inc. to operate a land-based freshwater aquaculture facility for the rearing of Atlantic Shortnose Sturgeon. ATO I-8608 expired in January 2016 (*n.b.*, a copy of ATO I-8608 is included in Appendix IV). In order to operate a Sea Urchin and Lobster Facility Quoddy will require that the existing ATO be amended or that a new ATO be issued.

A copy of the *Clean Environment Act* can be found at:

<<http://laws.gnb.ca/en/showfulldoc/cs/C-6//20130718>>; and

a copy of the Water Quality Regulation can be found at:

<<http://laws.gnb.ca/en/ShowPdf/cr/82-126.pdf>>.

Contact information for the NBDELG's Industrial Processes Section of the Impact Management Branch is as follows:

NBDELG
 Industrial Processes Section
 Impact Management Branch
 PO Box 6000
 Fredericton, NB
 E3B 5H1

☎ 506.453.7945
 📠 506.453.2390
 🌐 www.gnb.ca/environment
 ✉ elg/egl-info@gnb.ca

6.2.3 Commercial Aquaculture License

A commercial aquaculture license, as per the General Regulation [91-158] of the New Brunswick *Aquaculture Act*, was issued to Quoddy on 9 January 2017 for operating the former Breviro Facility. That license (*i.e.*, IF-0637), a copy of which is included in Appendix V, expires on 31 March 2021. In order for Quoddy to operate the Project as a sea urchin farm and lobster warehouse, a new commercial aquaculture license is

required (*i.e.*, the existing license only permits the cultivation of shortnose sturgeon and Atlantic sturgeon).

A copy of the *Aquaculture Act* can be found at:

<<http://laws.gnb.ca/en/ShowPdf/cs/2011-c.112.pdf>>; and

a copy of the General Regulation can be found at:

<<http://laws.gnb.ca/en/ShowPdf/cr/91-158.pdf>>.

Contact information for the New Brunswick Department of Agriculture, Aquaculture, and Fisheries (NBDAAF) Leasing and Licensing Branch of the Organizational Development and Services Division is as follows:

Department of Agriculture, Aquaculture, and Fisheries
Organizational Development and Services
Leasing and Licensing Branch
Agricultural Research Station (Experimental Farm)
PO Box 6000
Fredericton, NB
E3B 5H1

☎ 506.453.2252
☎ 506.462.5929
🌐 <http://www.gnb.ca/AgricultureAquacultureFisheries>
✉ daaf-maap@gnb.ca

6.2.4 Primary Processing Plant Licence

Pursuant to the New Brunswick *Seafood Processing Act*, Quoddy requires a Primary Processing Plant Licence to process seafood within the small on-site processing plant. On 21 December 2016, the NBDAAF issued a Class 2 Primary Processing Plant Licence to Quoddy. A copy of that licence (*i.e.*, SP-803012), which expires on 31 March 2018, is included in Appendix VI. Under that licence, Quoddy was approved to process all species of fish, except, American lobster, Atlantic salmon, herring, northern shrimp, and snow crab.

A copy of the *Seafood Processing Act* can be found at:

<<http://laws.gnb.ca/en/ShowPdf/cs/S-5.3.pdf>>; and

a copy of the Primary Processing Plant Licence application can be found at:

<<http://www2.gnb.ca/content/dam/gnb/Departments/10/pdf/Services/Fisheries-Peches/PrimaryProcessingPlant.pdf>>.

Contact information for NBDAFF's regional office is as follows:

Department of Agriculture, Aquaculture, and Fisheries
% Gail Smith
St. George Regional Office
PO Box 1037
St. George, NB
E5C 3S9

☎ 506.755.4000
📠 506.755.4001
🌐 <http://www.gnb.ca/AgricultureAquacultureFisheries>
✉ gail.smith@gnb.ca

6.3 FEDERAL APPROVALS

6.3.1 *Fish Processing Certification*

The small on-site processing plant will be used for the sea urchin roe extraction, processing, and shipping. Pursuant to Part V of the Fish Inspection Regulations **[C.R.C., c. 802]** of the federal *Fish Inspection Act*, the Quoddy Facility must be certified in order to process fresh, frozen, or semi-preserved seafood. As such, the processing plant was recently recertified (*i.e.*, on 29 March 2017) under the Canadian Food Inspection Agency (CFIA) Quality Management Program (QMP). A copy of the *Certificate of Registration of a Fish Processing Establishment* is included in Appendix VII.

7.0 FUNDING

The Project will be solely funded by Quoddy Savour Seafood Ltd.

In 2015, Quoddy was awarded a \$48 000 Innovation Voucher by the New Brunswick Innovation Foundation. A Total Development Fund grant of \$12 000 was received through the New Brunswick Department of Agriculture, Aquaculture, and Fisheries in 2017.

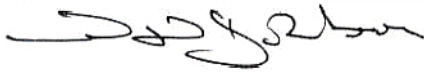
No federal monies are being used for this Project.

8.0 SIGNATURES

This Project Environmental Impact Assessment was prepared in accordance with the Environmental Impact Assessment Regulation [87-83] under the New Brunswick *Clean Environment Act* and on the advice of and in consultation with the various Regulators. Fundy Engineering & Consulting Ltd. prepared the document on behalf of Quoddy Savour Seafood Ltd. The Proponent has reviewed the document and understands the information contained within. Quoddy Savour Seafood Ltd. commits to undertaking all environmental mitigation measures described within this Environmental Impact Assessment document and those mitigation measures.

Respectfully submitted,

Proponent Signature:



Mr. W.D. (Bill) Robertson
Founder. Chief Development Officer.
Quoddy Savour Seafood Ltd.

Environmental Consultant Signature:



Tim A. Ryan, M.Eng., P.Eng.
Environmental Director
Fundy Engineering & Consulting Ltd.

5 May 2017

9.0 REFERENCES

Below is a list of reference documents that were used to prepare this EIA document. Any and all of these documents are available to the TRC upon request.

Allard, S. 2007a. *Granular aggregate resources and surficial geology of the St. George map area (NTS 21 G/02), southwestern New Brunswick*. New Brunswick Department of Natural Resources; Minerals, Policy, and Planning Division, Mineral Resources Report 2007-2, 74p.

Allard, S. 2007b. *Surficial geology of the St. George map area (NTS 21 G/02), southwestern New Brunswick*. New Brunswick Department of Natural Resources; Minerals, Policy, and Planning Division, Map Plate 2007-10.

Committee On the Status of Endangered Wildlife In Canada (COSEWIC). 2016. Species profiles. Information was obtained online at:

<http://www.cosewic.gc.ca/eng/sct0/index_e.cfm>

Environment Canada. 2016. Canadian climate normals. Data for the Pennfield weather station. The data were obtained online at:

<http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnProv&lstProvince=NB&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=6220&dispBack=0>

Hinds, H.R. 2000. *Flora of New Brunswick*, 2nd edition. Biology Department, University of New Brunswick: Fredericton.

McLeod, M.J., S.C. Johnson, S.M. Barr, and C.E. White. 2005. *Bedrock geology of the St. Stephen area (NTS 21 G/02), Charlotte County, New Brunswick*. New Brunswick Department of Natural Resources; Minerals, Policy, and Planning Division. Plate 2005-27 (revised 2011).

McLeod, M.J. 2005. *Geology of the Letang Harbour area (NTS 21 G/02c), Charlotte County, New Brunswick*. New Brunswick Department of Natural Resources, Minerals, Policy, and Planning Division. Plate 2005-51.

Natural Resources Canada. 2005. *The atlas of Canada – groundwater distribution*. An electronic version of the document was obtained online at:

<<http://atlas.gc.ca/site/english/maps/freshwater/distribution/groundwater>>

New Brunswick Department of the Environment and Local Government (NBDELG). 2012. *A guide to environmental impact assessment in New Brunswick*. An electronic version of the document was obtained online at:

<<http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/GuideEnvironmentalImpactAssessment.pdf>>

New Brunswick Department of the Environment and Local Government (NBDELG). 2004. *Additional Information Requirements for Aquaculture Facilities*. An electronic version of the document was obtained online at:

<<http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/SectorGuidelines/AquacultureFacilities.pdf>>

New Brunswick Department of the Environment and Local Government (NBDELG). 2004. *Additional Information Requirements for Wastewater Treatment Projects*. An electronic version of the document was obtained online at:

<<http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/SectorGuidelines/WastewaterTreatment.pdf>>

New Brunswick Department of the Environment and Local Government (NBDELG). 2004. *Additional Information Requirements Waterworks and Water Supply Projects*. An electronic version of the document was obtained online at:

<<http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/WaterworksWaterSupply.pdf>>

New Brunswick Department of Post-Secondary Education, Training, and Labour (NBDPETL). 2013. New Brunswick regional profiles: highlights and updates, Southwest Economic Region. An electronic version of the document was obtained online at:

<http://www2.gnb.ca/content/dam/gnb/Departments/petl-epft/PDF/Publications/NBRP3_Southwest.pdf>

Peel, M.C., B.L. Finlayson, and T.A. McMahon. 2007. Updated world map of the Köppen-Geiger climate classification. *Hydrol. Earth Syst. Sci.*, **11**: 1633-1644.

Pronk, A.G. and S. Allard. 2003. *Landscape map of New Brunswick*. New Brunswick Department of Natural Resources and Energy; Minerals, Policy, and Planning Division. Map NR-9.

Rampton, V.W., R.C. Gauthier, J. Thibault, and A.A. Seaman. 1984. Quaternary Geology of New Brunswick. *Geological Survey of Canada, Memoir*. 416.

Species at Risk Act (SARA). 2016. A to Z species index. The list was obtained online at:

<http://www.sararegistry.gc.ca/sar/index/default_e.cfm>

Webster, J.C. 1930. An Historical Guide To New Brunswick (Revised Edition). New Brunswick Government Bureau of Information and Tourist Travel. 100 p.

Wicklund, R.E. and K.K. Langmaid. 1953. Soil survey of southwestern New Brunswick, fourth report of the New Brunswick Soil Survey. An electronic version of the document was obtained online at:

<http://sis.agr.gc.ca/cansis/publications/surveys/nb/nb4/nb4_report.pdf?o=35357&l=sem&qsrc=990&qo=serpSearchTopBox&ad=semD&ap=google.ca&an=google_s&am=broad>

10.0 REPORT DISCLAIMERS AND DISCLOSURES

The sole purpose of this report and the associated services performed by Fundy Engineering & Consulting Ltd. is to complete an Environmental Impact Assessment document for Quoddy Savour Seafood Ltd.'s facility in Pennfield, New Brunswick. The scope of services was defined by the New Brunswick Department of the Environment and Local Government's guidelines to Environmental Impact Assessment in New Brunswick [NBDELG, 2012] and the NBDELG [2004] Sector Guidelines for Aquaculture Facilities, Wastewater Treatment Projects, and Waterworks and Water Supply Projects.

This report was prepared on behalf of and for the exclusive use of the Client. The report expresses the professional opinion of Fundy Engineering experts and is based on their technical / scientific knowledge. Fundy Engineering & Consulting Ltd. accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report or data by any third-party. Fundy Engineering makes no guarantee that the Client will be successful in the regulatory approval.

Appendix I:

Service New Brunswick Property Information



Map Scale / Échelle cartographique 1 : 3572

While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is a graphical representation of property boundaries which approximates the size, configuration and location of properties. It is not a survey and is not intended to be used for legal descriptions or to calculate exact dimensions or area.

Même si cette carte n'est peut-être pas libre de toute erreur ou omission, toutes les précautions ont été prises pour en assurer la meilleure qualité possible. Cette carte est une représentation graphique approximative des terrains (limites, dimensions, configuration et emplacement). Elle n'a aucun caractère officiel et ne doit donc pas servir à la rédaction de la description officielle d'un terrain ni au calcul de ses dimensions exactes ou de sa superficie.

PID:	15160708	County:	Charlotte
Status:	Active	Active Date/Time:	2003-06-23 12:30:15
Land Related Description:	Land	Management Unit:	NB0309
Area:	7.75	Area Unit:	Hectares
Date Last Updated:	2017-01-16 16:00:11	Harmonization Status:	Harmonized
Land Titles Status:	Land Titles	Land Titles Date/Time:	2003-07-09 10:54:29
Date of Last CRO:	2016-12-20 14:52:01	Manner of Tenure:	Not Applicable
Land Gazette Information:	NO		
Description of Tenure:			

Public Comments:

Parcel Interest Holders

Owner	Qualifier	Interest Type
Quoddy Savour Seafood Ltd.		Owner

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
5472016		512	L.S.D. of/D.S.L. de Pennfield

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
162	Mealey	Road		Pennfield

County Parish

County	Parish
Charlotte	Pennfield

Documents

Number	Registration Date	Book	Page	Code	Description
36633544	2016-12-20			5100	Mortgage
36633536	2016-12-20			1100	Deed/Transfer
36608173	2016-12-12			5400	Judgment
35477687	2015-11-26			5400	Judgment
33353450	2013-11-28			5200	Debenture or Other Voluntary Charge
33353427	2013-11-28			5200	Debenture or Other Voluntary Charge

Documents (cont.)

Number	Registration Date	Book	Page	Code	Description
33353351	2013-11-28			5200	Debenture or Other Voluntary Charge
33353328	2013-11-28			5200	Debenture or Other Voluntary Charge
33353252	2013-11-28			5200	Debenture or Other Voluntary Charge
33353203	2013-11-28			5200	Debenture or Other Voluntary Charge
33353153	2013-11-28			5200	Debenture or Other Voluntary Charge
33353039	2013-11-28			5200	Debenture or Other Voluntary Charge
33352981	2013-11-28			5200	Debenture or Other Voluntary Charge
33352932	2013-11-28			5200	Debenture or Other Voluntary Charge
33352833	2013-11-28			5200	Debenture or Other Voluntary Charge
33352478	2013-11-28			5200	Debenture or Other Voluntary Charge
32399033	2013-02-04			2200	Easement
32398829	2013-02-04			2200	Easement
32398662	2013-02-04			2200	Easement
30625140	2011-09-21			5110	Collateral Mortgage
29646966	2010-12-29			3210	Corporate Affairs Change of Name
29612968	2010-12-17			4820	Land Titles Rectification
29596674	2010-12-14			1100	Deed/Transfer
29596658	2010-12-14			3700	Court Vesting Order
29387108	2010-10-25			4820	Land Titles Rectification
17824773	2004-01-28			2200	Easement
16832470	2003-08-14			5100	Mortgage
16615917	2003-07-14			1100	Deed/Transfer
16589112	2003-07-09			3800	Land Titles First Notice
16589104	2003-07-09			3720	Land Titles First Order
16588809	2003-07-09			3900	Land Titles First Application
16478050	2003-06-20			1100	Deed/Transfer
16454333	2003-06-18			3500	Power of Attorney

No Records Returned

Plans

Parcel Relations

Related PID	Type Of Relation	Lot Information
1223320	Parent	

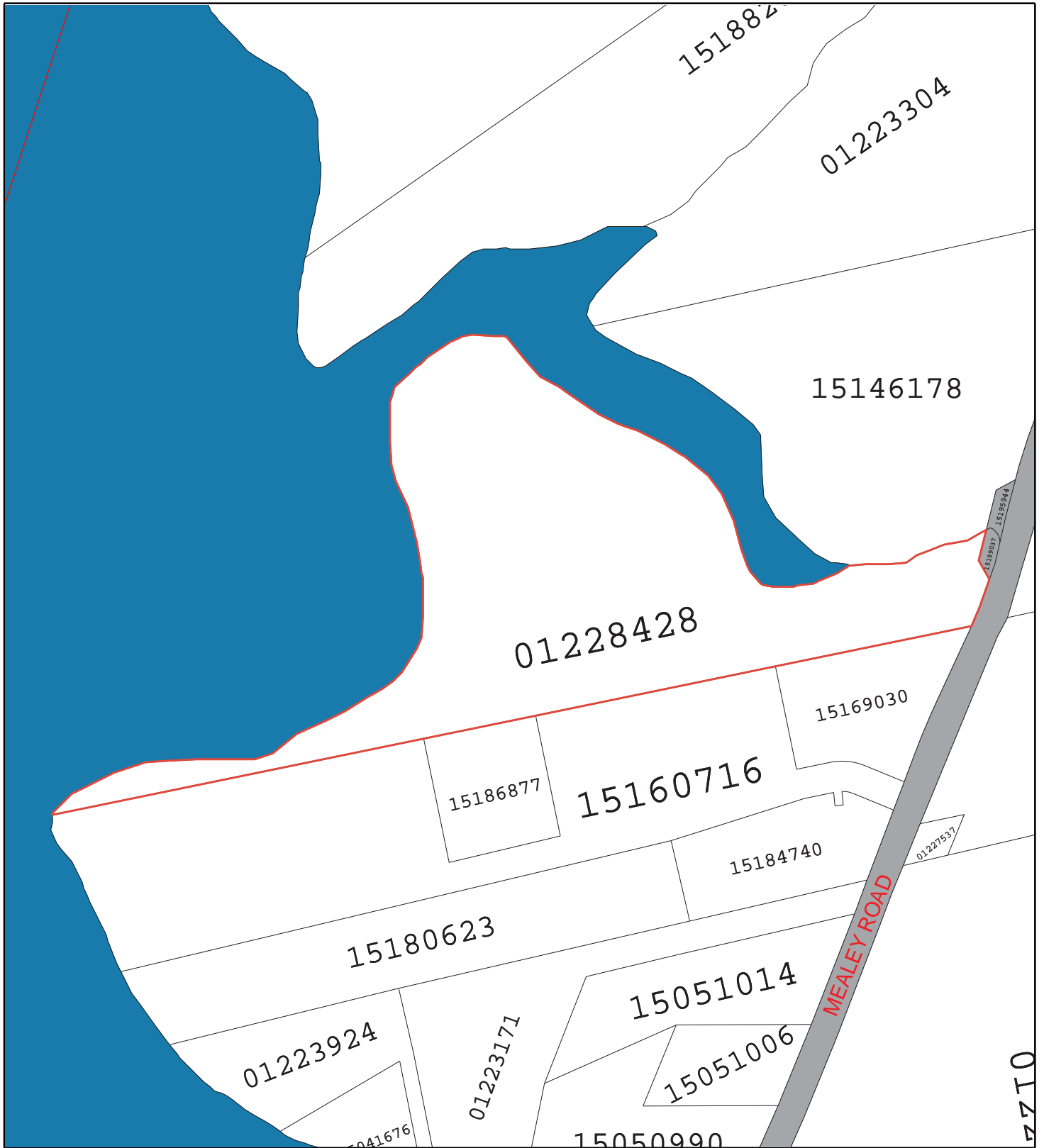
Non-Registered Instruments

Number	Date	Code	Description	Plan Name	Filing Reference	Office	Surveyor Name
1007982	2000-03-24	9000	Administration Plan	Supreme Sturgeon		SNB Map Library	

PAN:	5472016	Status:	Open
Assessed Owner(s):	Quoddy Savour Seafood Ltd.	Mailing Address:	203 Lake of the Loon Dr Johnson Settlement NB
Assessment Year:	2017	Postal Code:	E5A 3E2
Current Assessment:	\$ 84,500	Current Levy:	\$ 2,462.47
Location:	162 MEALEY RD	County:	Charlotte
Property Description:	STURGEON HATCHERY & LAND	Tax Class:	Fully Taxable
Property Type Code:	305	Property Type Name:	Fish Processing Pants
Taxing Authority Code:	512	Neighbourhood Code:	01
Taxing Authority Description:	L.S.D. of/D.S.L. de Pennfield	Neighbourhood Description:	SOUTH HWY #1 (PTYS TO 512-02/'93)
Sequence Number:	H016C	Sub Unit:	0
Harmonization:	COMPLETED (One to one match of parcels)	Farm Land Identifiation Program:	No
PID:	15160708	PID (2nd):	-
More PID(s):	No		

Sale Price Information

Price:	\$190,000	Date:	2016-12-20
Price:	\$1	Date:	2010-12-29
Price:	\$40,000	Date:	2010-12-14



Map Scale / Échelle cartographique 1 : 3572

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PID:	1228428	County:	Charlotte
Status:	Active	Active Date/Time:	
Land Related Description:	Land	Management Unit:	NB0309
Area:	5.8	Area Unit:	Hectares
Date Last Updated:	2017-03-17 12:13:37	Harmonization Status:	Harmonized
Land Titles Status:	Land Titles	Land Titles Date/Time:	2002-07-31 09:37:27
Date of Last CRO:	2016-12-20 14:52:01	Manner of Tenure:	Not Applicable
Land Gazette Information:	NO		

Description of Tenure:

Public Comments:

MAP / CARTE 21G02V1

Parcel Interest Holders

Owner	Qualifier	Interest Type
Quoddy Savour Seafood Ltd.		Owner

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
1340827		512	L.S.D. of/D.S.L. de Pennfield

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
169	Mealey	Road		Pennfield

County Parish

County	Parish
Charlotte	Pennfield

Documents

Number	Registration Date	Book	Page	Code	Description
36633544	2016-12-20			5100	Mortgage
36633536	2016-12-20			1100	Deed/Transfer
36608173	2016-12-12			5400	Judgment
35477687	2015-11-26			5400	Judgment
34709320	2015-03-27			4500	Notice of Intention to Expropriate
33353450	2013-11-28			5200	Debenture or Other Voluntary Charge

Documents (cont.)

