SEA FARM SITES (BAY MANAGEMENT AREAS) BASELINE STUDY

Prepared for

MOWI

Prepared by

LGL LIMITED

Est. 1971

environmental research associates

LGL Project No. FA0287C

April 2025

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1.0 Introduction

As part of the requirements stipulated in the Environmental Impact Statement (EIS) Guidelines for the Indian Head Hatchery Expansion Project (Registration Number 1975), this Sea Farm Sites Baseline Study was prepared. More specifically, this Baseline Study addresses Section 4.3.2 of the EIS Guidelines (see Appendix A of this document). Mowi Canada East (MCE), through the Indian Head Expansion Project (the Project), is proposing to increase the in-province production of Atlantic salmon (*Salmo salar*) smolt from MCE established broodstock networks in Atlantic Canada. These smolt will supply MCE's licensed sea farms located on the south coast of Newfoundland. The increase in local smolt production at the Indian Head Hatchery located in the Port of Stephenville Industrial Park will decrease reliance on smolt from out-of-province sources. The Project involves upgrades to improve the efficiency of the existing Hatchery facility, expansion of the Hatchery to increase smolt production, and installation of supporting ancillary infrastructure such as freshwater and saltwater influent and effluent treatment and discharge. These Hatchery upgrades will allow the production of an additional 2.2 million salmon smolt per year, which brings total annual production at the Hatchery to 6.7 million smolt (i.e., at 250+grams). These smolt will be stocked at the 53 licensed sea farms held by MCE (Figure 1.1).

The provincial Department of Fisheries, Forestry and Agriculture (FFA) is responsible for licensing all aquaculture operations (land and sea cage) in Newfoundland and Labrador (NL). FFA, along with many provincial and federal departments, are responsible for issuing licenses, permits or leases for occupation of aquaculture sites; water and land use; and establishing Codes of Practice to manage environmental impacts as a condition of license. The aquaculture licensing process has changed over time to require more comprehensive information which has resulted in varying scope and formats of the historic baseline information available. In general, the application package for a sea cage aquaculture license requires inclusion of data such as benthic characterization (physical, biological), current measurements, water quality (temperature, salinity, dissolved oxygen) data as well as site diagrams (i.e., sea cage array design), a business plan, and stakeholder consultations. In recent years, additional information (e.g., predicting depositional contours for carbon (biochemical oxygen demanding matter)) is available for sea farms that have been in production. This Sea Farm Sites Baseline Study provides a detailed description of the physical and biological data that were required to assess the suitability of each sea farm for salmon aquaculture as well as a review of historical farm monitoring and performance for the sea farms that are undergoing or have completed a production cycle.