Number	Registration Date	Book	Page	Code	Description
33353427	2013-11-28			5200	Debenture or Other Voluntary Charge
33353351	2013-11-28			5200	Debenture or Other Voluntary Charge
33353328	2013-11-28			5200	Debenture or Other Voluntary Charge
33353252	2013-11-28			5200	Debenture or Other Voluntary Charge
33353203	2013-11-28			5200	Debenture or Other Voluntary Charge
33353153	2013-11-28			5200	Debenture or Other Voluntary Charge
33353039	2013-11-28			5200	Debenture or Other Voluntary Charge
33352981	2013-11-28			5200	Debenture or Other Voluntary Charge
33352932	2013-11-28			5200	Debenture or Other Voluntary Charge
33352833	2013-11-28			5200	Debenture or Other Voluntary Charge
33352478	2013-11-28			5200	Debenture or Other Voluntary Charge
30625140	2011-09-21			5110	Collateral Mortgage
29646966	2010-12-29			3210	Corporate Affairs Change of Name
29612968	2010-12-17			4820	Land Titles Rectification
29596674	2010-12-14			1100	Deed/Transfer
29596658	2010-12-14			3700	Court Vesting Order
16896699	2003-08-25			5100	Mortgage
16896376	2003-08-25			1100	Deed/Transfer
14725460	2002-08-02			1100	Deed/Transfer
14701271	2002-07-31			3800	Land Titles First Notice
14701263	2002-07-31			3720	Land Titles First Order
14701081	2002-07-31			3900	Land Titles First Application
12530771	2001-07-26	752	130	1100	Deed/Transfer
67045	1971-01-01	179	559	101	Deed

Plans

Number	Suffix	Registration Date	Code	Description	Lot Information	Orientation
35074922		2015-07-27	9070	Expropriation	Lot	Provincial Grid
34708660		2015-03-27	9060	Transportation or Highway	Lot	Provincial Grid

Plans

Number	Suffix	Registration Date	Code	Description	Lot Information	Orientation
12530623		2001-07-26	9040	Retracement & Plan or Return of Survey		Provincial Grid

Parcel Relations

Related PID	Type Of Relation	Lot Information
15199037	Infant	Parcel 14-1

Non-Registered Instruments

Number	Date	Code	Description	Plan Name	Filing Reference	Office	Surveyor Name
1008022	2005-10-13	9020	Easement or Right-of-Way Plan	ABC Surgical Supplies (1978), Discharge Easement		N.B. Dept. of Natural Resources & Energy (was 9N)	Desaulniers, A. Edward

PAN:	1340827	Status:	Open
Assessed Owner(s):	Quoddy Savour Seafood Ltd.	Mailing Address:	203 Lake of the Loon Dr Johnson Settlement NB
Assessment Year:	2017	Postal Code:	E5A 3E2
Current Assessment:	\$ 36,600	Current Levy:	\$ 643.68
Location:	169 MEALEY RD	County:	Charlotte
Property Description:	SHORE LAND	Tax Class:	Fully Taxable
Property Type Code:	107	Property Type Name:	
Taxing Authority Code:	512	Neighbourhood Code:	01
Taxing Authority Description:	L.S.D. of/D.S.L. de Pennfield	Neighbourhood Description:	SOUTH HWY #1 (PTYS TO 512-02/'93)
Sequence Number:	H024	Sub Unit:	0
Harmonization:	COMPLETED (One to one match of parcels)	Farm Land Identifiation Program:	No
PID:	1228428	PID (2nd):	-
More PID(s):	No		

Sale Price Information

Price:	\$218,500	Date:	2016-12-20
Price:	\$1	Date:	2010-12-29
Price:	\$40,000	Date:	2010-12-14

Appendix II:

Online Well Log System Search Results

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Cable Tool	10/03/2002
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
6315	Steel	15.24cm	0m	45.72m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	68.25 lpm	0hr	28.96m	68.25 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	Submersible
	Qty 0L	Intake Setting (BTC)
		44.20m

Driller's Log				
Well Log	From	End	Colour	Rock Type
6315	0m	12.19m	Brown	Sand
6315	12.19m	36.58m	Mix	Gravel
6315	36.58m	41.15m	Brown	Sand
6315	41.15m	45.72m	EMPTY VALUE	Gravel

Overall Well Depth
45.72m
Bedrock Level
0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
6315	45.72m	68.25 lpm

Setbacks		
Well Log	Distance	Setback From
6315	16.76m	Septic Tank
6315	22.86m	Leach Field

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Cable Tool	09/04/2003
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
7973	Steel	15.24cm	0m	11.58m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	2.28 lpm	1hr	9.14m	2.28 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	76.20m

Driller's Log	Overall Well Depth
There is no rock layer information.	0m
	Bedrock Level
	0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
7973	73.15m	2.28 lpm

Setbacks		
Well Log	Distance	Setback From
7973	16.76m	Septic Tank
7973	22.86m	Leach Field

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	07/02/2004
Non-Drinking Water, Industrial			

Casing Information		Casing above ground 0.41m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
9093	Steel	15.24cm	0m	20.12m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0.61m	182 lpm	1hr	0.61m	182 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	Foam	Bleach (Javex)	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	20.12m
9093	0m	12.19m	Grey	Clay	
9093	12.19m	18.29m	Grey	Sand	Bedrock Level
9093	18.29m	20.12m	Mix	Gravel	12.19m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	08/27/2004
Drinking Water, Domestic			

Casing Information		Casing above ground 0.46m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
10396	Steel	15.24cm	0m	39.93m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	1hr	39.93m	45.5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	N/A
		Qty 4.55L	Intake Setting (BTC) 16.76m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	39.93m
10396	0m	36.58m	Brown	Clay	Bedrock Level 0m
10396	36.58m	39.93m	Grey	Sand and Gravel	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
10396	39.93m	45.5 lpm

Setbacks		
Well Log	Distance	Setback From
10396	18.29m	Septic Tank
10396	22.86m	Leach Field
10396	18.29m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	07/06/2005
Drinking Water, Domestic			

Casing Information		Casing above ground 0.30m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
10880	Steel	15.24cm	0m	12.19m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	45.5 lpm	0hr	12.19m	45.5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 0L	Intake Setting (BTC) 82.30m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	91.44m
10880	0m	7.01m	Brown	Clay	Bedrock Level
10880	7.01m	91.44m	Red	Granite	7.01m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
10880	86.87m	45.5 lpm

Setbacks		
Well Log	Distance	Setback From
10880	22.86m	Septic Tank
10880	30.48m	Leach Field

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	12/22/2004
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
11626	Steel	15.24cm	0m	7.01m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	2.28 lpm	1hr	1.22m	2.28 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	N/A
		Qty 0L	Intake Setting (BTC) 137.16m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	155.45m
11626	0m	4.57m	Brown	Till	Bedrock Level 0m
11626	4.57m	155.45m	Grey	Slate	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
11626	146.30m	2.28 lpm

Setbacks		
Well Log	Distance	Setback From
11626	16.76m	Septic Tank
11626	22.86m	Leach Field

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	07/07/2005
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
12107	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	6.71m	136.5 lpm	1hr	6.71m	136.5 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	79.25m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	88.39m
12107	0m	2.44m	Brown	Till	Bedrock Level
12107	2.44m	88.39m	Grey	Slate	0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
12107	36.58m	136.5 lpm

Setbacks		
Well Log	Distance	Setback From
12107	18.59m	Septic Tank
12107	27.74m	Leach Field

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	05/16/2008
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
13949	Steel	15.24cm	0m	32.92m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	24.38m	91 lpm	1hr	24.38m	45.5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 0L	Intake Setting (BTC) 28.96m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	32.92m
13949	27.43m	32.92m	EMPTY VALUE	Gravel	Bedrock Level 0m
13949	0m	12.19m	Brown	Sand	
13949	12.19m	27.43m	Mix	Gravel	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
13949	32.92m	91 lpm

Setbacks		
Well Log	Distance	Setback From
13949	22.86m	Septic Tank
13949	25.91m	Leach Field
13949	42.67m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	07/16/2008
Drinking Water, Domestic			

Casing Information		Casing above ground 0.46m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
14404	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	6.10m	6.82 lpm	1hr	5.49m	36.4 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 0L	Intake Setting (BTC) 67.06m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	76.20m
14404	45.72m	76.20m	Red and grey	Granite	Bedrock Level 0m
14404	0m	4.88m	Brown	Till	
14404	4.88m	42.06m	Red	Sandstone	
14404	42.06m	45.72m	Red	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
14404	42.67m	4.55 lpm
14404	60.96m	2.28 lpm

Setbacks		
Well Log	Distance	Setback From
14404	48.77m	Right of any Public Way Road
14404	19.81m	Septic Tank
14404	24.38m	Leach Field

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	08/28/2011
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
24214	Steel	15.24cm	0m	13.41m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	6.71m	13.65 lpm	1hr	6.71m	13.65 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	118.87m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	137.16m
24214	0m	13.41m	Brown	Sand and Gravel	
24214	13.41m	137.16m	Red and black	Granite	Bedrock Level 13.41m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
24214	121.92m	4.55 lpm
24214	134.11m	9.1 lpm

Setbacks		
Well Log	Distance	Setback From
24214	16.76m	Septic Tank
24214	24.38m	Leach Field
24214	42.67m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	09/20/2009
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
25246	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	5.49m	22.75 lpm	1hr	5.49m	22.75 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 0L	Intake Setting (BTC)
			103.63m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	124.97m
25246	0m	0.91m	Brown	Sand	Bedrock Level 0m
25246	0.91m	3.96m	Brown	Till and Rock	
25246	3.96m	124.97m	Red	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
25246	121.92m	22.75 lpm

Setbacks		
Well Log	Distance	Setback From
25246	60.96m	Right of any Public Way Road
No Septic tank on property at time of drilling		

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	09/20/2009
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
25247	Steel	15.24cm	0m	12.19m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	9.14m	15.92 lpm	1hr	9.14m	18.2 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	76.20m

Driller's Log					Overall Well Depth 112.78m
Well Log	From	End	Colour	Rock Type	
25247	0m	11.28m	Brown	Till and Rock	Bedrock Level 0m
25247	11.28m	112.78m	Red	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
25247	16.76m	6.82 lpm
25247	36.58m	4.55 lpm
25247	62.48m	4.55 lpm

Setbacks		
Well Log	Distance	Setback From
25247	60.96m	Right of any Public Way Road
No Septic on Property when drilled		

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	09/06/2009
Drinking Water, Domestic			

Casing Information		Casing above ground 0.30m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
25278	Steel	15.24cm	0m	39.62m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	455 lpm	1hr	12.19m	455 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Chlorine Pucks	Submersible
		Qty 0L	Intake Setting (BTC) 24.38m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	47.24m
25278	0m	36.58m	Grey	Clay	Bedrock Level
25278	36.58m	39.62m	Grey	Gravel	36.58m
25278	39.62m	47.24m	Grey	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
25278	44.20m	455 lpm

Setbacks		
Well Log	Distance	Setback From
25278	42.67m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	11/27/2009
Drinking Water, Domestic			

Casing Information		Casing above ground 0.30m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
25296	Steel	15.24cm	0m	22.56m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	18.2 lpm	1hr	54.86m	18.2 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	Foam	Chlorine Pucks	Submersible Intake Setting (BTC)
		Qty 0L	42.67m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	54.86m
25296	0m	21.34m	Grey	Clay	Bedrock Level
25296	21.34m	54.86m	Grey	Granite	21.34m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks		
Well Log	Distance	Setback From
25296	42.67m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use Drinking Water, Domestic	New Well	Rotary	01/31/2011

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
26616	Steel	15.24cm	0m	7.62m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	6.10m	45.5 lpm	1hr	6.10m	45.5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	167.64m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	185.93m
26616	153.92m	167.64m	Grey	Granite	
26616	0m	6.71m	Brown	Till	Bedrock Level
26616	6.71m	153.92m	Red	Granite	167.64m
26616	167.64m	185.93m	Red	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
26616	85.34m	9.1 lpm
26616	153.92m	22.75 lpm
26616	158.50m	13.65 lpm

Setbacks		
Well Log	Distance	Setback From
26616	91.44m	Right of any Public Way Road
No Sewage on property at time of drilling		

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	08/11/2014
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
30624	Steel	15.24cm	0m	8.84m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	7.62m	6.82 lpm	1hr	7.62m	9.1 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	38.10m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	44.20m
30624	0m	3.66m	Brown	Till	Bedrock Level 0m
30624	3.66m	8.53m	Brown	Gravel	
30624	8.53m	44.20m	Grey	Slate	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
30624	29.87m	6.82 lpm

Setbacks		
Well Log	Distance	Setback From
30624	22.86m	Septic Tank
30624	24.38m	Leach Field
30624	27.43m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	07/02/2013
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
31109	Steel	15.24cm	0m	41.15m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	6.10m	136.5 lpm	1hr	6.10m	136.5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0L	50.29m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	56.39m
31109	25.30m	39.93m	Grey	Clay and Sand	Bedrock Level 39.93m
31109	0m	24.38m	Grey	Clay	
31109	24.38m	25.30m	Brown	Sand and Gravel	
31109	39.93m	41.15m	Red	Rock	
31109	41.15m	56.39m	Red	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
31109	52.73m	136.5 lpm

Setbacks		
Well Log	Distance	Setback From
31109	48.77m	Septic Tank
31109	35.05m	Leach Field
31109	24.38m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use Drinking Water, Domestic	Deepened		10/25/2012

Casing Information		Casing above ground 0.41m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
31479	Steel	15.24cm	0m	22.86m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	3.96m	273 lpm	2hrs 02min	3.96m	273 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	Submersible
		Qty 0L	Intake Setting (BTC) 19.81m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	22.86m
31479	0m	18.29m	EMPTY VALUE	EMPTY VALUE	
31479	18.29m	22.86m	Brown	Sand and Gravel	Bedrock Level 0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
31479	22.86m	273 lpm

Setbacks		
Well Log	Distance	Setback From
31479	304.80m	Right of any Public Way Road
31479	314.55m	Center of road

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	11/23/2012
Drinking Water, Domestic			

Casing Information		Casing above ground 0.46m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
31517	Steel	20.32cm	0m	23.16m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	23.16m	1365 lpm	0hr 30min	0m	1365 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	Submersible
		Qty 0L	Intake Setting (BTC) 15.24m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	23.16m
31517	0m	3.96m	Brown	Clay and Gravel	
31517	3.96m	20.73m	Brown	Clay	Bedrock Level
31517	20.73m	23.16m	Grey	Sand and Gravel	0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
31517	23.16m	1365 lpm

Setbacks		
Well Log	Distance	Setback From
31517	314.86m	Center of road
31517	304.80m	Right of any Public Way Road

Well Driller's Report

Date printed 4/21/2017

Drilled by			
Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	06/30/1997

Casing Information		Casing above ground 0.61m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
90007382	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	22.75 lpm	0hr	9.14m	22.75 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 4.55L	54.86m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	64.01m
90007382	0m	2.44m	Brown	Till	
90007382	2.44m	64.01m	Black	Slate	Bedrock Level
					0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
90007382	18.29m	4.55 lpm
90007382	28.96m	4.55 lpm
90007382	51.82m	4.55 lpm
90007382	56.39m	9.1 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	10/17/1997
Drinking Water, Domestic			

Casing Information		Casing above ground 0.30m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
90008628	Steel	15.24cm	0m	21.34m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	9.1 lpm	0hr	10.67m	0 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	Submersible
		Qty 0L	Intake Setting (BTC) 68.58m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	83.82m
90008628	21.34m	83.82m	White	Granite	
90008628	0m	9.14m	Brown	Gravel	Bedrock Level
90008628	9.14m	21.34m	Brown	Clay	0m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	12/02/1998
Drinking Water, Domestic			

Casing Information		Casing above ground 0.30m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
90011260	Steel	15.24cm	0m	18.29m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	0m	9.1 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 1.83m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	91.44m
90011260	0m	16.46m	Brown	Sand and Mud	Bedrock Level
90011260	16.46m	91.44m	Grey	Rock	16.46m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use Drinking Water, Domestic	New Well	Rotary	03/02/1998

Casing Information		Casing above ground 0m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
90011261	Steel	15.24cm	0m	7.92m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m <i>(BTC - Below top of casina)</i>	0 lpm	0hr	7.62m	4.55 lpm	No	0 lpm

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	Submersible
		Qty 0L	Intake Setting (BTC) 1.83m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	
90011261	7.32m	91.44m	Grey	Rock	91.44m
90011261	0m	7.32m	Brown	Sand and Gravel	Bedrock Level 7.32m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	Deepened	Rotary	07/18/2000
Drinking Water, Domestic			

Casing Information	Casing above ground 0m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	0m	91 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	Submersible
		Qty 0L	Intake Setting (BTC) 124.36m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	137.16m
90013064	0m	91.44m	Unknown Rock Colour	Unknown	Bedrock Level 0m
90013064	91.44m	106.68m	Red	Granite	
90013064	106.68m	137.16m	Grey	Granite	

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well		01/01/2000
Drinking Water, Domestic			

Casing Information	Casing above ground 0m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	0m	0 lpm	0hr	0m	0 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log	Overall Well Depth
There is no rock layer information.	0m
	Bedrock Level
	0m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well		01/01/2000
Drinking Water, Domestic			

Casing Information	Casing above ground 0m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	0m	0 lpm	0hr	0m	0 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log	Overall Well Depth
There is no rock layer information.	0m
	Bedrock Level
	0m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	09/20/1994
Drinking Water, Domestic			

Casing Information	Casing above ground 0m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	0m	182 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Other	N/A
		Qty 0L	Intake Setting (BTC) 30.48m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	36.27m
90160600	0m	6.10m	Brown	Clay and Gravel and Rock	Bedrock Level
90160600	6.10m	35.05m	Grey	Clay and Gravel and Rock	35.05m
90160600	35.05m	36.27m	Grey	Gravel	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
90160600	36.27m	182 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	11/12/1994
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m	Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From End Slotted?
90162600	Steel	15.24cm	0m 22.56m

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	9.14m	136.5 lpm	0hr 30min	18.29m	136.5 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Other	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	22.56m
90162600	20.73m	22.56m	Red	Unknown	Bedrock Level
90162600	0m	6.10m	Brown	Boulders and Sand	0m
90162600	6.10m	18.29m	Brown	Sand	
90162600	18.29m	20.73m	Grey	Clay and Gravel and Rock	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
90162600	22.56m	136.5 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	11/05/1995
Drinking Water, Domestic			

Casing Information		Casing above ground 0m			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
90372100	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	4.55 lpm	0hr	0m	4.55 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	91.44m
90372100	0m	3.66m	Brown	Clay and Gravel	Bedrock Level 3.66m
90372100	3.66m	85.34m	Red	Granite	
90372100	85.34m	91.44m	Black	Slate	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
90372100	86.87m	4.55 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	01/03/1997
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
90738100	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	0m	9.1 lpm	1hr	0.61m	9.1 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 4.55L	Intake Setting (BTC) 76.20m

Driller's Log					Overall Well Depth 82.30m
Well Log	From	End	Colour	Rock Type	
90738100	0m	3.66m	Brown	Till	
90738100	3.66m	82.30m	Black	Slate	Bedrock Level 0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
90738100	60.96m	4.55 lpm
90738100	79.25m	4.55 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	08/08/1997
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m	Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From End Slotted?
90903800	Steel	15.24cm	0m 36.58m

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	91 lpm	1hr	24.38m	91 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 4.55L	Intake Setting (BTC) 35.05m

Driller's Log					Overall Well Depth 36.58m
Well Log	From	End	Colour	Rock Type	
90903800	0m	0.91m	Brown	Topsoil	
90903800	0.91m	36.58m	EMPTY VALUE	Gravel	Bedrock Level 0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
90903800	36.58m	91 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	12/02/1998
Drinking Water, Domestic			

Casing Information	Casing above ground 0m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	0m	0 lpm	0hr	0m	0 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log	Overall Well Depth
There is no rock layer information.	91.44m
	Bedrock Level
	16.46m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	03/02/1998
Drinking Water, Domestic			

Casing Information	Casing above ground 0m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	0m	0 lpm	0hr	0m	0 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log	Overall Well Depth
There is no rock layer information.	91.44m
	Bedrock Level
	7.32m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	Deepened (DEEPENED)	Rotary (ROTARY)	10/15/1999
Drinking Water, Domestic			

Casing Information	Casing above ground 0.61m	Drive Shoe Used? Yes
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	18.2 lpm	1hr	8.53m	18.2 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 4.55L	Intake Setting (BTC) 85.34m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	
91805100	48.77m	109.73m	Grey	Slate	109.73m
					Bedrock Level 48.77m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
91805100	1.22m	1569.75 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	03/02/2001
Non-Drinking Water, Observation			

Casing Information		Casing above ground 0.61m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
91994300	Steel	15.24cm	0m	25.91m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	455 lpm	0hr	5.49m	455 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	25.91m
91994300	0m	25.91m	EMPTY VALUE	Gravel	Bedrock Level 0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
91994300	25.91m	455 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by			
Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well (NEW WELL)	Rotary (ROTARY)	12/15/2000

Casing Information		Casing above ground 0.61m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
91995000	Steel	15.24cm	0m	18.29m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	27.3 lpm	1hr	13.72m	27.3 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 4.55L	Intake Setting (BTC) 54.86m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	64.01m
91995000	0m	18.29m	EMPTY VALUE	Gravel	Bedrock Level
91995000	18.29m	64.01m	Grey	Slate	0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
91995000	19.81m	27.3 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	01/08/2001
Drinking Water, Domestic			

Casing Information		Casing above ground 0.61m	Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From End Slotted?
92000800	Steel	15.24cm	0m 20.12m

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	27.3 lpm	0hr	12.19m	22.75 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible
		Qty 4.55L	Intake Setting (BTC) 39.62m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	44.20m
92000800	20.12m	44.20m	Black	Slate	Bedrock Level
92000800	0m	20.12m	EMPTY VALUE	Gravel	0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
92000800	35.05m	9.1 lpm
92000800	20.12m	6.82 lpm
92000800	26.52m	9.1 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 4/21/2017

Drilled by	Work Type	Drill Method	Work Completed
Well Use Drinking Water, Domestic	New Well	Rotary	03/02/2001

Casing Information		Casing above ground 0.61m		Drive Shoe Used? Yes	
Well Log	Casing Type	Diameter	From	End	Slotted?
92001000	Steel	15.24cm	0m	11.89m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	45.5 lpm	1hr	3.05m	45.5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	N/A
		Qty 4.55L	Intake Setting (BTC) 9.14m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	11.89m
92001000	0m	1.52m	Brown	Till	
92001000	1.52m	4.57m	Red	Clay	Bedrock Level
92001000	4.57m	11.89m	Red	Sand and Gravel	0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
92001000	11.89m	45.5 lpm

Setbacks
There is no Setback information.

Appendix III:

Atlantic Canada Conservation Data Centre Reports

DATA REPORT 5832: Pennfield, NB

Prepared 24 April 2017

by J. Churchill, Data Manager

CONTENTS OF REPORT

1.0 Preface

1.1 Data List

1.2 Restrictions

1.3 Additional Information

Map 1: Buffered Study Area

2.0 Rare and Endangered Species

2.1 Flora

2.2 Fauna

Map 2: Flora and Fauna

3.0 Special Areas

3.1 Managed Areas

3.2 Significant Areas

Map 3: Special Areas

4.0 Rare Species Lists

4.1 Fauna

4.2 Flora

4.3 Location Sensitive Species

4.4 Source Bibliography

5.0 Rare Species within 100 km

5.1 Source Bibliography



Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
PennfldNB_5832ob.xls	All Rare and legally protected <i>Flora and Fauna</i> in your study area
PennfldNB_5832ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
PennfldNB_5832sa.xls	All <i>Significant Natural Areas</i> in your study area
PennfldNB_5832ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)

1.2 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting ACCDC data, recipients assent to the following limits of use:

- a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
- b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
- c) The ACCDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
- d) ACCDC data responses are restricted to the data in our Data System at the time of the data request.
- e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
- f) ACCDC data responses are not to be construed as exhaustive inventories of taxa in an area.
- g) The absence of a taxon cannot be inferred by its absence in an ACCDC data response.

1.3 ADDITIONAL INFORMATION

The attached file DataDictionary 2.1.pdf provides metadata for the data provided.

Please direct any additional questions about ACCDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries

Sean Blaney, Senior Scientist, Executive Director

Tel: (506) 364-2658

sblaney@mta.ca

Animals (Fauna)

John Klymko, Zoologist

Tel: (506) 364-2660

jklymko@mta.ca

Plant Communities

Sarah Robinson, Community Ecologist

Tel: (506) 364-2664

srobinson@mta.ca

Data Management, GIS

James Churchill, Data Manager

Tel: (902) 679-6146

jlchurchill@mta.ca

Billing

Jean Breau

Tel: (506) 364-2657

jrbreau@mta.ca

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Stewart Lusk, Natural Resources: (506) 453-7110.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Sherman Boates, NSDNR: (902) 679-6146. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NSDNR Regional Biologist:

Western: Duncan Bayne

(902) 648-3536

Duncan.Bayne@novascotia.ca

Western: Donald Sam

(902) 634-7525

Donald.Sam@novascotia.ca

Central: Shavonne Meyer

(902) 893-6353

Shavonne.Meyer@novascotia.ca

Central: Kimberly George

(902) 893-5630

Kimberly.George@novascotia.ca

Eastern: Mark Pulsifer

(902) 863-7523

Mark.Pulsifer@novascotia.ca

Eastern: Donald Anderson

(902) 295-3949

Donald.Anderson@novascotia.ca

Eastern: Terry Power

(902) 563-3370

Terrance.Power@novascotia.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

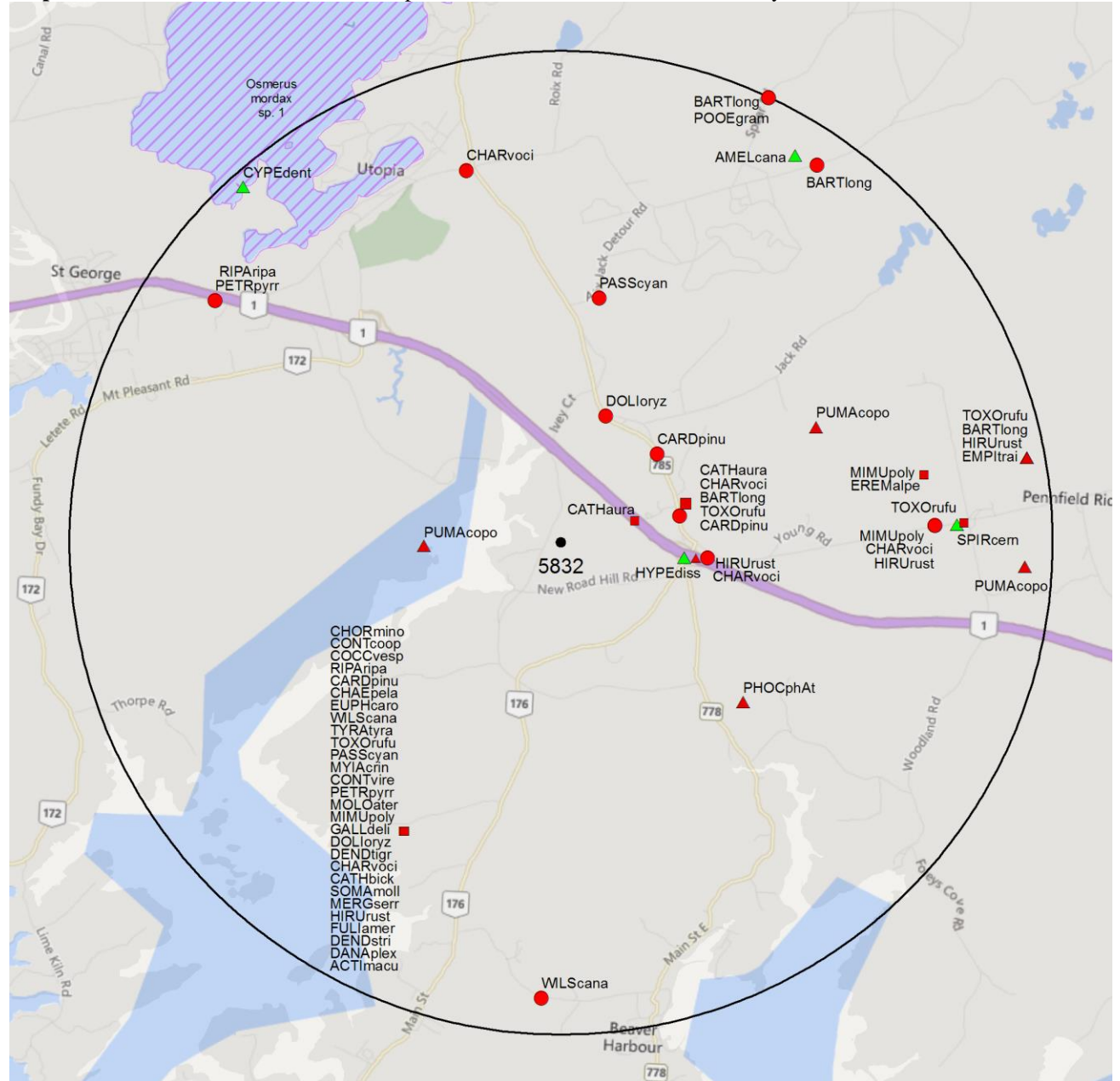
2.1 FLORA

The study area contains 4 records of 4 vascular, no records of nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 96 records of 34 vertebrate, 1 record of 1 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



- RESOLUTION**
- 4.7 within 50s of kilometers
 - 4.0 within 10s of kilometers
 - 3.7 within 5s of kilometers
 - △ 3.0 within kilometers
 - △ 2.7 within 500s of meters
 - ◇ 2.0 within 100s of meters
 - ◇ 1.7 within 10s of meters

- HIGHER TAXON**
- vertebrate fauna
 - invertebrate fauna
 - ▲ vascular flora
 - nonvascular flora

3.0 SPECIAL AREAS

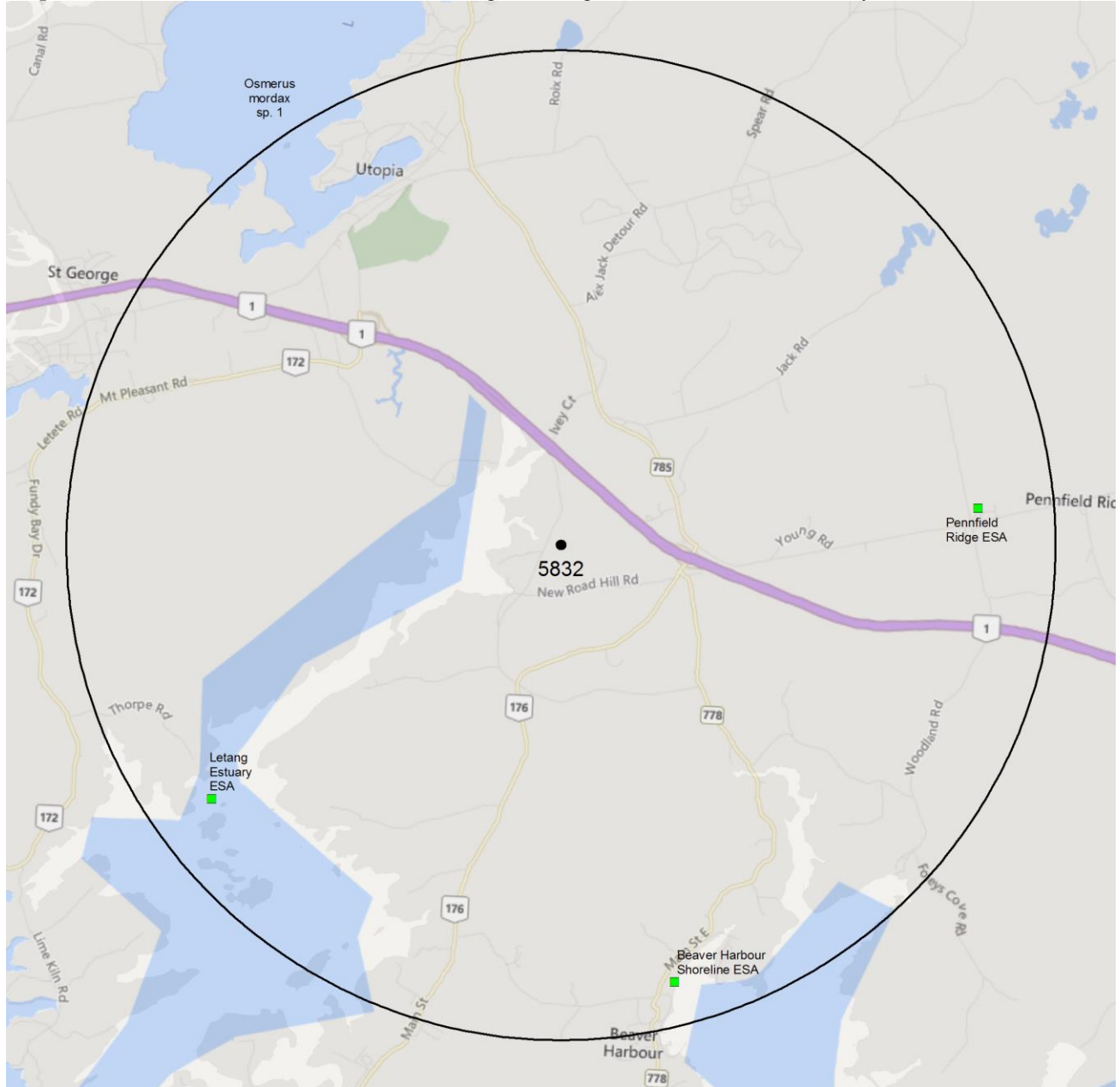
3.1 MANAGED AREAS

The GIS scan identified no managed areas in the vicinity of the study area (Map 3).

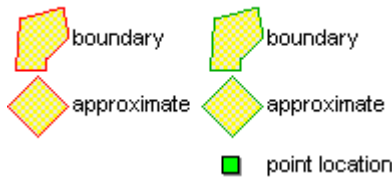
3.2 SIGNIFICANT AREAS

The GIS scan identified 3 biologically significant sites in the vicinity of the study area (Map 3 and attached file: *sa*.xls)

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.