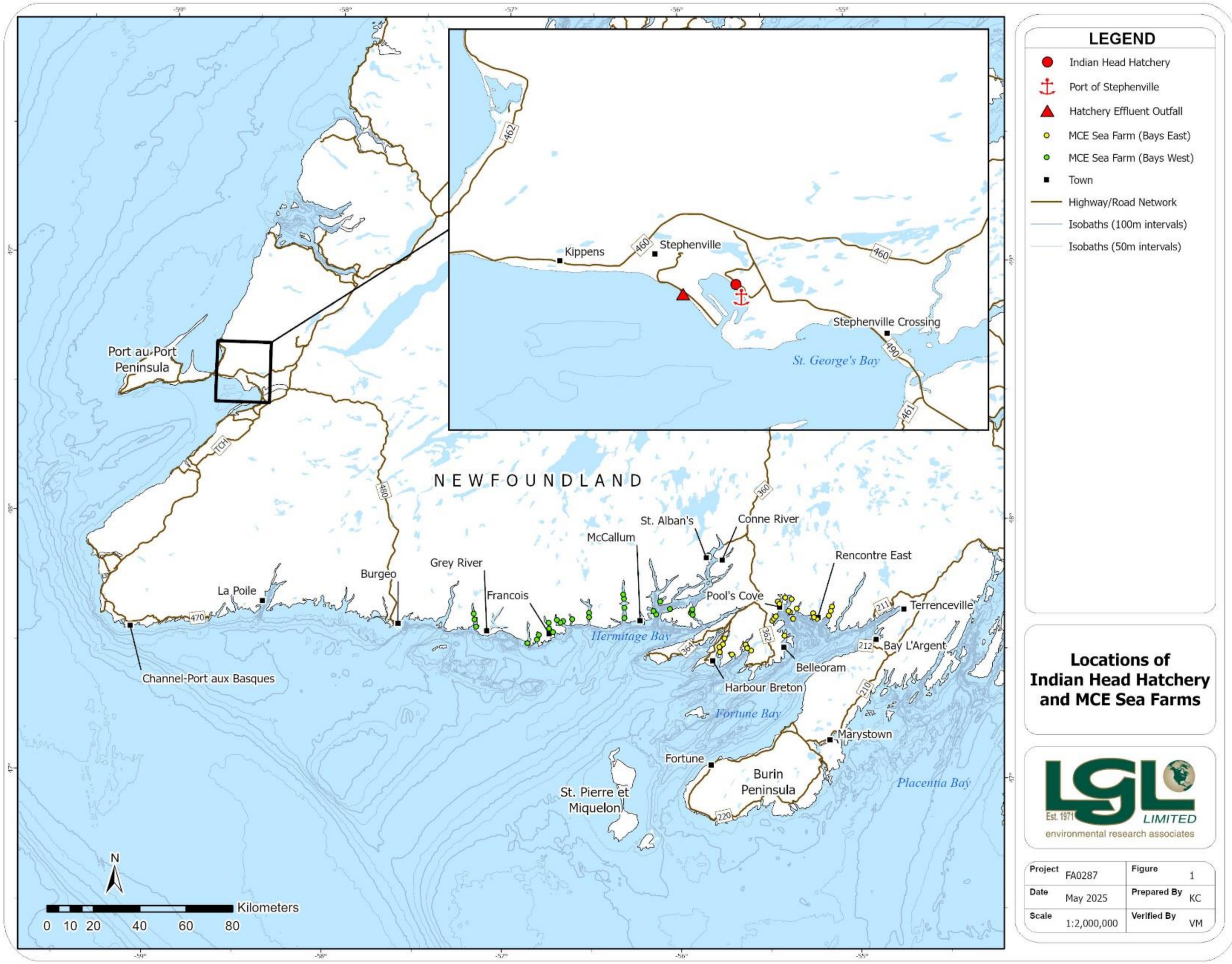

Figure 1.1. Location of the proposed Hatchery expansion Project and sea farms for MCE.

2.0 Study Area

MCE sea farms are located along the south coast of Newfoundland with many situated near coastal communities in Fortune Bay and Hermitage Bay. The sea farms are divided into two primary areas: “Bays East” (Figure 2.1) and “Bays West” (Figure 2.2). In total, MCE has 53 sea farms that are licensed, which are located in 13 Bay Management Areas (BMAs) (Table 2.1). As stipulated in the EIS Guidelines, the sea farm sites are considered the Study Area for this baseline study. The number of sea farms in use each year to produce 6.7 million Atlantic salmon annually will vary and depend on sea farm stocking capacity to ensure optimum fish health and welfare.

The design, construction, and installation of mooring systems is complete for 30 sea farms (Table 2.1). Mooring systems for 23 sea farms have yet to be constructed. Typically, sea farm construction is scheduled for the year preceding the first stocking with salmon. The construction and installation of all sea farm mooring systems and cages is completed by a third-party supplier, with oversight by MCE. Table 2.1 provides a summary of sites with existing mooring systems and those that have been stocked previously (existing), sites that are planned to be stocked in 2025 (scheduled), and sites that will be stocked beyond 2025 (TBD, i.e., to be determined). Beyond 2025, the site construction dates are not yet confirmed (TBD). Sites in BMA 8 and 9 are currently shared with another Atlantic salmon producer and MCE has no immediate plans to operate in conjunction with this operator for biosecurity reasons. The production schedule for other sites is subject to variability associated with the need to secure smolt as well as updated engineering and design of mooring systems to accommodate state-of-the-art containment systems (i.e., the most recent stage of technological development).

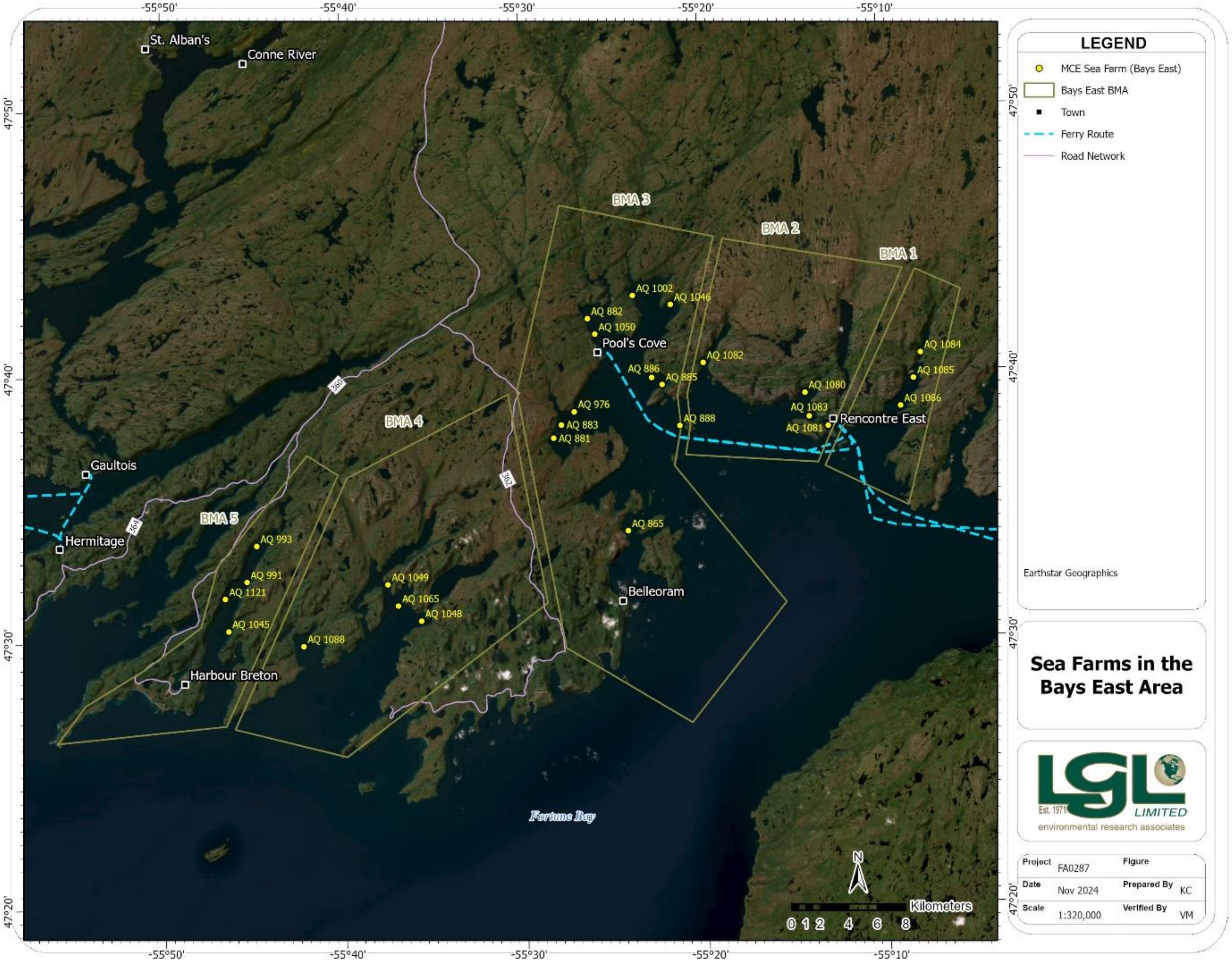

Figure 2.1. Locations of sea farms and BMAs in the Bays East area.

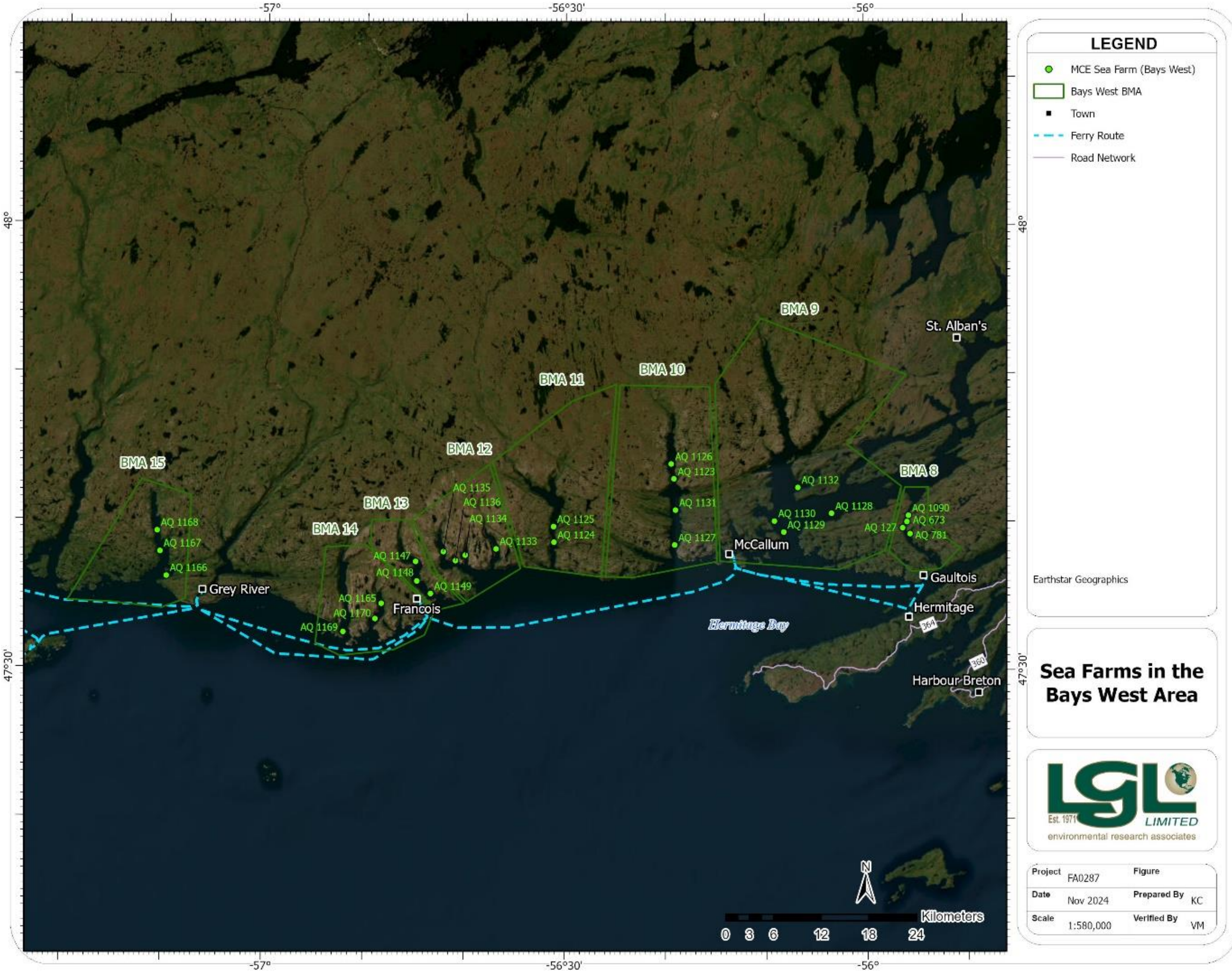

Figure 2.2. Locations of sea farms and BMAs in the Bays West area.