MANAGED AREAS SIGNIFICANT AREAS



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (\pm the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2	3 Sensitive	1	1.3 \pm 1.0
P	<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses				S2S3	3 Sensitive	1	4.0 \pm 1.0
P	<i>Amelanchier canadensis</i>	Canada Serviceberry				S3	4 Secure	1	4.6 \pm 1.0
P	<i>Cyperus dentatus</i>	Toothed Flatsedge				S3	4 Secure	1	4.8 \pm 1.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2B,S2M	1 At Risk	1	3.3 \pm 7.0
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	1 At Risk	4	3.3 \pm 7.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened			S2S3B,S2S3M	3 Sensitive	3	3.3 \pm 7.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened		Threatened	S3B,S3M	3 Sensitive	6	1.4 \pm 0.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		Threatened	S3B,S3M	3 Sensitive	2	1.4 \pm 0.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S3B,S4M	1 At Risk	3	3.3 \pm 7.0
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3S4B,S3S4M	1 At Risk	1	3.3 \pm 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3S4B,S3S4M	1 At Risk	5	3.3 \pm 7.0
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B,S3M	2 May Be At Risk	1	3.3 \pm 7.0
A	<i>Phocoena phocoena (NW Atlantic pop.)</i>	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4	4	2.5 \pm 1.0	
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		Special Concern	S4B,S4M	4 Secure	2	3.3 \pm 7.0
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1S2B,S1S2M	3 Sensitive	1	3.3 \pm 7.0
A	<i>Puma concolor pop. 1</i>	Cougar - Eastern pop.	Data Deficient		Endangered	SU	5 Undetermined	3	1.4 \pm 1.0
A	<i>Bartramia longicauda</i>	Upland Sandpiper				S1B,S1M	3 Sensitive	6	1.3 \pm 12.0
A	<i>Eremophila alpestris</i>	Horned Lark				S1B,S4N,S5M	2 May Be At Risk	1	3.8 \pm 7.0
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	1	4.8 \pm 2.0
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	4	3.3 \pm 7.0
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	7	1.3 \pm 12.0
A	<i>Poocetes gramineus</i>	Vesper Sparrow				S2B,S2M	2 May Be At Risk	1	5.0 \pm 0.0
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S2S3B,S2S3M	3 Sensitive	1	3.3 \pm 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	3	3.3 \pm 7.0
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	5	1.2 \pm 0.0
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	2	0.8 \pm 4.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	9	1.3 \pm 12.0
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B,S3M	4 Secure	2	2.5 \pm 0.0
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	1	3.3 \pm 7.0
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak				S3B,S3S4N,SUM	3 Sensitive	1	3.3 \pm 7.0
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	2	3.3 \pm 7.0
A	<i>Dendroica tigrina</i>	Cape May Warbler				S3B,S4S5M	4 Secure	1	3.3 \pm 7.0
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	3	3.3 \pm 7.0
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B,S3S4M	3 Sensitive	5	3.3 \pm 7.0
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	2	3.3 \pm 7.0
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3S4B,S5M	4 Secure	1	3.3 \pm 7.0
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B,S5M	4 Secure	2	3.3 \pm 7.0
I	<i>Danaus plexippus</i>	Monarch	Special Concern	Special Concern	Special Concern	S3B,S3M	3 Sensitive	1	3.3 \pm 5.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species “location sensitive”. Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with “YES”.

New Brunswick

Scientific Name	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
<i>Chrysemys picta picta</i>	Eastern Painted Turtle			No
<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	No
<i>Haliaeetus leucocephalus</i>	Bald Eagle		Endangered	YES
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	No
<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	No
<i>Coenonympha nipisiquit</i>	Maritime Ringlet	Endangered	Endangered	No
<i>Bat Hibernaculum</i>		[Endangered] ¹	[Endangered] ¹	No

¹ *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NB Species at Risk Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
35	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
29	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
13	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
12	Pardieck, K.L. & Ziolkowski Jr., D.J.; Hudson, M.-A.R. 2014. North American Breeding Bird Survey Dataset 1966 - 2013, version 2013.0. U.S. Geological Survey, Patuxent Wildlife Research Center <www.pwrc.usgs.gov/BBS/RawData/>.
4	Sollows, M.C., 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.
3	Benedict, B. Connell Herbarium Specimens (Data) . University New Brunswick, Fredericton. 2003.
3	Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor cougar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada, 298 recs.
3	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc.
1	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
1	Dept of Fisheries & Oceans, source unspecified.
1	Klymko, J.J.D. 2012. Maritimes Butterfly Atlas, 2010 and 2011 records. Atlantic Canada Conservation Data Centre, 6318 recs.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 30415 records of 141 vertebrate and 889 records of 69 invertebrate fauna; 5664 records of 342 vascular, 201 records of 98 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs. All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (\pm the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	59	41.5 \pm 5.0	NB
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	14	47.9 \pm 1.0	NB
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	2	52.6 \pm 0.0	NB
A	<i>Eubalaena glacialis</i>	North Atlantic Right Whale	Endangered	Endangered	Endangered	S1		7	19.7 \pm 1.0	NB
A	<i>Sterna dougallii</i>	Roseate Tern	Endangered	Endangered	Endangered	S1?B,S1?M	1 At Risk	21	16.8 \pm 0.0	NB
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B,S1M	1 At Risk	24	22.2 \pm 0.0	NB
A	<i>Dermochelys coriacea</i> (Atlantic pop.)	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	29.9 \pm 0.0	NB
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered	Endangered	S2	2 May Be At Risk	7	18.6 \pm 0.0	NB
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S2M	1 At Risk	379	22.2 \pm 0.0	NB
A	<i>Rangifer tarandus pop. 2</i>	Woodland Caribou (Atlantic-Gasp [r-sie pop.)	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	4	46.1 \pm 1.0	NB
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened		Threatened	S1B,S1M	2 May Be At Risk	25	21.7 \pm 7.0	NB
A	<i>Ixobrychus exilis</i>	Least Bittern	Threatened	Threatened	Threatened	S1S2B,S1S2M	1 At Risk	27	5.9 \pm 5.0	NB
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened		Threatened	S1S2B,S1S2M	2 May Be At Risk	157	11.1 \pm 7.0	NB
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B,S2M	1 At Risk	68	11.1 \pm 7.0	NB
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2B,S2M	1 At Risk	21	3.3 \pm 7.0	NB
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2S3	1 At Risk	60	26.7 \pm 0.0	NB
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	1 At Risk	207	3.3 \pm 7.0	NB
A	<i>Riparia riparia</i>	Bank Swallow	Threatened		Threatened	S2S3B,S2S3M	3 Sensitive	309	3.3 \pm 7.0	NB
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened		Threatened	S3	4 Secure	1	61.7 \pm 1.0	NB
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened		Threatened	S3B,S3M	3 Sensitive	985	1.4 \pm 0.0	NB
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		Threatened	S3B,S3M	3 Sensitive	460	1.4 \pm 0.0	NB
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S3B,S4M	1 At Risk	234	3.3 \pm 7.0	NB
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3S4B,S3S4M	1 At Risk	204	3.3 \pm 7.0	NB
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3S4B,S3S4M	1 At Risk	593	3.3 \pm 7.0	NB
A	<i>Anguilla rostrata</i>	American Eel	Threatened		Threatened	S4	4 Secure	34	21.8 \pm 0.0	NB
A	<i>Osmerus mordax pop. 2</i>	Lake Utopia Smelt large-bodied pop.	Threatened		Threatened			2	6.7 \pm 1.0	NB
A	<i>Coturnicops noveboracensis</i>	Yellow Rail	Special Concern	Special Concern	Special Concern	S1?B,SUM	2 May Be At Risk	3	91.1 \pm 7.0	NB
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	1 At Risk	206	16.0 \pm 0.0	NB
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Endangered	S1B,S3M	1 At Risk	546	9.1 \pm 1.0	NB
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern	Special Concern	S2B,S2M	3 Sensitive	17	43.1 \pm 7.0	NB
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2M,S2N	3 Sensitive	55	9.1 \pm 1.0	NB
A	<i>Balaenoptera physalus</i>	Fin Whale - Atlantic pop.	Special Concern	Special Concern	Special Concern	S2S3		5	41.7 \pm 1.0	NB
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	7	51.8 \pm 10.0	NB
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	27	13.9 \pm 1.0	NB
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B,S3M	2 May Be At Risk	105	3.3 \pm 7.0	NB
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	225	13.1 \pm 0.0	NB
A	<i>Phocoena phocoena</i>	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		232	2.5 \pm 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	(NW Atlantic pop.) <i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		Special Concern	S4B,S4M	4 Secure	396	3.3 ± 7.0	NB
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern		Special Concern	S4N,S4M	4 Secure	269	7.1 ± 22.0	NB
A	<i>Bubo scandiacus</i>	Snowy Owl	Not At Risk			S1N,S2S3M	4 Secure	30	26.5 ± 0.0	NB
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1S2B,S1S2M	2 May Be At Risk	18	51.9 ± 1.0	NB
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1S2B,S1S2M	3 Sensitive	4	3.3 ± 7.0	NB
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S1S2B,SUM	2 May Be At Risk	5	42.9 ± 1.0	NB
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	2	59.6 ± 1.0	NB
A	<i>Buteo lineatus</i>	Red-shouldered Hawk	Not At Risk	Special Concern		S2B,S2M	2 May Be At Risk	44	17.6 ± 0.0	NB
A	<i>Chlidonias niger</i>	Black Tern	Not At Risk			S2B,S2M	3 Sensitive	108	55.6 ± 4.0	NB
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3		3	17.8 ± 1.0	NB
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S3	1 At Risk	7	24.8 ± 50.0	NB
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	57	28.9 ± 1.0	NB
A	<i>Megaptera novaeangliae</i>	Humpback Whale (NW Atlantic pop.)	Not At Risk	Special Concern		S3		4	19.7 ± 5.0	NB
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B,SUM	3 Sensitive	293	15.8 ± 11.0	NB
A	<i>Podiceps grisegena</i>	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	680	5.9 ± 0.0	NB
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	60.2 ± 1.0	NB
A	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Not At Risk		Endangered	S4	1 At Risk	1375	3.3 ± 7.0	NB
A	<i>Canis lupus</i>	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	3	46.6 ± 1.0	NB
A	<i>Puma concolor pop. 1</i>	Cougar - Eastern pop.	Data Deficient		Endangered	SU	5 Undetermined	41	1.4 ± 1.0	NB
A	<i>Morone saxatilis</i>	Striped Bass	E,E,SC			S3	2 May Be At Risk	10	27.2 ± 1.0	NB
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S1?B,S5M	4 Secure	960	6.9 ± 0.0	NB
A	<i>Gallinula chloropus</i>	Common Moorhen				S1B,S1M	3 Sensitive	18	5.9 ± 5.0	NB
A	<i>Bartramia longicauda</i>	Upland Sandpiper				S1B,S1M	3 Sensitive	47	1.3 ± 12.0	NB
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	58	33.8 ± 1.0	NB
A	<i>Leucophaeus atricilla</i>	Laughing Gull				S1B,S1M	3 Sensitive	88	8.6 ± 0.0	NB
A	<i>Progne subis</i>	Purple Martin				S1B,S1M	2 May Be At Risk	185	24.2 ± 0.0	NB
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B,S2S3M	4 Secure	48	14.2 ± 0.0	NB
A	<i>Uria aalge</i>	Common Murre				S1B,S3N,S3M	4 Secure	145	13.6 ± 0.0	NB
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	203	21.8 ± 2.0	NB
A	<i>Aythya marila</i>	Greater Scaup				S1B,S4M,S2N	4 Secure	35	22.2 ± 2.0	NB
A	<i>Eremophila alpestris</i>	Horned Lark				S1B,S4N,S5M	2 May Be At Risk	25	3.8 ± 7.0	NB
A	<i>Sterna paradisaea</i>	Arctic Tern				S1B,SUM	2 May Be At Risk	151	9.1 ± 1.0	NB
A	<i>Fratercula arctica</i>	Atlantic Puffin				S1B,SUN,SUM	3 Sensitive	186	9.1 ± 1.0	NB
A	<i>Branta bernicla</i>	Brant				S1N, S2S3M	4 Secure	546	8.4 ± 10.0	NB
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S1N,S2M	3 Sensitive	40	7.6 ± 0.0	NB
A	<i>Butorides virescens</i>	Green Heron				S1S2B,S1S2M	3 Sensitive	22	25.7 ± 7.0	NB
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	62	6.0 ± 0.0	NB
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	74	4.8 ± 2.0	NB
A	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow				S1S2B,S1S2M	2 May Be At Risk	24	5.3 ± 2.0	NB
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	31	10.2 ± 0.0	NB
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S1S2B,S4N,S5M	4 Secure	49	12.6 ± 0.0	NB
A	<i>Calidris bairdii</i>	Baird's Sandpiper				S1S2M	3 Sensitive	106	33.7 ± 1.0	NB
A	<i>Cistothorus palustris</i>	Marsh Wren				S2B,S2M	3 Sensitive	63	35.0 ± 0.0	NB
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	142	3.3 ± 7.0	NB
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	73	1.3 ± 12.0	NB
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B,S2M	2 May Be At Risk	58	5.0 ± 0.0	NB
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	88	23.6 ± 3.0	NB
A	<i>Alca torda</i>	Razorbill				S2B,S3N,S3M	4 Secure	181	13.6 ± 0.0	NB
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2B,S4S5N,S4S5M	3 Sensitive	22	24.0 ± 7.0	NB
A	<i>Tringa solitaria</i>	Solitary Sandpiper				S2B,S5M	4 Secure	251	5.3 ± 2.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel				S2B,SUM	3 Sensitive	140	12.6 ± 0.0	NB
A	<i>Chen caerulescens</i>	Snow Goose				S2M	4 Secure	7	43.3 ± 0.0	NB
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2N,S2M	4 Secure	313	6.6 ± 0.0	NB
A	<i>Somateria spectabilis</i>	King Eider				S2N,S2M	4 Secure	56	12.5 ± 12.0	NB
A	<i>Larus hyperboreus</i>	Glaucous Gull				S2N,S2M	4 Secure	156	6.0 ± 0.0	NB
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	20	6.5 ± 6.0	NB
A	<i>Picoides dorsalis</i>	American Three-toed Woodpecker				S2S3	3 Sensitive	10	24.0 ± 7.0	NB
A	<i>Salmo salar</i>	Atlantic Salmon				S2S3	2 May Be At Risk	36	6.3 ± 1.0	NB
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	73	5.3 ± 4.0	NB
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S2S3B,S2S3M	3 Sensitive	172	3.3 ± 7.0	NB
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	399	3.3 ± 7.0	NB
A	<i>Pluvialis dominica</i>	American Golden-Plover				S2S3M	3 Sensitive	269	22.2 ± 0.0	NB
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S2S3N,SUM	3 Sensitive	38	43.3 ± 0.0	NB
A	<i>Cepphus grylle</i>	Black Guillemot				S3	4 Secure	782	8.4 ± 21.0	NB
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	93	7.1 ± 7.0	NB
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	189	1.2 ± 0.0	NB
A	<i>Prosopium cylindraceum</i>	Round Whitefish				S3	4 Secure	3	69.8 ± 10.0	NB
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	3 Sensitive	5	26.3 ± 0.0	NB
A	<i>Sorex maritimensis</i>	Maritime Shrew				S3	4 Secure	1	94.7 ± 1.0	NB
A	<i>Eptesicus fuscus</i>	Big Brown Bat				S3	3 Sensitive	47	7.4 ± 1.0	NB
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	255	0.8 ± 4.0	NB
A	<i>Rallus limicola</i>	Virginia Rail				S3B,S3M	3 Sensitive	103	5.3 ± 2.0	NB
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	694	1.3 ± 12.0	NB
A	<i>Tringa semipalmata</i>	Willet				S3B,S3M	3 Sensitive	164	22.2 ± 0.0	NB
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	152	7.1 ± 7.0	NB
A	<i>Vireo gilvus</i>	Warbling Vireo				S3B,S3M	4 Secure	194	6.0 ± 0.0	NB
A	<i>Piranga olivacea</i>	Scarlet Tanager				S3B,S3M	4 Secure	147	7.1 ± 7.0	NB
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B,S3M	4 Secure	93	2.5 ± 0.0	NB
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	213	3.3 ± 7.0	NB
A	<i>Icterus galbula</i>	Baltimore Oriole				S3B,S3M	4 Secure	152	7.1 ± 7.0	NB
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak				S3B,S3S4N,SUM	3 Sensitive	155	3.3 ± 7.0	NB
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	1954	3.3 ± 7.0	NB
A	<i>Dendroica tigrina</i>	Cape May Warbler				S3B,S4S5M	4 Secure	104	3.3 ± 7.0	NB
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	47	35.2 ± 1.0	NB
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	371	3.3 ± 7.0	NB
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	4 Secure	709	22.2 ± 0.0	NB
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S3M	3 Sensitive	127	13.1 ± 0.0	NB
A	<i>Melanitta nigra</i>	Black Scoter				S3M,S1S2N	3 Sensitive	803	7.1 ± 0.0	NB
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	1112	5.4 ± 0.0	NB
A	<i>Calidris maritima</i>	Purple Sandpiper				S3M,S3N	4 Secure	269	7.2 ± 0.0	NB
A	<i>Uria lomvia</i>	Thick-billed Murre				S3N,S3M	5 Undetermined	67	8.2 ± 0.0	NB
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3S4	4 Secure	18	60.5 ± 1.0	NB
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B,S3S4M	3 Sensitive	367	3.3 ± 7.0	NB
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	837	3.3 ± 7.0	NB
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3S4B,S5M	4 Secure	531	3.3 ± 7.0	NB
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	219	9.1 ± 1.0	NB
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B,S5M	4 Secure	81	3.3 ± 7.0	NB
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3S4M	4 Secure	849	6.9 ± 0.0	NB
A	<i>Limosa haemastica</i>	Hudsonian Godwit				S3S4M	4 Secure	92	33.0 ± 1.0	NB
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3S4M	4 Secure	2057	6.9 ± 0.0	NB
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	312	24.4 ± 0.0	NB
A	<i>Calidris alba</i>	Sanderling				S3S4M,S1N	3 Sensitive	848	22.2 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	4 Secure	842	9.1 ± 1.0	NB
A	<i>Lanius ludovicianus</i>	Loggerhead Shrike				SXB,SXM	1 At Risk	1	51.9 ± 1.0	NB
	<i>Quercus macrocarpa</i> - <i>Acer rubrum</i> / <i>Onoclea sensibilis</i> - <i>Carex arcta</i>	Bur Oak - Red Maple / Sensitive Fern - Northern Clustered Sedge Forest				S2		1	96.2 ± 0.0	NB
C	<i>Acer saccharinum</i> / <i>Onoclea sensibilis</i> - <i>Lysimachia terrestris</i>	Silver Maple / Sensitive Fern - Swamp Yellow Loosestrife Forest				S3		1	63.8 ± 0.0	NB
C	<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Polystichum acrostichoides</i>	Sugar Maple - White Ash / Christmas Fern Forest				S3S4		1	78.8 ± 0.0	NB
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered		Endangered	S1S2	2 May Be At Risk	48	87.8 ± 0.0	NB
I	<i>Ophiogomphus howei</i>	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	2 May Be At Risk	3	14.5 ± 0.0	NB
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Special Concern	S2	3 Sensitive	1	67.5 ± 0.0	NB
I	<i>Lampsilis cariosa</i>	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	79	63.8 ± 0.0	NB
I	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern			S3?	3 Sensitive	9	88.9 ± 0.0	NB
I	<i>Danaus plexippus</i>	Monarch	Special Concern	Special Concern	Special Concern	S3B,S3M	3 Sensitive	91	3.3 ± 5.0	NB
I	<i>Appalachina sayana</i>	Spike-lip Crater	Not At Risk			S3?		1	63.1 ± 1.0	NB
I	<i>Haematopota rara</i>	Shy Cleg				S1	5 Undetermined	1	91.3 ± 1.0	NB
I	<i>Lycaena dorcas</i>	Dorcas Copper				S1	2 May Be At Risk	1	44.0 ± 0.0	NB
I	<i>Erora laeta</i>	Early Hairstreak				S1	2 May Be At Risk	1	93.8 ± 1.0	NS
I	<i>Somatochlora septentrionalis</i>	Muskeg Emerald				S1	2 May Be At Risk	1	91.1 ± 1.0	NB
I	<i>Celithemis martha</i>	Martha's Pennant				S1	5 Undetermined	1	44.5 ± 0.0	NB
I	<i>Arigomphus furcifer</i>	Lilypad Clubtail				S1	5 Undetermined	6	91.1 ± 0.0	NB
I	<i>Polites origenes</i>	Crossline Skipper				S1?	5 Undetermined	5	83.8 ± 0.0	NB
I	<i>Plebejus saepiolus</i>	Greenish Blue				S1S2	4 Secure	3	16.4 ± 0.0	NB
I	<i>Ophiogomphus colubrinus</i>	Boreal Snaketail				S1S2	2 May Be At Risk	36	23.3 ± 1.0	NB
I	<i>Brachyleptura circumdata</i>	a Longhorned Beetle				S2		6	91.0 ± 0.0	NB
I	<i>Satyrrium calanus</i>	Banded Hairstreak				S2	3 Sensitive	12	90.9 ± 0.0	NB
I	<i>Satyrrium calanus falacer</i>	Banded Hairstreak				S2	4 Secure	4	93.8 ± 1.0	NB
I	<i>Strymon melinus</i>	Grey Hairstreak				S2	4 Secure	4	34.3 ± 1.0	NB
I	<i>Aeshna clepsydra</i>	Mottled Darner				S2	3 Sensitive	8	48.4 ± 1.0	NB
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S2	5 Undetermined	4	49.4 ± 1.0	NB
I	<i>Ladona exusta</i>	White Corporal				S2	5 Undetermined	9	23.0 ± 0.0	NB
I	<i>Hetaerina americana</i>	American Rubyspot				S2	3 Sensitive	2	67.5 ± 0.0	NB
I	<i>Ischnura posita</i>	Fragile Forktail				S2	2 May Be At Risk	8	8.1 ± 0.0	NB
I	<i>Callophrys henrici</i>	Henry's Elfin				S2S3	4 Secure	14	79.6 ± 0.0	NB
I	<i>Agonum excavatum</i>	a Ground Beetle				S3	4 Secure	1	91.1 ± 0.0	NB
I	<i>Badister neopulchellus</i>	a Ground Beetle				S3	4 Secure	1	91.1 ± 0.0	NB
I	<i>Clivina americana</i>	a Ground Beetle				S3	4 Secure	1	91.1 ± 0.0	NB
I	<i>Elaphrus americanus</i>	a Ground Beetle				S3	4 Secure	1	91.1 ± 0.0	NB
I	<i>Olisthopus parmatius</i>	a Ground Beetle				S3	4 Secure	1	94.8 ± 0.0	NB
I	<i>Paratychys scitulus</i>	a Ground Beetle				S3	5 Undetermined	1	91.1 ± 0.0	NB
I	<i>Sphaeroderus nitidicollis</i>	a Ground Beetle				S3	4 Secure	1	94.8 ± 0.0	NB
I	<i>Coccinella hieroglyphica kirbyi</i>	a Ladybird Beetle				S3	4 Secure	1	58.8 ± 1.0	NB
I	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	4 Secure	2	58.8 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
I	<i>Stenocorus vittigera</i>	a Longhorned Beetle				S3		1	91.1 ± 0.0	NB
I	<i>Hesperia sassacus</i>	Indian Skipper				S3	4 Secure	3	51.9 ± 0.0	NB
I	<i>Euphyes bimaculata</i>	Two-spotted Skipper				S3	4 Secure	8	6.0 ± 0.0	NB
I	<i>Lycaena hyllus</i>	Bronze Copper				S3	3 Sensitive	4	34.6 ± 1.0	NB
I	<i>Satyrium acadica</i>	Acadian Hairstreak				S3	4 Secure	7	47.4 ± 1.0	NB
I	<i>Callophrys polios</i>	Hoary Elfin				S3	4 Secure	7	58.8 ± 1.0	NB
I	<i>Plebejus idas</i>	Northern Blue				S3	4 Secure	5	25.0 ± 0.0	NB
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	6	17.4 ± 1.0	NB
I	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	19	6.0 ± 0.0	NB
I	<i>Boloria bellona</i>	Meadow Fritillary				S3	4 Secure	32	15.3 ± 1.0	NB
I	<i>Polygonia satyrus</i>	Satyr Comma				S3	4 Secure	11	48.0 ± 1.0	NB
I	<i>Polygonia gracilis</i>	Hoary Comma				S3	4 Secure	1	95.2 ± 1.0	NB
I	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S3	4 Secure	21	48.0 ± 1.0	NB
I	<i>Gomphus vastus</i>	Cobra Clubtail				S3	3 Sensitive	54	78.0 ± 0.0	NB
I	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail				S3	4 Secure	23	49.7 ± 0.0	NB
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	5 Undetermined	10	47.4 ± 1.0	NB
I	<i>Dorocordulia lepida</i>	Petite Emerald				S3	4 Secure	22	44.6 ± 0.0	NB
I	<i>Somatochlora cingulata</i>	Lake Emerald				S3	4 Secure	11	22.3 ± 1.0	NB
I	<i>Somatochlora forcipata</i>	Forcipate Emerald				S3	4 Secure	18	22.0 ± 1.0	NB
I	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S3	4 Secure	13	47.4 ± 1.0	NB
I	<i>Lestes eurinus</i>	Amber-Winged Spreadwing				S3	4 Secure	8	41.8 ± 1.0	NB
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	32	8.1 ± 0.0	NB
I	<i>Enallagma geminatum</i>	Skimming Bluet				S3	5 Undetermined	8	45.7 ± 1.0	NB
I	<i>Enallagma signatum</i>	Orange Bluet				S3	4 Secure	8	45.7 ± 1.0	NB
I	<i>Stylurus scudleri</i>	Zebra Clubtail				S3	4 Secure	64	21.9 ± 1.0	NB
I	<i>Alasmidonta undulata</i>	Triangle Floater				S3	3 Sensitive	17	30.1 ± 1.0	NB
I	<i>Leptodea ochracea</i>	Tidewater Mucket				S3	4 Secure	54	51.3 ± 1.0	NB
I	<i>Neohelix albolabris</i>	Whitelip				S3		1	91.4 ± 1.0	NB
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3		34	40.8 ± 0.0	NB
I	<i>Pantala hymenaea</i>	Spot-Winged Glider				S3B,S3M	4 Secure	5	22.0 ± 1.0	NB
I	<i>Satyrium liparops</i>	Striped Hairstreak				S3S4	4 Secure	2	90.9 ± 0.0	NB
I	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S3S4	4 Secure	1	97.6 ± 10.0	NB
I	<i>Cupido comyntas</i>	Eastern Tailed Blue				S3S4	4 Secure	9	39.0 ± 0.0	NB
I	<i>Coccinella transversoguttata richardsoni</i>	Transverse Lady Beetle				SH	2 May Be At Risk	2	49.7 ± 0.0	NB
I	<i>Erioderma pedicellatum</i> (Atlantic pop.)	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	1 At Risk	1	28.2 ± 1.0	NB
N	<i>Degelia plumbea</i>	Blue Felt Lichen	Special Concern	Special Concern	Special Concern	S1	2 May Be At Risk	2	27.5 ± 5.0	NB
N	<i>Pseudevernia cladonia</i>	Ghost Antler Lichen	Not At Risk			S2S3	5 Undetermined	17	6.4 ± 0.0	NB
N	<i>Bryum muehlenbeckii</i>	Muehlenbeck's Bryum Moss				S1	2 May Be At Risk	1	52.5 ± 1.0	NB
N	<i>Sphagnum macrophyllum</i>	Sphagnum				S1	2 May Be At Risk	2	41.6 ± 0.0	NB
N	<i>Coscidonon cribrus</i>	Sieve-Toothed Moss				S1	2 May Be At Risk	1	55.7 ± 0.0	NB
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S1	2 May Be At Risk	1	46.1 ± 10.0	NB
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S1?	2 May Be At Risk	1	98.5 ± 3.0	NS
N	<i>Calliargon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	46.2 ± 0.0	NB
N	<i>Dichelyma falcatum</i>	a Moss				S1?	2 May Be At Risk	2	51.0 ± 1.0	NB
N	<i>Dicranum bonjeanii</i>	Bonjean's Broom Moss				S1?	2 May Be At Risk	1	93.4 ± 1.0	NB
N	<i>Eurhynchium hians</i>	Light Beaked Moss				S1?	2 May Be At Risk	1	95.2 ± 1.0	NB
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1?	2 May Be At Risk	1	52.0 ± 0.0	NB
N	<i>Racomitrium ericoides</i>	a Moss				S1?	2 May Be At Risk	1	65.1 ± 3.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
N	<i>Splachnum pennsylvanicum</i>	Southern Dung Moss				S1?	2 May Be At Risk	1	90.2 ± 0.0	NB
N	<i>Platylomella lescurii</i>	a Moss				S1?	5 Undetermined	1	31.7 ± 1.0	NB
N	<i>Jungermannia obovata</i>	Egg Flapwort				S1S2	6 Not Assessed	1	66.1 ± 0.0	NB
N	<i>Pallavicinia lyellii</i>	Lyell's Ribbonwort				S1S2	6 Not Assessed	1	68.5 ± 1.0	NB
N	<i>Reboulia hemisphaerica</i>	Purple-margined Liverwort				S1S2	6 Not Assessed	1	29.6 ± 1.0	NB
N	<i>Brachythecium acuminatum</i>	Acuminate Ragged Moss				S1S2	5 Undetermined	3	95.2 ± 10.0	NB
N	<i>Bryum salinum</i>	a Moss				S1S2	2 May Be At Risk	1	18.7 ± 1.0	NB
N	<i>Campyllum radicale</i>	Long-stalked Fine Wet Moss				S1S2	5 Undetermined	1	95.2 ± 1.0	NB
N	<i>Ditrichum pallidum</i>	Pale Cow-hair Moss				S1S2	2 May Be At Risk	1	84.7 ± 1.0	NB
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2	5 Undetermined	2	58.5 ± 0.0	NB
N	<i>Tomentypnum falcifolium</i>	Sickle-leaved Golden Moss				S1S2	2 May Be At Risk	1	28.3 ± 1.0	NB
N	<i>Pseudotaxiphyllum distichaceum</i>	a Moss				S1S2	2 May Be At Risk	2	18.7 ± 1.0	NB
N	<i>Hamatocaulis vernicosus</i>	a Moss				S1S2	2 May Be At Risk	1	81.3 ± 100.0	NB
N	<i>Calypogeia neesiana</i>	Nees' Pouchwort				S1S3	6 Not Assessed	1	78.2 ± 1.0	NB
N	<i>Cephaloziella elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	46.1 ± 5.0	NB
N	<i>Porella pinnata</i>	Pinnate Scalewort				S1S3	6 Not Assessed	2	59.8 ± 1.0	NB
N	<i>Amphidium mougeotii</i>	a Moss				S2	3 Sensitive	2	30.9 ± 8.0	NB
N	<i>Anomodon viticulosus</i>	a Moss				S2	2 May Be At Risk	4	55.2 ± 1.0	NB
N	<i>Cynodontium strumiferum</i>	Strumose Dogtooth Moss				S2	3 Sensitive	1	30.9 ± 8.0	NB
N	<i>Dicranella palustris</i>	Drooping-Leaved Fork Moss				S2	3 Sensitive	1	97.4 ± 100.0	NB
N	<i>Didymodon ferrugineus</i>	a moss				S2	3 Sensitive	1	77.3 ± 1.0	NB
N	<i>Anomodon tristis</i>	a Moss				S2	2 May Be At Risk	1	61.2 ± 1.0	NB
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	49.5 ± 0.0	NB
N	<i>Physcomitrium immersum</i>	a Moss				S2	3 Sensitive	6	83.1 ± 1.0	NB
N	<i>Sphagnum centrale</i>	Central Peat Moss				S2	3 Sensitive	2	57.1 ± 0.0	NB
N	<i>Sphagnum lindbergii</i>	Lindberg's Peat Moss				S2	3 Sensitive	7	18.7 ± 1.0	NB
N	<i>Tayloria serrata</i>	Serrate Trumpet Moss				S2	3 Sensitive	1	88.3 ± 1.0	NB
N	<i>Tetraplodon mnioides</i>	Entire-leaved Nitrogen Moss				S2	3 Sensitive	3	18.7 ± 1.0	NB
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S2	3 Sensitive	1	55.3 ± 0.0	NB
N	<i>Ulotia phyllantha</i>	a Moss				S2	3 Sensitive	4	18.7 ± 1.0	NB
N	<i>Anomobryum filiforme</i>	a moss				S2	5 Undetermined	1	95.2 ± 1.0	NB
N	<i>Nephroma laevigatum</i>	Mustard Kidney Lichen				S2	2 May Be At Risk	1	46.1 ± 10.0	NB
N	<i>Andreaea rothii</i>	a Moss				S2?	3 Sensitive	1	76.0 ± 0.0	NB
N	<i>Brachythecium digastrum</i>	a Moss				S2?	3 Sensitive	2	89.1 ± 0.0	NB
N	<i>Bryum pallescens</i>	Pale Bryum Moss				S2?	5 Undetermined	2	44.6 ± 1.0	NB
N	<i>Dichelyma capillaceum</i>	Hairlike Dichelyma Moss				S2?	3 Sensitive	1	82.4 ± 4.0	NB
N	<i>Dicranum spurium</i>	Spurred Broom Moss				S2?	3 Sensitive	2	22.3 ± 0.0	NB
N	<i>Schistostega pennata</i>	Luminous Moss				S2?	3 Sensitive	2	95.2 ± 1.0	NB
N	<i>Seligeria campylopoda</i>	a Moss				S2?	3 Sensitive	1	81.3 ± 100.0	NB
N	<i>Seligeria diversifolia</i>	a Moss				S2?	3 Sensitive	1	98.8 ± 0.0	NB
N	<i>Sphagnum angermanicum</i>	a Peatmoss				S2?	3 Sensitive	2	30.9 ± 10.0	NB
N	<i>Bryum uliginosum</i>	a Moss				S2S3	3 Sensitive	1	78.8 ± 4.0	NB
N	<i>Buxbaumia aphylla</i>	Brown Shield Moss				S2S3	3 Sensitive	2	30.9 ± 8.0	NB
N	<i>Calliergonella cuspidata</i>	Common Large Wetland Moss				S2S3	3 Sensitive	6	20.7 ± 10.0	NB
N	<i>Campyllum polygamum</i>	a Moss				S2S3	3 Sensitive	1	76.1 ± 1.0	NB