Table 2.1. Summary of sea farms in Bays East and Bays West area including BMA (name and number), AQ licence number, sea farm site coordinates (centre point), and construction status.

Area	BMA Name	BMA No.	Farm Site Name	AQ Licence No.	Site Coordinates Latitude (°N)	Site Coordinates Longitude (°W)	Construction Status [a]
Bays East	Mal Bay	1	Benny's Cove	1084	47.67711	-55.13000	TBD
			Foshie's Cove	1085	47.66131	-55.13681	Pre-existing
			The Hobby	1086	47.64389	-55.14931	Pre-existing
	Rencontre East	2	Deep Water Point	1080	47.65319	-55.23769	Pre-existing
			Rencontre East Island	1081	47.63219	-55.21650	Pre-existing
			Old Woman's Cove	1082	47.67269	-55.33169	Pre-existing
			Little Burdock Cove	1083	47.63831	-55.23400	Pre-existing
	Fortune Bay West	3	Ironskull Point	865	47.56811	-55.40319	Pre-existing
			Spyglass Cove	881	47.62661	-55.47111	Pre-existing
			Spoon Cove	882	47.70131	-55.43819	Pre-existing
			Cinq Island Cove	883	47.63490	-55.46380	Pre-existing
			McGrath Cove South	885	47.65939	-55.36989	Pre-existing
			McGrath Cove North	886	47.66389	-55.37942	Pre-existing
			Belle Island	888	47.63350	-55.35389	TBD
			Tilt Point	976	47.64311	-55.45150	Pre-existing
			Hickman's Point	1002	47.71539	-55.39611	Pre-existing
			Steamers Head	1050	47.69150	-55.43150	Pre-existing
			South East Bight	1046	47.70950	-55.36119	TBD
	Great Bay de l'Eau	4	Salmonier Cove	1048	47.51297	-55.59531	Pre-existing
			Dog Cove	1049	47.53619	-55.62581	Pre-existing
			Red Cove	1065	47.52269	-55.61639	TBD
			Murphy Point	1088	47.49800	-55.70411	Pre-existing
	Harbour Breton Bay	5	Harvey Hill East	991	47.53850	-55.75619	Pre-existing
			Harvey Hill North	993	47.56081	-55.74733	Pre-existing
			Broad Cove	1045	47.50769	-55.77339	Pre-existing
			Harvey Hill South	1121	47.52800	-55.77631	Pre-existing
Bays West	Little Passage	8	Strickland Cove	127	47.66000	-55.93880	TBD
			Blackfish Cove	673	47.66690	-55.93140	Pre-existing
			Seal Nest Cove	781	47.65330	-55.92670	Pre-existing
			Deer Cove	1090	47.67390	-55.92910	TBD
	Outer Bay d'Espoir	9	Butter Cove	1128	47.67650	-56.05680	TBD
			Jervis Island	1129	47.65570	-56.13630	TBD
			Pass My Can	1130	47.66820	-56.15170	TBD
			Goblin Bay	1132	47.70570	-56.11280	TBD
	Facheux Bay	10	Wallace Cove	1123	47.71561	-56.31889	Pre-existing
			Dennis Arm	1131	47.68061	-56.31644	TBD
			Indian Tea Point	1126	47.73222	-56.32339	TBD
			Wild Cove	1127	47.64131	-56.31781	Scheduled 2025
	Hare Bay	11	Mare Cove South	1125	47.66189	-56.51969	TBD
			North Bob Locke Cove	1124	47.64431	-56.51889	Scheduled 2025
	Rencontre West	12	Devil Bay	1133	47.63681	-56.61489	Pre-existing
			Little Bay	1134	47.62950	-56.66600	Pre-existing
			Rencontre Bay	1136	47.62311	-56.68239	TBD
			The Gorge	1135	47.63311	-56.70269	Pre-existing
	Chaleur Bay	13	Chaleur Bay	1147	47.62211	-56.74839	Pre-existing
			Friar Cove	1148	47.60000	-56.74669	Pre-existing
			Shooter Point	1149	47.58610	-56.72356	TBD
	Aviron Bay and La Hune Bay	14	Aviron North	1165	47.57469	-56.80539	TBD
		14	Aviron South	1170	47.55756	-56.81553	Scheduled 2025
		14	Foots Cove	1169	47.54269	-56.86864	TBD
	Bay de Vieux	15	Denny Island	1166	47.60419	-57.16281	TBD
		15	Gnat Island	1167	47.63181	-57.17361	TBD
		15	Shoal Cove	1168	47.65503	-57.17856	TBD

Notes:

[a] Pre-existing refers to sea farms with pre-existing production. Sea farm system components are constructed by third parties. Installations are not permanent and are rotated between production and fallow periods, and to upgrade end-of-life construction materials.