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N	<i>Didymodon rigidulus</i>	Rigid Screw Moss				S2S3	3 Sensitive	1	80.4 ± 8.0	NB
N	<i>Fissidens bushii</i>	Bush's Pocket Moss				S2S3	3 Sensitive	1	98.5 ± 3.0	NS
N	<i>Orthotrichum speciosum</i>	Showy Bristle Moss				S2S3	5 Undetermined	3	19.2 ± 2.0	NB
N	<i>Racomitrium fasciculare</i>	a Moss				S2S3	3 Sensitive	1	23.4 ± 0.0	NB
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	4	46.2 ± 0.0	NB
N	<i>Sphagnum subfulvum</i>	a Peatmoss				S2S3	2 May Be At Risk	4	28.3 ± 1.0	NB
N	<i>Taxiphyllum deplanatum</i>	Imbricate Yew-leaved Moss				S2S3	3 Sensitive	1	18.7 ± 1.0	NB
N	<i>Zygodon viridissimus</i>	a Moss				S2S3	2 May Be At Risk	3	23.6 ± 3.0	NB
N	<i>Schistidium agassizii</i>	Elf Bloom Moss				S2S3	3 Sensitive	2	19.2 ± 2.0	NB
N	<i>Loeskeobryum brevirostre</i>	a Moss				S2S3	3 Sensitive	4	86.0 ± 3.0	NS
N	<i>Cynodontium tenellum</i>	Delicate Dogtooth Moss				S3	3 Sensitive	1	18.7 ± 1.0	NB
N	<i>Hypnum curvifolium</i>	Curved-leaved Plait Moss				S3	3 Sensitive	1	28.2 ± 5.0	NB
N	<i>Schistidium maritimum</i>	a Moss				S3	4 Secure	3	18.7 ± 1.0	NB
N	<i>Aulacomnium androgynum</i>	Little Groove Moss				S3?	4 Secure	3	28.2 ± 5.0	NB
N	<i>Dicranella rufescens</i>	Red Forklet Moss				S3?	5 Undetermined	2	88.4 ± 4.0	NB
N	<i>Rhytidiadelphus loreus</i>	Lanky Moss				S3?	2 May Be At Risk	1	59.0 ± 10.0	NB
N	<i>Sphagnum lescurii</i>	a Peatmoss				S3?	5 Undetermined	2	56.4 ± 1.0	NB
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3 Sensitive	1	98.5 ± 3.0	NS
N	<i>Barbula convoluta</i>	Lesser Bird's-claw Beard Moss				S3S4	4 Secure	1	80.4 ± 8.0	NB
N	<i>Brachythecium velutinum</i>	Velvet Ragged Moss				S3S4	4 Secure	3	26.2 ± 0.0	NB
N	<i>Dicranella cerviculata</i>	a Moss				S3S4	3 Sensitive	3	18.7 ± 1.0	NB
N	<i>Dicranum majus</i>	Greater Broom Moss				S3S4	4 Secure	6	18.7 ± 1.0	NB
N	<i>Fissidens bryoides</i>	Lesser Pocket Moss				S3S4	4 Secure	2	77.1 ± 5.0	NB
N	<i>Heterocladium dimorphum</i>	Dimorphous Tangle Moss				S3S4	4 Secure	1	19.2 ± 2.0	NB
N	<i>Isopterygiopsis muelleriana</i>	a Moss				S3S4	4 Secure	6	26.2 ± 0.0	NB
N	<i>Myurella julacea</i>	Small Mouse-tail Moss				S3S4	4 Secure	1	30.9 ± 8.0	NB
N	<i>Physcomitrium pyriforme</i>	Pear-shaped Urn Moss				S3S4	3 Sensitive	3	89.1 ± 0.0	NB
N	<i>Pogonatum dentatum</i>	Mountain Hair Moss				S3S4	4 Secure	1	18.7 ± 1.0	NB
N	<i>Sphagnum torreyanum</i>	a Peatmoss				S3S4	4 Secure	4	42.4 ± 0.0	NB
N	<i>Sphagnum austinii</i>	Austin's Peat Moss				S3S4	4 Secure	1	42.4 ± 1.0	NB
N	<i>Sphagnum contortum</i>	Twisted Peat Moss				S3S4	4 Secure	1	65.0 ± 0.0	NB
N	<i>Splachnum rubrum</i>	Red Collar Moss				S3S4	4 Secure	1	82.1 ± 1.0	NB
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	4	18.5 ± 0.0	NB
N	<i>Tetraplodon angustatus</i>	Toothed-leaved Nitrogen Moss				S3S4	4 Secure	1	18.7 ± 1.0	NB
N	<i>Weissia controversa</i>	Green-Cushioned Weissia				S3S4	4 Secure	1	98.8 ± 3.0	NS
N	<i>Trichostomum tenuirostre</i>	Acid-Soil Moss				S3S4	4 Secure	2	26.2 ± 0.0	NB
N	<i>Grimmia anodon</i>	Toothless Grimmiid Moss				SH	5 Undetermined	2	57.4 ± 10.0	NB
N	<i>Leucodon brachypus</i>	a Moss				SH	2 May Be At Risk	3	23.6 ± 3.0	NB
N	<i>Thelia hirtella</i>	a Moss				SH	2 May Be At Risk	1	98.5 ± 3.0	NS
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	50	62.8 ± 1.0	NB
P	<i>Polemonium vanbruntiae</i>	Van Brunt's Jacob's-ladder	Threatened	Threatened	Threatened	S1	1 At Risk	72	7.0 ± 0.0	NB
P	<i>Symphotrichum anticostense</i>	Anticosti Aster	Threatened	Threatened	Endangered	S2S3	1 At Risk	4	94.7 ± 0.0	NB
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Endangered	S2	1 At Risk	21	55.0 ± 0.0	NB
P	<i>Pterospora</i>	Woodland Pinedrops			Endangered	S1	1 At Risk	11	94.7 ± 0.0	NB

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P	<i>andromedeae</i>									
P	<i>Sanicula trifoliata</i>	Large-Fruited Sanicle				S1	2 May Be At Risk	1	86.4 ± 5.0	NB
P	<i>Antennaria parlinii</i>	a Pussytoes				S1	2 May Be At Risk	7	43.3 ± 0.0	NB
P	<i>Antennaria howellii</i>	Pussy-Toes				S1	2 May Be At Risk	4	50.2 ± 1.0	NB
P	<i>ssp. petaloidea</i>									
P	<i>Bidens discoidea</i>	Swamp Beggarticks				S1	2 May Be At Risk	3	94.2 ± 0.0	NB
P	<i>Helianthus decapetalus</i>	Ten-rayed Sunflower				S1	2 May Be At Risk	13	94.8 ± 1.0	NB
P	<i>Hieracium kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	6	18.0 ± 1.0	NB
P	<i>Hieracium kalmii</i> var. <i>kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	7	17.3 ± 1.0	NB
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S1	2 May Be At Risk	6	75.5 ± 1.0	NB
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S1	2 May Be At Risk	14	49.9 ± 0.0	NB
P	<i>Cardamine parviflora</i> var. <i>arenicola</i>	Small-flowered Bittercress				S1	2 May Be At Risk	12	17.4 ± 1.0	NB
P	<i>Cardamine concatenata</i>	Cut-leaved Toothwort				S1	2 May Be At Risk	1	86.7 ± 1.0	NB
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	7	31.3 ± 0.0	NB
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	7	51.9 ± 1.0	NB
P	<i>Minuartia groenlandica</i>	Greenland Stitchwort				S1	2 May Be At Risk	4	40.5 ± 0.0	NB
P	<i>Chenopodium capitatum</i>	Strawberry-blite				S1	2 May Be At Risk	3	58.2 ± 1.0	NB
P	<i>Chenopodium simplex</i>	Maple-leaved Goosefoot				S1	2 May Be At Risk	8	55.3 ± 1.0	NB
P	<i>Callitriche terrestris</i>	Terrestrial Water-Starwort				S1	5 Undetermined	1	58.7 ± 0.0	NB
P	<i>Triadenum virginicum</i>	Virginia St John's-wort				S1	2 May Be At Risk	7	56.8 ± 0.0	NB
P	<i>Viburnum acerifolium</i>	Maple-leaved Viburnum				S1	2 May Be At Risk	10	47.8 ± 0.0	NB
P	<i>Corema conradii</i>	Broom Crowberry				S1	2 May Be At Risk	1	56.0 ± 10.0	NB
P	<i>Vaccinium boreale</i>	Northern Blueberry				S1	2 May Be At Risk	1	22.3 ± 0.0	NB
P	<i>Vaccinium corymbosum</i>	Highbush Blueberry				S1	3 Sensitive	7	40.6 ± 5.0	NB
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S1	2 May Be At Risk	8	46.4 ± 0.0	NB
P	<i>Desmodium glutinosum</i>	Large Tick-Trefoil				S1	2 May Be At Risk	1	50.9 ± 1.0	NB
P	<i>Gentiana rubricaulis</i>	Purple-stemmed Gentian				S1	2 May Be At Risk	14	23.0 ± 0.0	NB
P	<i>Lomatogonium rotatum</i>	Marsh Felwort				S1	2 May Be At Risk	2	19.6 ± 0.0	NB
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S1	2 May Be At Risk	2	18.6 ± 0.0	NB
P	<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint				S1	2 May Be At Risk	4	82.1 ± 0.0	NB
P	<i>Lysimachia hybrida</i>	Lowland Yellow Loosestrife				S1	2 May Be At Risk	15	44.2 ± 0.0	NB
P	<i>Lysimachia quadrifolia</i>	Whorled Yellow Loosestrife				S1	2 May Be At Risk	16	46.7 ± 1.0	NB
P	<i>Primula laurentiana</i>	Laurentian Primrose				S1	2 May Be At Risk	8	86.0 ± 1.0	NS
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1	2 May Be At Risk	6	42.5 ± 1.0	NB
P	<i>Crataegus jonesiae</i>	Jones' Hawthorn				S1	2 May Be At Risk	5	22.8 ± 0.0	NB
P	<i>Galium brevipes</i>	Limestone Swamp Bedstraw				S1	2 May Be At Risk	3	47.4 ± 5.0	NB
P	<i>Saxifraga paniculata</i> ssp. <i>neogaea</i>	White Mountain Saxifrage				S1	2 May Be At Risk	7	65.9 ± 10.0	NB
P	<i>Agalinis paupercula</i> var. <i>borealis</i>	Small-flowered Agalinis				S1	2 May Be At Risk	8	76.2 ± 1.0	NB
P	<i>Agalinis tenuifolia</i>	Slender Agalinis				S1	2 May Be At Risk	6	91.1 ± 0.0	NB
P	<i>Gratiola aurea</i>	Golden Hedge-Hyssop				S1	3 Sensitive	2	37.8 ± 5.0	NB
P	<i>Pedicularis canadensis</i>	Canada Lousewort				S1	2 May Be At Risk	20	26.9 ± 0.0	NB
P	<i>Viola sagittata</i> var. <i>ovata</i>	Arrow-Leaved Violet				S1	2 May Be At Risk	24	42.7 ± 0.0	NB
P	<i>Alisma subcordatum</i>	Southern Water Plantain				S1	5 Undetermined	6	62.9 ± 5.0	NB
P	<i>Carex cephaloidea</i>	Thin-leaved Sedge				S1	2 May Be At Risk	2	91.7 ± 0.0	NB
P	<i>Carex merritt-feraldii</i>	Merritt Fernald's Sedge				S1	2 May Be At Risk	2	25.6 ± 0.0	NB

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P	<i>Carex saxatilis</i>	Russet Sedge				S1	2 May Be At Risk	13	55.2 ± 10.0	NB
P	<i>Carex sterilis</i>	Sterile Sedge				S1	2 May Be At Risk	1	94.8 ± 0.0	NB
P	<i>Carex grisea</i>	Inflated Narrow-leaved Sedge				S1	2 May Be At Risk	9	87.0 ± 0.0	NB
P	<i>Cyperus diandrus</i>	Low Flatsedge				S1	2 May Be At Risk	7	91.0 ± 1.0	NB
P	<i>Cyperus lupulinus</i>	Hop Flatsedge				S1	2 May Be At Risk	3	95.9 ± 0.0	NB
P	<i>Cyperus lupulinus ssp. macilentus</i>	Hop Flatsedge				S1	2 May Be At Risk	12	95.5 ± 0.0	NB
P	<i>Eleocharis olivacea</i>	Yellow Spikerush				S1	2 May Be At Risk	4	46.4 ± 1.0	NB
P	<i>Rhynchospora capillacea</i>	Slender Beakrush				S1	2 May Be At Risk	3	94.7 ± 0.0	NB
P	<i>Sisyrinchium angustifolium</i>	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	4	57.3 ± 1.0	NB
P	<i>Juncus greenii</i>	Greene's Rush				S1	2 May Be At Risk	1	7.3 ± 0.0	NB
P	<i>Juncus subtilis</i>	Creeping Rush				S1	2 May Be At Risk	1	81.7 ± 5.0	NB
P	<i>Allium canadense</i>	Canada Garlic				S1	2 May Be At Risk	11	82.1 ± 0.0	NB
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S1	2 May Be At Risk	1	94.1 ± 0.0	NB
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	3	45.9 ± 10.0	NB
P	<i>Platanthera flava var. herbiola</i>	Pale Green Orchid				S1	2 May Be At Risk	12	32.2 ± 0.0	NB
P	<i>Platanthera macrophylla</i>	Large Round-Leaved Orchid				S1	2 May Be At Risk	1	93.6 ± 1.0	NB
P	<i>Spiranthes casei</i>	Case's Ladies'-Tresses				S1	2 May Be At Risk	6	96.7 ± 0.0	NB
P	<i>Bromus pubescens</i>	Hairy Wood Brome Grass				S1	5 Undetermined	6	96.0 ± 0.0	NB
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1	2 May Be At Risk	22	42.5 ± 0.0	NB
P	<i>Danthonia compressa</i>	Flattened Oat Grass				S1	2 May Be At Risk	1	91.4 ± 0.0	NB
P	<i>Dichanthelium dichotomum</i>	Forked Panic Grass				S1	2 May Be At Risk	19	42.8 ± 0.0	NB
P	<i>Glyceria obtusa</i>	Atlantic Manna Grass				S1	2 May Be At Risk	6	23.5 ± 5.0	NB
P	<i>Sporobolus compositus</i>	Rough Dropseed				S1	2 May Be At Risk	17	93.8 ± 0.0	NB
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S1	2 May Be At Risk	6	49.4 ± 5.0	NB
P	<i>Potamogeton nodosus</i>	Long-leaved Pondweed				S1	2 May Be At Risk	4	89.9 ± 1.0	NB
P	<i>Potamogeton strictifolius</i>	Straight-leaved Pondweed				S1	2 May Be At Risk	2	71.8 ± 0.0	NB
P	<i>Xyris difformis</i>	Bog Yellow-eyed-grass				S1	5 Undetermined	3	56.8 ± 0.0	NB
P	<i>Asplenium ruta-muraria var. cryptolepis</i>	Wallrue Spleenwort				S1	2 May Be At Risk	3	65.4 ± 0.0	NB
P	<i>Botrychium oneidense</i>	Blunt-lobed Moonwort				S1	2 May Be At Risk	4	62.8 ± 0.0	NB
P	<i>Botrychium rugulosum</i>	Rugulose Moonwort				S1	2 May Be At Risk	1	47.9 ± 1.0	NB
P	<i>Schizaea pusilla</i>	Little Curlygrass Fern				S1	2 May Be At Risk	21	30.7 ± 0.0	NB
P	<i>Hieracium kalmii var. fasciculatum</i>	Kalm's Hawkweed				S1?	5 Undetermined	6	22.7 ± 0.0	NB
P	<i>Drosera rotundifolia var. comosa</i>	Round-leaved Sundew				S1?	5 Undetermined	5	16.2 ± 1.0	NB
P	<i>Wolffia columbiana</i>	Columbian Watermeal				S1?	2 May Be At Risk	5	86.7 ± 0.0	NB
P	<i>Rumex aquaticus var. fenestratus</i>	Western Dock				S1S2	2 May Be At Risk	1	85.8 ± 1.0	NB
P	<i>Saxifraga virginiana</i>	Early Saxifrage				S1S2	2 May Be At Risk	14	90.4 ± 0.0	NB
P	<i>Potamogeton bicupulatus</i>	Snailseed Pondweed				S1S2	2 May Be At Risk	5	24.7 ± 0.0	NB
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1S2	2 May Be At Risk	19	84.8 ± 0.0	NS
P	<i>Thelypteris simulata</i>	Bog Fern				S1S2	2 May Be At Risk	1	95.7 ± 0.0	NB
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S1S3	2 May Be At Risk	2	55.1 ± 1.0	NB
P	<i>Listera australis</i>	Southern Twayblade			Endangered	S2	1 At Risk	11	73.9 ± 0.0	NB
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	3 Sensitive	3	25.7 ± 0.0	NB
P	<i>Sanicula odorata</i>	Clustered Sanicle				S2	2 May Be At Risk	1	99.5 ± 0.0	NB
P	<i>Pseudognaphalium macounii</i>	Macoun's Cudweed				S2	3 Sensitive	8	55.7 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Solidago simplex</i> var. <i>racemosa</i>	Sticky Goldenrod				S2	2 May Be At Risk	12	93.3 ± 1.0	NB
P	<i>Ionactis linariifolius</i>	Stiff Aster				S2	3 Sensitive	1	97.8 ± 0.0	NB
P	<i>Symphotrichum racemosum</i>	Small White Aster				S2	3 Sensitive	7	74.3 ± 0.0	NB
P	<i>Alnus serrulata</i>	Smooth Alder				S2	3 Sensitive	36	45.5 ± 0.0	NB
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	9	55.3 ± 1.0	NB
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2	3 Sensitive	21	8.6 ± 0.0	NB
P	<i>Sagina nodosa</i> ssp. <i>borealis</i>	Knotted Pearlwort				S2	3 Sensitive	2	40.0 ± 0.0	NB
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	4	55.7 ± 10.0	NB
P	<i>Atriplex franktonii</i>	Frankton's Saltbush				S2	4 Secure	3	21.7 ± 1.0	NB
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	4	53.0 ± 0.0	NB
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2	3 Sensitive	6	1.3 ± 1.0	NB
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2	3 Sensitive	6	92.1 ± 1.0	NB
P	<i>Viburnum lentago</i>	Nannyberry				S2	4 Secure	89	42.7 ± 0.0	NB
P	<i>Viburnum recognitum</i>	Northern Arrow-Wood				S2	4 Secure	168	5.6 ± 0.0	NB
P	<i>Astragalus eucosmus</i>	Elegant Milk-vetch				S2	2 May Be At Risk	10	77.1 ± 0.0	NB
P	<i>Oxytropis campestris</i> var. <i>johannensis</i>	Field Locoweed				S2	3 Sensitive	8	65.1 ± 50.0	NB
P	<i>Quercus macrocarpa</i>	Bur Oak				S2	2 May Be At Risk	33	24.5 ± 1.0	NB
P	<i>Gentiana linearis</i>	Narrow-Leaved Gentian				S2	3 Sensitive	5	95.1 ± 5.0	NB
P	<i>Myriophyllum humile</i>	Low Water Milfoil				S2	3 Sensitive	7	72.1 ± 0.0	NB
P	<i>Proserpinaca palustris</i> var. <i>crebra</i>	Marsh Mermaidweed				S2	3 Sensitive	24	7.0 ± 0.0	NB
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	59	24.0 ± 1.0	NB
P	<i>Nuphar lutea</i> ssp. <i>rubrodisca</i>	Red-disked Yellow Pond-lily				S2	3 Sensitive	9	35.6 ± 0.0	NB
P	<i>Orobanche uniflora</i>	One-Flowered Broomrape				S2	3 Sensitive	13	28.3 ± 0.0	NB
P	<i>Polygala paucifolia</i>	Fringed Milkwort				S2	3 Sensitive	11	10.3 ± 1.0	NB
P	<i>Polygala senega</i>	Seneca Snakeroot				S2	3 Sensitive	2	92.1 ± 1.0	NB
P	<i>Polygonum amphibium</i> var. <i>emersum</i>	Water Smartweed				S2	3 Sensitive	20	6.2 ± 0.0	NB
P	<i>Polygonum careyi</i>	Carey's Smartweed				S2	3 Sensitive	8	26.1 ± 1.0	NB
P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S2	3 Sensitive	22	44.2 ± 0.0	NB
P	<i>Anemone multifida</i>	Cut-leaved Anemone				S2	3 Sensitive	1	94.2 ± 0.0	NB
P	<i>Hepatica nobilis</i> var. <i>obtusata</i>	Round-lobed Hepatica				S2	3 Sensitive	32	42.7 ± 0.0	NB
P	<i>Ranunculus flabellaris</i>	Yellow Water Buttercup				S2	4 Secure	17	49.8 ± 0.0	NB
P	<i>Ranunculus longirostris</i>	Eastern White Water-Crowfoot				S2	5 Undetermined	4	19.6 ± 1.0	NB
P	<i>Crataegus scabrada</i>	Rough Hawthorn				S2	3 Sensitive	3	65.3 ± 0.0	NB
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S2	3 Sensitive	1	95.2 ± 5.0	NB
P	<i>Cephalanthus occidentalis</i>	Common Buttonbush				S2	3 Sensitive	65	42.6 ± 0.0	NB
P	<i>Salix candida</i>	Sage Willow				S2	3 Sensitive	2	86.8 ± 1.0	NB
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S2	3 Sensitive	32	36.7 ± 1.0	NB
P	<i>Euphrasia randii</i>	Rand's Eyebright				S2	2 May Be At Risk	23	17.3 ± 0.0	NB
P	<i>Scrophularia lanceolata</i>	Lance-leaved Figwort				S2	3 Sensitive	3	76.5 ± 5.0	NB
P	<i>Dirca palustris</i>	Eastern Leatherwood				S2	2 May Be At Risk	4	94.8 ± 1.0	NB
P	<i>Phryma leptostachya</i>	American Lopseed				S2	3 Sensitive	2	98.7 ± 1.0	NB
P	<i>Verbena urticifolia</i>	White Vervain				S2	2 May Be At Risk	12	91.6 ± 1.0	NB
P	<i>Viola novae-angliae</i>	New England Violet				S2	3 Sensitive	5	5.1 ± 1.0	NB
P	<i>Symplocarpus foetidus</i>	Eastern Skunk Cabbage				S2	3 Sensitive	91	6.2 ± 0.0	NB