3.0 Methodology

This Baseline Study includes information, as required by the EIS Guidelines, that has previously or recently been collected at each of the MCE sea farms including:

1. Site maps that show the location of sea farms and details of sea cage layouts;
2. Benthic surveys which include substrate type, and characterization of flora and fauna;
3. Water quality data including water temperature, salinity and dissolved oxygen;
4. Oceanographic and meteorological data including bathymetry, water currents, wind and wave action, flood and tidal zones, ice dynamics, and storm patterns;
5. Exposure zone modelling for the use of approved fish health treatment products including pesticides, therapeutants, and disinfectants[1]; and
6. For sites that are undergoing or have completed a production cycle:
   i. identification of past or present fallow periods;
   ii. benthic monitoring, management of biochemical oxygen demand (BOD) matter, and performance; and
   iii. a discussion of historical information of sea farm performance including fish mortality, deposits of drug or pesticides, disease, escapes, and sea lice.

The baseline information in Sections 4.0 (Bays East) and 5.0 (Bays West) is organized by BMA with details provided for each sea farm within a given BMA. Detailed methodology used to collect baseline information is described below.

3.1 Sea Farm Maps

Equipment installed at a sea farm consists of sea cages, a barge, and a mooring system. A typical sea cage used for the Project consists of a circular containment net hanging from a floating HDPE (high-density polyethylene) plastic cage collar (i.e., 140 m circumference), which is weighed down in the water column by a weighted ring (typically HDPE tube filled with concrete). Sea cages are anchored to the seafloor by a mooring system and navigational markers line the perimeter of each site. A feed and/or accommodation barge (15 m x 30 m) with associated feed lines is typically moored alongside the sea cages. As a requirement of the licensing process, site layout diagrams and maps are required by FFA and Transport Canada (TC) and must include the arrangement and location of the sea cage. Where available, the sea farm schematics and maps provided in this Baseline Study have been extracted from lease applications as approved by TC for navigational markings. If lease application maps were unavailable, schematics and maps from monitoring reports were used. To assist the reader, maps of MCE sea farm leases are provided in Appendix C. In addition, the sea cage layout schematics have been compiled in Appendix D.

[1] Exposure zone modelling is not appliable to the use of disinfectants. Moderate amounts of disinfectants are applied directly to the surfaces of equipment and personal protective equipment at critical control points for biosecurity and are not discharged directly to the sea.

MCE purchased the assets of Gray Aqua Group in 2017 and Northern Harvest Smolt Ltd. in 2018, and the sea farm historical design and equipment of these two companies varied. MCE's parent company, Mowi ASA, has global operations and adheres to regulations for sea cage design and mooring such as those defined in the Scottish[2] or Norwegian standards (NS9415[3]). These standards are being used for the design of all new MCE sea farms as well as updates to the existing sea farms that were acquired by MCE from Northern Harvest Smolt and Gray Aqua Group. The process of re-design and upgrading equipment used at some sea farms is on-going as older farms rotate back into production. As of 1 January 2024, and per FFA policy, all salmonid sea cage culture operations are required to demonstrate that marine site cage system components and installation meet ISO or certified third-party engineering standards (FFA 2019). All MCE farms in active production have been certified by a third-party. As MCE upgrades equipment and sea cage designs in step with future production, newer state-of-the-art designs will replace older designs (see Section 4.3.1.7). More recent designs (see Section 5.8.1.1) meet the ISO or third-party engineering standard in addition to NPP[4] requirements and reflect MCE plans according to the Scottish or Norwegian standards for cage design. All updated designs are submitted to FFA as part of the licensing policy and process.

3.2 Benthic Baseline Surveys

Prior to the introduction of the Aquaculture Activities Regulations (AAR[5]) in July 2015, DFO (Fisheries and Oceans Canada) and FFA required aquaculture operators to provide information concerning the seabed within locations representative of the entire lease and perform fallow period monitoring. The introduction of the AAR resulted in new standards for benthic baseline (site characterization) and performance monitoring (during peak feeding). AAR standards are applied to assess aquaculture developments and activities. Compliance demonstrates effective management of fish and fish habitat. Currently in Newfoundland, as part of the application process, applicants must collect environmental data to identify benthic conditions at the proposed site and submit a Baseline Survey Report. As part of the Baseline Survey Report requirements, visual benthic surveys (for hard bottom) or sediment bottom grabs (for soft bottom) were conducted by MCE to collect qualitative and quantitative data of the physical and biological characteristics of the fish and fish habitat within the sea farms. The presence and relative abundance of dominant substrate type, flora, and fauna were documented within the site at stations that were laid out in a grid pattern or along transects (100 m between stations). Sampling stations along the transect or within a grid represent the physical/biological characteristics of the bottom habitat over the entire lease. Third-party consulting companies have conducted benthic surveys for 49 of MCE's 53 sea farms (Table 3.1). The four sea farm licenses in BMA 8 that do not

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[2] https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2015/06/technical-standard-scottish-finfish-aquaculture/documents/00479005-pdf/00479005-pdf/govscot%3Adocument/00479005.pdf

[3] https://online.standard.no/nb/ns-9415-2021ac-2024

[4] Navigation Protection Program (NPP) helps keep Canada's navigable waters open for transportation and recreation. Transport Canada sets requirements for all licensed aquaculture operators as a condition of license.

[5] https://laws.justice.gc.ca/eng/regulations/SOR-2015-177/page-1.html

have recent surveys have pre-existed for many years. The area is actively farmed by another producer, and the need for baseline surveys would only be revisited in-step with plans to redevelop the locations. Video footage was recorded using an underwater video camera, which was mounted perpendicular to the seafloor in a stainless-steel frame. Several camera models have been used over the monitoring period (2009–2024) including a Falkjar underwater video camera powered by an NTSC operational system (2009–2010), a Sony FCB-1X 11A optical zoom high resolution camera mounted on a ROV (2017–2018), a JW Fisher DV-2 underwater video camera (2023) and a Shark Marine underwater video camera (2024). A minimum of 1 minute of video on the bottom was recorded at each station. The maximum water depth requirements for sampling have changed over time. Prior to the AAR, DFO accepted a 100 m depth maximum for sample collection; post-AAR, sampling is attempted at deeper water depths. Any station deemed soft bottom required three attempts to obtain sediment (>5 ml) with an Ekman Grab or core sampler. If sufficient sediments were collected, redox and sulphide were measured using calibrated probes.

Table 3.1. Summary of benthic surveys (video and/or redox) conducted at MCE farms (2009–2024) and the applicable regulatory standards.

BMA No.	Sea Farm	Year Survey Completed	Benthic Survey Regulations	Video Analysis	Sediment (Redox) Analysis
1	Benny's Cove	2010	DFO and FFA	x	x
1	Foshie's Cove	2010	DFO and FFA	x	
1	The Hobby	2010	DFO and FFA	x	
2	Deep Water Point	2010	DFO and FFA	x	x
2	Rencontre East Island	2010	DFO and FFA	x	x
2	Old Woman's Cove	2010	DFO and FFA	x	x
2	Little Burdock Cove	2010	DFO and FFA	x	x
3	Ironskull Point	2024	AAR (DFO) and FFA	x	
3	Spyglass Cove	2024	AAR (DFO) and FFA	x	
3	Spoon Cove	2024	AAR (DFO) and FFA	x	
3	Cinq Island Cove	2024	AAR (DFO) and FFA	x	
3	McGrath Cove South	2024	AAR (DFO) and FFA	x	
3	McGrath Cove North	2024	AAR (DFO) and FFA	x	
3	Belle Island	2022	AAR (DFO) and FFA	x	
3	Tilt Point	2024	AAR (DFO) and FFA	x	
3	Hickman's Point	2024	AAR (DFO) and FFA	x	
3	Steamers Head	2024	AAR (DFO) and FFA	x	
3	South East Bight	2024	AAR (DFO) and FFA	x	
4	Salmonier Cove	2024	AAR (DFO) and FFA	x	
4	Dog Cove	2024	AAR (DFO) and FFA	x	
4	Red Cove	2024	AAR (DFO) and FFA	x	
4	Murphy Point	2011	DFO and FFA	x	x
5	Harvey Hill East	2024	AAR (DFO) and FFA	x	
5	Harvey Hill North	2024	AAR (DFO) and FFA	x	
5	Broad Cove	2024	AAR (DFO) and FFA	x	
5	Harvey Hill South	2009	DFO and FFA	x	
8	Strickland Cove	n/a	n/a	n/a	n/a
8	Blackfish Cove	n/a	n/a	n/a	n/a
8	Seal Nest Cove	n/a	n/a	n/a	n/a
8	Deer Cove	n/a	n/a	n/a	n/a
9	Butter Cove	2017	AAR (DFO) and FFA	x	
9	Jervis Island	2017	AAR (DFO) and FFA	x	
9	Pass My Can	2017	AAR (DFO) and FFA	x	
9	Goblin Bay	2017	AAR (DFO) and FFA	x	
10	Wallace Cove	2017	AAR (DFO) and FFA	x	
10	Dennis Arm	2018	AAR (DFO) and FFA	x	
10	Indian Tea Point	2017	AAR (DFO) and FFA	x	
10	Wild Cove	2018	AAR (DFO) and FFA	x	

BMA No.	Sea Farm	Year Survey Completed	Benthic Survey Regulations	Video Analysis	Sediment (Redox) Analysis
11	Mare Cove South	2017	AAR (DFO) and FFA	x	
11	North Bob Locke Cove	2017	AAR (DFO) and FFA	x	
12	Devil Bay	2018	AAR (DFO) and FFA	x	
12	Little Bay	2018	AAR (DFO) and FFA	x	
12	Rencontre Bay	2018	AAR (DFO) and FFA	x	
12	The Gorge	2018	AAR (DFO) and FFA	x	
13	Chaleur Bay	2018	AAR (DFO) and FFA	x	
13	Friar Cove	2018	AAR (DFO) and FFA	x	
13	Shooter Point	2018	AAR (DFO) and FFA	x	
14	Aviron North	2018	AAR (DFO) and FFA	x	
14	Aviron South	2018	AAR (DFO) and FFA	x	
14	Foots Cove	2018	AAR (DFO) and FFA	x	
15	Denny's Island	2018	AAR (DFO) and FFA	x	
15	Gnat's Island	2018	AAR (DFO) and FFA	x	
15	Shoal Cove	2018	AAR (DFO) and FFA	x	

The video footage was reviewed and analyzed, with observations of substrate type, fauna, and flora noted at each station. A habitat map was generated, using the seafloor observations. Ratings of video quality, where available, are on a scale of 1–4; a rating of 1 indicates poor video quality with no recognition of sediment surface indicators; a rating of 2 results in better visual identification; however, determination of sediment condition is poor; a rating of 3 shows improved video quality, but the smaller sediment/benthos may be indistinguishable; and a rating of 4 indicates a high-quality video with easy identification of benthos and substrate conditions. Video quality was influenced by external factors such as current speed, type of seafloor, presence of marine snow, and turbidity.