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P	<i>Carex granularis</i>	Limestone Meadow Sedge				S2	3 Sensitive	7	58.1 ± 0.0	NB
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S2	3 Sensitive	4	52.0 ± 0.0	NB
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2	3 Sensitive	3	90.2 ± 0.0	NB
P	<i>Carex livida</i> var. <i>radicaulis</i>	Livid Sedge				S2	3 Sensitive	1	55.7 ± 2.0	NB
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S2	3 Sensitive	1	87.1 ± 1.0	NB
P	<i>Carex prairea</i>	Prairie Sedge				S2	3 Sensitive	1	86.0 ± 5.0	NS
P	<i>Carex rostrata</i>	Narrow-leaved Beaked Sedge				S2	3 Sensitive	1	40.1 ± 0.0	NB
P	<i>Carex salina</i>	Saltmarsh Sedge				S2	3 Sensitive	2	54.0 ± 1.0	NB
P	<i>Carex spengelii</i>	Longbeak Sedge				S2	3 Sensitive	1	96.1 ± 0.0	NB
P	<i>Carex tenuiflora</i>	Sparse-Flowered Sedge				S2	2 May Be At Risk	5	45.7 ± 0.0	NB
P	<i>Carex albicans</i> var. <i>emmonsii</i>	White-tinged Sedge				S2	3 Sensitive	1	62.8 ± 0.0	NB
P	<i>Cyperus squarrosus</i>	Awned Flatsedge				S2	3 Sensitive	18	83.4 ± 0.0	NB
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2	2 May Be At Risk	4	95.1 ± 0.0	NB
P	<i>Blysmus rufus</i>	Red Bulrush				S2	3 Sensitive	3	43.6 ± 0.0	NB
P	<i>Elodea nuttallii</i>	Nuttall's Waterweed				S2	3 Sensitive	8	45.9 ± 0.0	NB
P	<i>Allium tricoccum</i>	Wild Leek				S2	2 May Be At Risk	5	78.4 ± 0.0	NB
P	<i>Najas gracillima</i>	Thread-Like Naiad				S2	3 Sensitive	11	10.1 ± 0.0	NB
P	<i>Calypso bulbosa</i> var. <i>americana</i>	Calypso				S2	2 May Be At Risk	3	62.0 ± 0.0	NB
P	<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid				S2	2 May Be At Risk	5	81.2 ± 5.0	NB
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	5	49.9 ± 1.0	NB
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	3 Sensitive	11	52.0 ± 1.0	NB
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S2	2 May Be At Risk	10	46.2 ± 0.0	NB
P	<i>Dichantherium linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	7	42.7 ± 0.0	NB
P	<i>Elymus canadensis</i>	Canada Wild Rye				S2	2 May Be At Risk	15	87.0 ± 1.0	NB
P	<i>Leersia virginica</i>	White Cut Grass				S2	2 May Be At Risk	41	80.2 ± 10.0	NB
P	<i>Piptatherum canadense</i>	Canada Rice Grass				S2	3 Sensitive	5	57.2 ± 0.0	NB
P	<i>Poa glauca</i>	Glaucous Blue Grass				S2	4 Secure	1	55.7 ± 2.0	NB
P	<i>Puccinellia phryganodes</i>	Creeping Alkali Grass				S2	3 Sensitive	15	12.8 ± 0.0	NB
P	<i>Schizachyrium scoparium</i>	Little Bluestem				S2	3 Sensitive	21	73.9 ± 0.0	NB
P	<i>Zizania aquatica</i> var. <i>aquatica</i>	Indian Wild Rice				S2	5 Undetermined	3	91.8 ± 0.0	NB
P	<i>Potamogeton vaseyi</i>	Vasey's Pondweed				S2	3 Sensitive	10	49.6 ± 0.0	NB
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	9	53.1 ± 0.0	NB
P	<i>Woodwardia virginica</i>	Virginia Chain Fern				S2	3 Sensitive	19	61.4 ± 1.0	NB
P	<i>Woodsia alpina</i>	Alpine Cliff Fern				S2	3 Sensitive	5	66.0 ± 0.0	NB
P	<i>Selaginella selaginoides</i>	Low Spikemoss				S2	3 Sensitive	4	28.6 ± 0.0	NB
P	<i>Toxicodendron radicans</i>	Poison Ivy				S2?	3 Sensitive	11	56.2 ± 0.0	NB
P	<i>Symphotrichum novi-belgii</i> var. <i>crenifolium</i>	New York Aster				S2?	5 Undetermined	9	16.5 ± 0.0	NB
P	<i>Humulus lupulus</i> var. <i>lupuloides</i>	Common Hop				S2?	3 Sensitive	4	88.8 ± 0.0	NB
P	<i>Rubus recurvicaulis</i>	Arching Dewberry				S2?	4 Secure	3	52.2 ± 1.0	NB
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2?	4 Secure	4	91.9 ± 1.0	NB
P	<i>Salix myricoides</i>	Bayberry Willow				S2?	3 Sensitive	7	25.1 ± 0.0	NB
P	<i>Carex vacillans</i>	Estuarine Sedge				S2?	3 Sensitive	4	16.5 ± 1.0	NB

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P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S2?	5 Undetermined	2	53.6 ± 1.0	NB
P	<i>Solidago altissima</i>	Tall Goldenrod				S2S3	4 Secure	6	69.3 ± 0.0	NB
P	<i>Barbarea orthoceras</i>	American Yellow Rocket				S2S3	3 Sensitive	4	44.4 ± 10.0	NB
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	15	43.2 ± 0.0	NB
P	<i>Callitriche hermaphroditica</i>	Northern Water-starwort				S2S3	4 Secure	6	34.3 ± 0.0	NB
P	<i>Lonicera oblongifolia</i>	Swamp Fly Honeysuckle				S2S3	3 Sensitive	12	37.6 ± 6.0	NB
P	<i>Elatine americana</i>	American Waterwort				S2S3	3 Sensitive	8	49.2 ± 1.0	NB
P	<i>Bartonia paniculata</i>	Branched Bartonia				S2S3	3 Sensitive	5	30.9 ± 0.0	NB
P	<i>Bartonia paniculata</i> <i>ssp. iodandra</i>	Branched Bartonia				S2S3	3 Sensitive	14	22.1 ± 1.0	NB
P	<i>Geranium robertianum</i>	Herb Robert				S2S3	4 Secure	17	18.2 ± 0.0	NB
P	<i>Myriophyllum quitense</i>	Andean Water Milfoil				S2S3	4 Secure	71	49.6 ± 0.0	NB
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2S3	3 Sensitive	11	51.8 ± 1.0	NB
P	<i>Rumex pallidus</i>	Seabeach Dock				S2S3	3 Sensitive	6	13.7 ± 1.0	NB
P	<i>Rubus pensilvanicus</i>	Pennsylvania Blackberry				S2S3	4 Secure	9	24.7 ± 3.0	NB
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2S3	3 Sensitive	3	15.9 ± 1.0	NB
P	<i>Valeriana uliginosa</i>	Swamp Valerian				S2S3	3 Sensitive	1	42.4 ± 1.0	NB
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	4 Secure	3	52.9 ± 1.0	NB
P	<i>Corallorhiza maculata</i> <i>var. occidentalis</i>	Spotted Coralroot				S2S3	3 Sensitive	6	25.6 ± 0.0	NB
P	<i>Corallorhiza maculata</i> <i>var. maculata</i>	Spotted Coralroot				S2S3	3 Sensitive	2	92.7 ± 1.0	NB
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	9	50.2 ± 1.0	NB
P	<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses				S2S3	3 Sensitive	15	4.0 ± 1.0	NB
P	<i>Eragrostis pectinacea</i>	Tufted Love Grass				S2S3	4 Secure	14	23.0 ± 0.0	NB
P	<i>Stuckenia filiformis</i> <i>ssp. alpina</i>	Thread-leaved Pondweed				S2S3	3 Sensitive	6	55.7 ± 2.0	NB
P	<i>Stuckenia pectinata</i>	Sago Pondweed				S2S3	3 Sensitive	61	23.7 ± 0.0	NB
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S2S3	4 Secure	13	48.1 ± 0.0	NB
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S2S3	3 Sensitive	9	19.9 ± 1.0	NB
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	6	38.2 ± 1.0	NB
P	<i>Panax trifolius</i>	Dwarf Ginseng				S3	3 Sensitive	5	51.3 ± 0.0	NB
P	<i>Artemisia campestris</i>	Field Wormwood				S3	4 Secure	3	95.5 ± 0.0	NB
P	<i>Artemisia campestris</i> <i>ssp. caudata</i>	Field Wormwood				S3	4 Secure	32	47.8 ± 0.0	NB
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	4 Secure	6	47.8 ± 0.0	NB
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	63	50.6 ± 1.0	NB
P	<i>Tanacetum bipinnatum</i> <i>ssp. huronense</i>	Lake Huron Tansy				S3	4 Secure	22	63.5 ± 1.0	NB
P	<i>Symphotrichum boreale</i>	Boreal Aster				S3	3 Sensitive	10	11.8 ± 0.0	NB
P	<i>Betula pumila</i>	Bog Birch				S3	4 Secure	22	50.1 ± 0.0	NB
P	<i>Arabis hirsuta</i> var. <i>pycnocarpa</i>	Western Hairy Rockcress				S3	4 Secure	12	55.3 ± 0.0	NB
P	<i>Cardamine maxima</i>	Large Toothwort				S3	4 Secure	24	58.8 ± 0.0	NB
P	<i>Subularia aquatica</i> var. <i>americana</i>	Water Awlwort				S3	4 Secure	18	9.6 ± 0.0	NB
P	<i>Lobelia cardinalis</i>	Cardinal Flower				S3	4 Secure	361	6.7 ± 0.0	NB
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S3	4 Secure	6	17.3 ± 0.0	NB
P	<i>Hudsonia tomentosa</i>	Woolly Beach-heath				S3	4 Secure	3	35.1 ± 0.0	NB
P	<i>Cornus amomum</i> ssp. <i>obliqua</i>	Pale Dogwood				S3	3 Sensitive	189	42.5 ± 0.0	NB
P	<i>Crassula aquatica</i>	Water Pygmyweed				S3	4 Secure	9	50.2 ± 1.0	NB
P	<i>Rhodiola rosea</i>	Roseroot				S3	4 Secure	41	9.7 ± 1.0	NB

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P	<i>Penthorum sedoides</i>	Ditch Stonecrop				S3	4 Secure	61	6.7 ± 0.0	NB
P	<i>Elatine minima</i>	Small Waterwort				S3	4 Secure	48	9.2 ± 0.0	NB
P	<i>Astragalus alpinus</i> var. <i>brunetianus</i>	Alpine Milk-Vetch				S3	4 Secure	3	88.9 ± 0.0	NB
P	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch				S3	4 Secure	2	77.8 ± 0.0	NB
P	<i>Gentianella amarella</i> ssp. <i>acuta</i>	Northern Gentian				S3	4 Secure	7	55.1 ± 5.0	NB
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	5	24.2 ± 1.0	NB
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S3	4 Secure	22	11.4 ± 0.0	NB
P	<i>Myriophyllum heterophyllum</i>	Variable-leaved Water Milfoil				S3	4 Secure	36	48.9 ± 0.0	NB
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S3	4 Secure	17	7.1 ± 0.0	NB
P	<i>Stachys tenuifolia</i>	Smooth Hedge-Nettle				S3	3 Sensitive	12	77.2 ± 0.0	NB
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	3	48.1 ± 1.0	NB
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	40	10.1 ± 0.0	NB
P	<i>Nuphar lutea</i> ssp. <i>pumila</i>	Small Yellow Pond-lily				S3	4 Secure	14	55.7 ± 0.0	NB
P	<i>Epilobium hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	3	24.1 ± 0.0	NB
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	4 Secure	19	37.4 ± 0.0	NB
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	3 Sensitive	8	74.9 ± 0.0	NB
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S3	4 Secure	11	46.7 ± 0.0	NB
P	<i>Polygonum punctatum</i>	Dotted Smartweed				S3	4 Secure	2	92.5 ± 0.0	NB
P	<i>Polygonum punctatum</i> var. <i>confertiflorum</i>	Dotted Smartweed				S3	4 Secure	15	35.0 ± 1.0	NB
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	4 Secure	29	17.1 ± 0.0	NB
P	<i>Littorella uniflora</i>	American Shoreweed				S3	4 Secure	25	7.0 ± 5.0	NB
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	12	48.9 ± 1.0	NB
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	4 Secure	2	23.6 ± 0.0	NB
P	<i>Clematis occidentalis</i>	Purple Clematis				S3	4 Secure	14	42.8 ± 0.0	NB
P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	5	91.7 ± 0.0	NB
P	<i>Thalictrum venulosum</i>	Northern Meadow-rue				S3	4 Secure	79	18.0 ± 0.0	NB
P	<i>Amelanchier canadensis</i>	Canada Serviceberry				S3	4 Secure	15	4.6 ± 1.0	NB
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	40	7.3 ± 0.0	NB
P	<i>Rubus occidentalis</i>	Black Raspberry				S3	4 Secure	21	72.0 ± 0.0	NB
P	<i>Galium boreale</i>	Northern Bedstraw				S3	4 Secure	5	48.1 ± 0.0	NB
P	<i>Salix interior</i>	Sandbar Willow				S3	4 Secure	27	84.7 ± 1.0	NB
P	<i>Salix nigra</i>	Black Willow				S3	3 Sensitive	83	50.2 ± 1.0	NB
P	<i>Salix pedicellaris</i>	Bog Willow				S3	4 Secure	46	7.0 ± 0.0	NB
P	<i>Parnassia glauca</i>	Fen Grass-of-Parnassus				S3	4 Secure	1	86.6 ± 10.0	NB
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	10	42.4 ± 5.0	NB
P	<i>Veronica serpyllifolia</i> ssp. <i>humifusa</i>	Thyme-Leaved Speedwell				S3	4 Secure	1	92.7 ± 100.0	NB
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S3	3 Sensitive	129	14.9 ± 0.0	NB
P	<i>Pilea pumila</i>	Dwarf Clearweed				S3	4 Secure	20	81.4 ± 0.0	NB
P	<i>Viola adunca</i>	Hooked Violet				S3	4 Secure	3	17.5 ± 1.0	NB
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	7	52.6 ± 0.0	NB
P	<i>Carex aquatilis</i>	Water Sedge				S3	4 Secure	12	18.6 ± 0.0	NB
P	<i>Carex arcta</i>	Northern Clustered Sedge				S3	4 Secure	34	55.9 ± 0.0	NB
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S3	4 Secure	1	55.7 ± 0.0	NB
P	<i>Carex capillaris</i>	Hairlike Sedge				S3	4 Secure	2	55.7 ± 2.0	NB
P	<i>Carex chordorrhiza</i>	Creeping Sedge				S3	4 Secure	20	32.7 ± 1.0	NB
P	<i>Carex conoidea</i>	Field Sedge				S3	4 Secure	25	24.6 ± 1.0	NB
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	81	16.4 ± 0.0	NB
P	<i>Carex garberi</i>	Garber's Sedge				S3	3 Sensitive	2	52.0 ± 1.0	NB
P	<i>Carex haydenii</i>	Hayden's Sedge				S3	4 Secure	27	13.9 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	98	42.6 ± 0.0	NB
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	54	7.7 ± 0.0	NB
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S3	4 Secure	6	59.3 ± 0.0	NB
P	<i>Carex rosea</i>	Rosy Sedge				S3	4 Secure	16	75.3 ± 0.0	NB
P	<i>Carex tenera</i>	Tender Sedge				S3	4 Secure	41	25.2 ± 1.0	NB
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S3	4 Secure	61	36.9 ± 0.0	NB
P	<i>Carex vaginata</i>	Sheathed Sedge				S3	3 Sensitive	9	45.7 ± 6.0	NB
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	33	15.5 ± 0.0	NB
P	<i>Carex recta</i>	Estuary Sedge				S3	4 Secure	7	21.6 ± 0.0	NB
P	<i>Cyperus dentatus</i>	Toothed Flatsedge				S3	4 Secure	62	4.8 ± 1.0	NB
P	<i>Cyperus esculentus</i>	Perennial Yellow Nutsedge				S3	4 Secure	25	82.5 ± 0.0	NB
P	<i>Eleocharis intermedia</i>	Matted Spikerush				S3	4 Secure	2	56.1 ± 0.0	NB
P	<i>Eleocharis quinqueflora</i>	Few-flowered Spikerush				S3	4 Secure	6	65.1 ± 0.0	NB
P	<i>Rhynchospora capitellata</i>	Small-headed Beakrush				S3	4 Secure	7	52.9 ± 0.0	NB
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	36	6.8 ± 0.0	NB
P	<i>Trichophorum clintonii</i>	Clinton's Clubrush				S3	4 Secure	6	6.9 ± 5.0	NB
P	<i>Schoenoplectus fluviatilis</i>	River Bulrush				S3	3 Sensitive	46	49.5 ± 1.0	NB
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S3	4 Secure	27	18.6 ± 0.0	NB
P	<i>Lemna trisulca</i>	Star Duckweed				S3	4 Secure	17	67.6 ± 1.0	NB
P	<i>Triantha glutinosa</i>	Sticky False-Asphodel				S3	4 Secure	9	76.7 ± 0.0	NB
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	18	50.0 ± 0.0	NB
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3	4 Secure	17	29.3 ± 0.0	NB
P	<i>Platanthera blephariglottis</i>	White Fringed Orchid				S3	4 Secure	13	52.4 ± 1.0	NB
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	3 Sensitive	32	6.2 ± 0.0	NB
P	<i>Bromus latiglumis</i>	Broad-Glumed Brome				S3	3 Sensitive	2	56.4 ± 0.0	NB
P	<i>Calamagrostis pickeringii</i>	Pickering's Reed Grass				S3	4 Secure	104	15.9 ± 0.0	NB
P	<i>Dichanthelium depauperatum</i>	Starved Panic Grass				S3	4 Secure	2	56.6 ± 0.0	NB
P	<i>Muhlenbergia richardsonis</i>	Mat Muhly				S3	4 Secure	9	94.5 ± 0.0	NB
P	<i>Heteranthera dubia</i>	Water Stargrass				S3	4 Secure	56	55.7 ± 0.0	NB
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	13	43.1 ± 0.0	NB
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S3	3 Sensitive	13	55.7 ± 1.0	NB
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	25	22.4 ± 0.0	NB
P	<i>Zannichellia palustris</i>	Horned Pondweed				S3	4 Secure	5	49.6 ± 0.0	NB
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S3	4 Secure	7	48.7 ± 1.0	NB
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S3	4 Secure	1	75.9 ± 1.0	NB
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	15	49.0 ± 1.0	NB
P	<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	2	53.1 ± 0.0	NB
P	<i>Dryopteris goldiana</i>	Goldie's Woodfern				S3	3 Sensitive	6	97.1 ± 0.0	NB
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S3	4 Secure	1	85.5 ± 1.0	NB
P	<i>Equisetum palustre</i>	Marsh Horsetail				S3	4 Secure	6	88.2 ± 10.0	NB
P	<i>Isoetes tuckermanii</i>	Tuckerman's Quillwort				S3	4 Secure	20	19.6 ± 1.0	NB
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3	4 Secure	5	44.2 ± 1.0	NB
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	2	57.7 ± 1.0	NB
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	26	23.1 ± 5.0	NB
P	<i>Botrychium</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	11	53.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>lanceolatum</i> var. <i>angustisegmentum</i>									
P	<i>Botrychium simplex</i>	Least Moonwort				S3	4 Secure	9	38.2 ± 0.0	NB
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	4 Secure	9	17.4 ± 0.0	NB
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	19	24.5 ± 0.0	NB
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S3?	3 Sensitive	18	22.7 ± 1.0	NB
P	<i>Mertensia maritima</i>	Sea Lungwort				S3S4	4 Secure	25	8.5 ± 0.0	NB
P	<i>Lobelia kalmii</i>	Brook Lobelia				S3S4	4 Secure	18	22.7 ± 0.0	NB
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	5	23.5 ± 5.0	NB
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	4 Secure	24	23.7 ± 1.0	NB
P	<i>Stachys pilosa</i>	Hairy Hedge-Nettle				S3S4	5 Undetermined	4	84.8 ± 1.0	NB
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	41	7.1 ± 0.0	NB
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4	4 Secure	2	22.7 ± 1.0	NB
P	<i>Potentilla arguta</i>	Tall Cinquefoil				S3S4	4 Secure	28	17.9 ± 1.0	NB
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	55	8.0 ± 1.0	NB
P	<i>Geocaulon lividum</i>	Northern Comandra				S3S4	4 Secure	9	15.9 ± 0.0	NB
P	<i>Juniperus horizontalis</i>	Creeping Juniper				S3S4	4 Secure	21	17.5 ± 1.0	NB
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	41	22.7 ± 0.0	NB
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	4 Secure	2	46.2 ± 1.0	NB
P	<i>Triglochin gaspensis</i>	Gasp Arrowgrass				S3S4	4 Secure	16	16.5 ± 1.0	NB
P	<i>Spirodela polyrrhiza</i>	Great Duckweed				S3S4	4 Secure	33	44.3 ± 0.0	NB
P	<i>Corallorhiza maculata</i>	Spotted Coralroot				S3S4	3 Sensitive	7	6.2 ± 0.0	NB
P	<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass				S3S4	4 Secure	1	50.2 ± 2.0	NB
P	<i>Potamogeton oakesianus</i>	Oakes' Pondweed				S3S4	4 Secure	38	9.2 ± 0.0	NB
P	<i>Montia fontana</i>	Water Blinks				SH	2 May Be At Risk	4	16.7 ± 1.0	NB
P	<i>Solidago caesia</i>	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	58.2 ± 1.0	NB
P	<i>Celastrus scandens</i>	Climbing Bittersweet				SX	0.1 Extirpated	3	86.8 ± 100.0	NB
P	<i>Carex swanii</i>	Swan's Sedge				SX	0.1 Extirpated	45	49.5 ± 1.0	NB