3.3 Water Quality

The FFA licensing process requires potential finfish cage culture operators to assess site suitability. As part of this assessment, water quality parameters including water temperature (°C), dissolved oxygen (mg/L), and salinity (in parts per thousand, ppt, or ‰) were measured for most MCE sea farms. When data for a specific BMA or sea farm were unavailable, water quality parameters are provided for the general area; these data were collected by FFA (formerly NL Department of Fisheries and Land Resources [DFLR], or from a nearby BMA). Water quality measurements are routinely collected with a handheld device such as a YSI with probes for temperature, dissolved oxygen, and salinity.

For each sea farm with available data, water quality parameters are summarized by season and year and at various water depths as applicable. Average, minimum, and maximum values are presented for water temperature and dissolved oxygen and average salinity values are presented. Seasons are categorized as winter (January–March), spring (April–June), summer (July–September), and fall (October–December).

3.4 Oceanographic and Meteorological Data

As part of the licensing process, bathymetry maps, water depth ranges, and currents are assessed for each proposed sea farm. As required in the EIS Guidelines, wind and wave, flood and tidal zone, ice dynamic, and storm pattern information is also provided for the BMAs; if data were not available for a specific BMA a proxy is provided. A summary of equipment, deployment and recovery dates, and water depths, as well as modelling and calculations for wind and wave data are summarized in Table 3.2. Detailed descriptions of these methods follow.

3.4.1 Bathymetry

Several methods have been used to provide bathymetric data for MCE sea farms. Of the 53 sea farms, bathymetry maps are provided for 49 (BMA 8 sea farms are missing data for Strickland Cove, Blackfish Cove, Seal Nest Cove, and Deer Cove). In 2010, continuous water depth data were collected using a Garmin GPSMAP 545s to produce a 3-D depth profile of the lease area. In 2018, bathymetry maps were created using a combination of data sources that were available and collected previously by the Marine Institute of Memorial University of Newfoundland and supplemented where needed with data collected by MCE and/or the Canadian Hydrographic Society (CHS). The combined data were used to produce a two-dimensional (2-D) contour diagram of the site area. Comprehensive seabed and water column profiling data were collected by the Marine Institute using a Kongsberg EM2040P multi-beam echo sounder (MBES), Knudsen CHIRP sub-bottom profiler and Moving Vessel Profiler (MVP 200). MCE used Olex software which plots bathymetry via GPS and echo sounder. The data collected were incomplete near the shoreline because the survey vessel was unable to reach the shallow areas. CHS chart data were used to fill in the areas where data were not collected by MBES. MCE uses Olex software, which plots bathymetry and positional data from the GPS and MBES from the vessel.

In 2022–2024, water depth data were collected using a chartplotter (Garmin 922xs or Garmin GPS 721 XS) and CHIRP sub-bottom profiler combination unit. Survey transects were typically spaced 25–100 m apart and covered the entire lease area. The sub-bottom profiler and GPS collected data as the vessel travelled the transect lines. Water depths were corrected to chart datum to show water depths at low tide. Using Canvas X software, a bathymetric contour map was produced from the data.

Table 3.2. Summary of oceanographic and meteorological measurements (currents, waves, wind) collected at MCE sea farms (2017–2024) and modelled (2009–2024).

		Current									Wave					
BMA	Sea farm	Water Depth (m)	Upward-looking ADCP Deployment Depth (m)	Downward-looking ADCP Deployment Depth (m)	Aquadopp Deployment Depth Above Bottom (m)	ADCP Height Above Bottom (m)	ADCP/ Aquadopp Deployment Date	ADCP/ Aquadopp Recovery Date	No. Days	Deployment Type	Wave Spotter Buoy Deployment Date	Wave Spotter Buoy Recovery Date	Wave Calculation (Fetch Length)	Wave Calculation (Numerical - SWAN)	Wave Modeling (MSC50)	Wind Modeling (MSC50)
1	Benny's Cove	55	55			0.5	06-Jun-24	16-Jul-24	40	Bottom frame					x	x
1	Foshies Cove	123	25	26		96-97	16-Jul-24	18-Aug-24	33	moored in water column					x	x
1	The Hobby	128	49	50	5	78-79	06-Jun-24	16-Jul-24	40	moored in water column					x	x
2	Deep Water Point	79	37	38		41-42	06-Jun-24	17-Jul-24	41	moored in water column					x	x
2	Rencontre East Island	39	39			0.5	06-Jun-24	17-Jul-24	41	Bottom frame					x	x
2	Old Woman's Cove	61	31	32		31-32	06-Jun-24	15-Jul-24	39	moored in water column					x	x
2	Little Burdock Cove	57	32			25	22-Apr-23	04-Aug-23	104	moored in water column					x	x
3	Ironskull Point	77	30			47	15-Nov-22	20-Feb-23	97	moored in water column			x	x	x	x
3	Spyglass Cove	49	49			0.5	07-Jun-24	16-Jul-24	39	Bottom frame					x	x
3	Spoon Cove	45	45			0.5	07-Jun-24	15-Jul-24	38	Bottom frame					x	x
3	Cinq Island Cove	57	32			25	15-Nov-22	20-Feb-23	97	moored in water column			x		x	x
3	McGrath Cove South	33	33			0.5	07-Jun-24	14-Jul-24	37	Bottom frame					x	x
3	McGrath Cove North	71	29			42	15-Nov-22	20-Feb-23	97	moored in water column			x		x	x
3	Belle Island	70	23	24		46-47	15-Nov-22	20-Feb-23	97	moored in water column			x		x	x
3	Tilt Point	67	46	47		20-21	18-Jul-24	18-Aug-24	31	moored in water column					x	x
3	Hickman's Point	45	45			0.5	07-Jun-24	15-Jul-24	37	Bottom frame					x	x
3	Steamer's Head	41	41			0.5	18-Jul-24	18-Aug-24	31	Bottom frame					x	x
3	South East Bight	54	25	24		29-30	18-Jul-24	18-Aug-24	31	moored in water column					x	x
4	Salmonier Cove	60	31			29	21-Apr-23	03-Aug-24	104	moored in water column				x	x	x
4	Dog Cove	57	23	24		33-34	08-Jun-24	14-Jul-24	36	moored in water column					x	x
4	Red Cove	80	32	33	13 and 41	47-48	09-Mar-24	09-Jun-24	92	moored in water column	09-Mar-24	27-Apr-24			x	x
4	Murphy Point[a]		39.9				14-Jul-22	11-Oct-22	90	moored in water column					x	x
5	Harvey Hill East	88	27			61	21-Apr-23	03-Aug-23	104	moored in water column					x	x
5	Harvey Hill North	58	30	31		27-28	08-Jun-24	14-Jul-24	36	moored in water column					x	x
5	Broad Cove	74	28			46	21-Apr-23	03-Aug-23	104	moored in water column					x	x
5	Harvey Hill South	150	32	33	5	117-118	02-Dec-23	06-Mar-24	95	moored in water column	02-Dec-23	05-Mar-24			x	x
8	Strickland Cove	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
8	Blackfish Cove	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
8	Seal Nest Cove	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
8	Deer Cove	58	58			0.5	19-Jul-24	19-Aug-24	31	Bottom frame						