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The recipient of these data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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Appendix IV:

Breviro Approval To Operate



APPROVAL TO OPERATE

I-8608

Pursuant to paragraph 8(1) of the *Water Quality Regulation - Clean Environment Act*, this Approval to Operate is hereby issued to:

Breviro Caviar Inc.
for the operation of the
Mealey Road Sturgeon Hatchery

Description of Source: **A land based freshwater aquaculture recirculation facility for the culturing of Atlantic and Shortnose sturgeon.**

Source Classification: **Fees for Industrial Approvals Regulation - Clean Water Act** **Class 5**

Parcel Identifier: **15160708**


Mailing Address: **162 Mealey Road
Pennfield, NB E5H 0B1**


Conditions of Approval: **See attached Schedule (s)"A" and "B" of this Approval**

Supersedes Approval: **I-8225**

Valid From: **February 01, 2014**

Valid To: **January 31, 2016**

Recommended by: 
Environment Division

Issued by: 
for the Minister of Environment and Local Government

January 24, 2014
Date

SCHEDULE "A"

A. DESCRIPTION AND LOCATION OF SOURCE

Breviro Caviar Inc. operate a land-based, freshwater aquaculture facility for the rearing of Shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus*) in Pennfield, Charlotte County. At peak operation, the facility will require approximately 577 litres of water per minute (125 IGPM). The primary water source for this facility is a artesian well (ID# 0044408) located on PID 01218189 which delivers well water to the facility via a 700 metre pipeline. Surface water is also used on a seasonal basis from an unnamed stream source running through the property. The facility utilizes water recirculation technology reusing approximately 95% of the water through treatment with rotary drum filters and biofiltration. Effluent discharged is further treated through two settling ponds prior to discharge to a pipeline with an outfall within a small inlet in the Lower Letang River Estuary. The facility referenced by parcel identifier 15160708 is hereby approved subject to the following:

B. DEFINITIONS

1. **"Approval Holder"** means the person or persons to whom the Certificate of Approval has been issued and includes all persons responsible for the operation of the source.
2. **"after hours"** means the hours when the Department's offices are closed. These include statutory holidays, weekends, and the hours before 8:15 a.m. and after 4:30 p.m. from Monday to Friday.
3. **"Chemical"** means antibacterial and antibiotic agents, therapeutants, pesticides, herbicides, anesthetics, feed additives, hormones, veterinary biologics, biotechnology products, disinfectants, water treatment agents, fertilizers, paint products, organic solvents, anti-foulant products, petroleum products, liquid and gaseous fuels, sealants, lubricants, flocculants, and any other hazardous, toxic, or potentially harmful substance.
4. **"Department"** means the New Brunswick Department of the Environment and Local Government.
5. **"Director"** means the Director of the Impact Management Branch of the Department and includes any person designated to act on the Director's behalf.
6. **"Facility"** means all property, real or personal, utilized in the operation or maintenance of the source.
7. **"Inspector"** means an Inspector designated under the *Clean Air Act*, the *Clean Environment Act*, or the *Clean Water Act*.

8. **"Minister"** means the Minister of the Department of the Environment and Local Government and includes any person designated to act on the Minister's behalf.
9. **"Source"** means "source of contaminant" as defined in the Act.
10. **"watercourse"** means the full width and length, including the beds, banks, sides and shoreline, or any part of a river, creek, stream, spring, brook, lake, pond, reservoir, canal, ditch or other natural or artificial channel open to the atmosphere, the primary function of which is the conveyance or containment of water whether the flow be continuous or not.

C. EMERGENCY REPORTING

The Approval Holder, operator or any person in charge of the Facility shall **immediately** report to the New Brunswick Department of the Environment where:

- a) there has been, or is likely to be, an unauthorized release of solid, liquid or gaseous material including wastewater, petroleum or hazardous materials, to the environment;
- b) there has been a violation of the *Air Quality Regulation*, the *Water Quality Regulation* or any Approval issued thereunder; or
- c) a release of a contaminant or contaminants is of such magnitude or period that there is concern for the health or safety of the general public, or there could be significant harm to the environment.

During normal business hours, contact the:

**Saint John Regional Office
(506) 658-2558**

After hours, or in the event the Regional Office cannot be reached contact the:

**Canadian Coast Guard
1-800-565-1633**

All reports shall include:

- a) a description of the source, including the name of the owner or operator;
- b) the nature, extent, duration and environmental impact of the release;
- c) the cause or suspected cause of the release; and
- d) any remedial action taken or to be taken to prevent a recurrence of the release.

An Inspector will be contacted to return the call and provide direction, where required.

D. GENERAL INFORMATION

12. The Approval Holder shall operate the facility in compliance with the *Water Quality Regulation-Clean Environment Act*.
13. This Certificate of Approval does not relieve the owner from complying with municipal bylaws, other provincial acts and regulations, or any federal acts and regulations.
14. Violation of any conditions of this Certificate of Approval constitutes a violation of the *Clean Environment Act*.
15. The Minister may revoke this approval at any time and the approval is automatically revoked by the issuing of a new approval applying to the same source.
16. An Inspector, at any reasonable time, has the authority to inspect the Facility and carry out such duties as defined in the *Clean Air Act*, the *Clean Environment Act* or the *Clean Water Act*.
17. The terms and conditions of this Approval are severable. If any term or condition of this Approval is held invalid, is revoked or is modified, the remainder of the Approval shall not be affected.

E. TERMS AND CONDITIONS

GENERAL CONDITIONS

18. The Approval holder shall operate the facility in accordance with the most recent version of the *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick* issued by the Department.
19. The Approval holder shall not pump Breviro-PW (Well ID #: 0044408) situated on PID 01218189 and have a maximum water withdrawal rate not exceeding the free flow rate of the well (average 127 IGPM or 577 litres per minute). The proponent must contact the Department prior to any modifications to the well (i.e. pump installed) as further hydrogeological testing may be required.
20. The Approval Holder shall monitor and maintain a log of static well water levels within the Breviro well (ID#: 0044408) and MW1 (ID#: 0020441) on a bi-weekly basis and provide data within annual report.
21. Groundwater extraction rates from well PW98-1 (ID #: 12714) shall not exceed 50 cubic metres litres per day (7.5 IGPM or 35 lpm).

22. The use of onsite well PW-2 (ID #: 370) is not permitted but may be used as a back up ground water supply in emergency situations. In such circumstances, the approval holder shall contact the department prior to bringing the well online in order to establish a maximum pumping rate and duration. The approval holder shall notify the department when the use of the required emergency water supply has ceased.
23. The Approval Holder shall ensure that the maximum surface water withdrawal from the unnamed stream on PID 15160708 does not exceed 250 litres per minute (55 IGPM) and/or the flow downstream is sufficient as determined by an inspector so as to maintain the aquatic habitat downstream of the withdrawal location.
24. All water withdrawals, including those from ground, surface or pipeline sources shall be equipped with flow meters and weekly usage maintained in a log. All data must be included within annual report and a log maintained so that it may be made available to an Inspector upon request.
25. The Approval Holder shall ensure that any overflow water from the sludge holding tanks is directed through the primary and secondary settling ponds.
26. The Approval Holder shall ensure that all effluent released from the facility is discharged through a single outfall pipe to below the mean low water mark in the Letang River Estuary. All such effluent must pass through the primary and secondary settling ponds prior to discharge.
27. The Approval Holder shall ensure that a copy of the Approval, including all attached schedules is posted in a prominent location in the office or working area of this facility.
28. The Approval Holder shall apply in writing to the Director and receive approval for an amendment of this Approval before making any changes that would impact the quantity or quality of effluent discharged from the currently approved facility.
29. The Approval Holder shall *immediately* notify the Minister in writing of any change in its name or address.
30. The Approval Holder shall submit a written application to the Director for a new Approval to Operate a **minimum of 90 days prior** to the expiration of this Approval.

SOLID WASTE MANAGEMENT

31. The Approval Holder shall ensure that all wastes generated during the operation of the facility are disposed of in a manner acceptable to an Inspector.

WASTE MANAGEMENT PLAN

32. The Approval Holder shall ensure that all wastes generated throughout the operation and maintenance of the facility are managed and disposed of in accordance with the procedures and practices detailed in the Waste Management Plan in the attached SCHEDULE "C", or in a manner deemed acceptable by an Inspector, or as otherwise directed by the Department.

CHEMICAL STORAGE AND HANDLING

33. The Approval Holder shall ensure that all chemicals, and petroleum products at the Facility are secured in sealed and resistant containers, stored on a concrete pad with no floor drains and equipped with sufficient containment as to prevent the escape of any spill to the environment.

TESTING AND MONITORING

34. The Approval Holder shall conduct a water quality monitoring program in accordance Section 2.4, Table 2.9 and methodology in accordance with Appendix 1 and Table A1-4 within the most recent version of the *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick* issued by the Department and summarized in SCHEDULE "B".
35. The Approval Holder shall establish a monitoring program as outlined in SCHEDULE "B". Monitoring shall include samples taken from the outer perimeter and outside (control station) of the mixing zone as established by an Inspector and approved by the Minister.

DISCHARGE LIMITS

36. The Approval Holder shall ensure that the level of total phosphorus and total nitrogen as measured at the edge of the mixing zone is in accordance with Table 2.10 of the most recent version of the *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick*.

REPORTING

37. The Approval Holder shall submit reports in accordance with Figure 1 and Appendix 2 of the most recent version of the document titled *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick*, issued by the Department.

Prepared by: 
Troy Lyons, MSc.
Aquaculture Approvals Officer, Industrial Processes

SCHEDULE "B"

MONITORING AND SAMPLING PLAN

Level 1

<u>Station</u> *	<u>Parameters</u> **	<u>Analysis</u>	<u>Time Period</u>	<u>Frequency</u>	<u>Method</u>
1-3	TP _L and TN Temp, DO and pH	Lab Self	June 1-Nov 15	Monthly	Grab Meter
4	Flow and Temp	Self	Jan 1-Dec 31	Monthly	Meter

Level 2

<u>Station</u> *	<u>Parameters</u> **	<u>Analysis</u>	<u>Method</u>
1	TP _L and TN Temp, DO and pH	Lab Self	Grab Meter
2-3	TP _L , TN, TAN and COD Temp, DO and pH	Lab Self	Grab Meter
4	Flow and Temp	Self	Meter
5	TSS and TP _L	Lab	Grab

***Stations**

- 1. Control station:** within the Letang estuary as established by the department
- 2. Effluent:** at point of departure from second settling pond
- 3. Edge of mixing zone:** within the Letang estuary as established by the department
- 4. Well:** at point of entry into facility
- 5. Effluent:** at point of entry into first settling pond

****Parameters**

- TP_L - Total Phosphorus (low level) reported in milligrams per litre.
 TN - Total Nitrogen reported in milligrams per litre
 DO - Dissolved Oxygen
 Temp - Temperature (degrees Celsius)

Appendix V:

Quoddy Commercial Aquaculture License

COMMERCIAL AQUACULTURE LICENCE



Licence # **IF-0637**

Expiry date: **March 31, 2021**

This **COMMERCIAL AQUACULTURE LICENCE** is hereby issued under the authority of subsection 8(1) of the *Aquaculture Act*, Acts of New Brunswick, 2011, chapter 112, as amended (the "Act") to:

QUODDY SAVOUR SEAFOOD LTD.

for Inland Aquaculture Site # IF-0637 in Pennfield in the Parish of Pennfield, County of Charlotte for the cultivation of finfish. This licence is subject to the provisions of the *Act*, as amended, the *General Regulation – Aquaculture Act*, New Brunswick Regulation 91-158 along with any amendments thereto and the terms and conditions set forth in Schedule "A" annexed hereto.

Effective January 9, 2017

Peter M. Cashin
Registrar of Aquaculture

SCHEDULE A
OPERATING TERMS AND CONDITIONS
COMMERCIAL AQUACULTURE LICENCE
Inland Aquaculture Site - Finfish Culture
Aquaculture Licence # IF-0637

1. This Commercial Aquaculture Licence is issued in the name of **Quoddy Savour Seafood Ltd.** herein referred to as the "licensee".
2. The licensee is hereby authorized to conduct aquaculture on Inland Aquaculture Site # IF-0637 in Pennfield, on Mealey Road, PID # 15160708, as shown on a sketch on file with the Registrar of Aquaculture.
3. Should the licensee cease to be the owner or lessee of the licensed site, then pursuant to subsection 29(1)(e) of the *Aquaculture Act* this licence shall be considered revoked.
4. The species approved for cultivation are Shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus*).
5. The licensee will save harmless the Minister of Agriculture, Aquaculture and Fisheries (DAAF) or his agents from any legal action associated with the performance of duties under the provisions of the *Aquaculture Act* (Chap. 112, RSNB 2011) and the *General Regulation - Aquaculture Act* (NBR 91-158).
6. Access to the licensed operation and associated facilities will be permitted to staff of the Department of Agriculture, Aquaculture and Fisheries or any of its agents as may be required from time to time.
7. 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 *Navigation Protection 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.
8. The licensee will pay an annual licence fee before the first day of April.
9. The Department of Agriculture, Aquaculture and Fisheries must be notified immediately, in writing, of any changes in the corporate Board of Directors and/or owners of the facility.
10. Inlet and outlet structures for the aquaculture facility must be equipped with screening in accordance with the specifications of the Department of Agriculture, Aquaculture and Fisheries, unless otherwise prescribed under the *Clean Water Act* or the *Clean Environment Act*.
11. Prior to the transfer of fish to the subject site, fish health testing in accordance with the *Aquaculture Act* and *General Regulation - Aquaculture Act* must be completed.

12. The licensee shall forward to Department of Agriculture, Aquaculture and Fisheries, Registrar of Aquaculture, P.O. Box 6000, Fredericton, NB, E3B 5H1, copies of all the results of fish health testing done on fish at the subject site.
13. Nothing in this licence permits the movement of live finfish from the subject aquaculture site to another aquaculture site unless the site has completed the fish health testing in accordance with the *Aquaculture Act* and *General Regulation-Aquaculture Act*.
14. This commercial licence supersedes, rescinds and replaces any and all previous licences issued on Inland Aquaculture Site # IF-0637.

Appendix VI:

Quoddy Primary Processing Plant Licence



Department of Agriculture, Aquaculture and Fisheries

CLASS 2

PRIMARY PROCESSING PLANT LICENCE

Quoddy Savour Seafood Ltd.

SP- 803012

Effective Date: April 1, 2017

Expiry Date: March 31, 2018

Pursuant to the *Seafood Processing Act*, s. 16.32, a **Class 2 Primary Processing Plant Licence** is hereby issued to Quoddy Savour Seafood Ltd. for their plant located at 162 Mealey Road, Pennfield.

Conditions:

All species of fish are authorized to be processed under this licence except:

American Lobster, Atlantic Salmon, Herring, Northern Shrimp, Snow crab

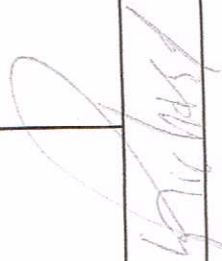
Registrar

Appendix VII:

Quoddy Certificate of Registration of a Fish Processing Establishment

CERTIFICATE OF REGISTRATION OF A FISH PROCESSING ESTABLISHMENT
CERTIFICAT D'AGRÉMENT D'UN ÉTABLISSEMENT DE TRANSFORMATION DU POISSON

Name of Establishment / Nom de l'établissement QUODDY SAVOUR SEAFOOD LTD.		Registration No. / N° d'agrément 6055	Region / Région NEW BRUNSWICK REGIONAL OFFICE - FREDERICTON
Mailing Address / Adresse postale 162 MEALEY ROAD PENNFIELD NEW BRUNSWICK CANADA E5H0B1		Issue Date / Date d'émission Y / A M D / J 2017/03/29	Expiry Date / Date d'expiration Y / A M D / J 2018/03/28
Location of Establishment / Lieu de l'établissement 162 MEALEY ROAD PENNFIELD NEW BRUNSWICK CANADA E5H0B1		Type(s) of Process Operation / Type(s) d'opération de transformation Fresh or Frozen or Semi-Preserve	
Signature		Regional Director / Directeur régional	



This certificate is issued in accordance with the *Fish Inspection Regulations*.
 Cet agrément , cette licence ____, ce permis ____, ou cette autorisation ____ est également une licence émise en vertu de la *Loi sur la salubrité des aliments au Canada* dès sa date d'exécution.

This registration , licence ____, permit ____, or authorization ____ is also a licence that is issued under the *Safe Food for Canadians Act* upon its commencement day.

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