BMA	Sea farm	Current									Wave					Wind Modeling (MSC50)
		Water Depth (m)	Upward-looking ADCP Deployment Depth (m)	Downward-looking ADCP Deployment Depth (m)	Aquadopp Deployment Depth Above Bottom (m)	ADCP Height Above Bottom (m)	ADCP/ Aquadopp Deployment Date	ADCP/ Aquadopp Recovery Date	No. Days	Deployment Type	Wave Spotter Buoy Deployment Date	Wave Spotter Buoy Recovery Date	Wave Calculation (Fetch Length)	Wave Calculation (Numerical - SWAN)	Wave Modeling (MSC50)	
9	Butter Cove	71	38	40		31-33	12-Aug-17	12-Sep-17	30	moored in water column					x	x
9	Jervis Island	70	46	46.5		24	09-Oct-17	27-Nov-17	49	moored in water column					x	x
9	Pass My Can	49	20	21		28-29	09-Oct-17	27-Nov-17	49	moored in water column					x	x
9	Goblin Bay	104	36	37		67-68	09-Oct-17	27-Nov-17	49	moored in water column					x	x
10	Wallace Cove	345	96	96		249	16-Aug-17	15-Sep-17	30	moored in water column					x	x
10	Dennis Arm	380	41	113	5	267-339	09-Oct-17	28-Nov-17	47	moored in water column					x	x
10	Indian Tea Point	248	83	186	123	62-165	16-Aug-17	15-Sep-17	30	moored in water column					x	x
10	Wild Cove	390	100	100	5	290	09-Oct-17	28-Nov-17	50	moored in water column	08-Feb-24	06-May-24			x	x
11	Mare Cove South	176	122	123		53-54	16-Aug-17	15-Sep-17	30	moored in water column						
11	North Bob Locke Cove	183	125	126		57-58	13-Aug-17	12-Sep-17	30	moored in water column						
12	Devil Bay	126	59	97		29-67	09-Oct-17	27-Nov-17	49	moored in water column					x	x
12	Little Bay	224	55	177	115	47-169	10-Oct-17	28-Nov-17	49	moored in water column					x	x
12	Rencontre Bay	176	85	85		91	10-Oct-17	28-Nov-17	49	moored in water column					x	x
12	The Gorge	146	35	36	5	110-111	09-May-18	14-Jun-18	37	moored in water column					x	x
13	Chaleur Bay	131	33	34	4	97-98	09-May-18	13-Jun-18	34	moored in water column					x	x
13	Friar Cove	245	29	30	5	215-216	09-May-18	13-Jun-18	34	moored in water column					x	x
13	Shooter Point	206	35	36	5	170-171	10-May-18	13-Jun-18	34	moored in water column					x	x
14	Aviron North	110	34	33	5	76-77	10-May-18	14-Jun-18	35	moored in water column				x	x	x
14	Aviron South	135	36	37	5	98-99	10-May-18	14-Jun-18	35	moored in water column				x	x	x
14	Foots Cove	129	40	40	5	89	10-May-18	13-Jun-18	34	moored in water column				x	x	x
15	Denny Island	110	44	45	5	65-66	13-Jun-18	21-Jul-18	38	moored in water column				x	x	x
15	Gnat's Island	215	35	35	5	180	13-Jun-18	21-Jul-18	38	moored in water column				x	x	x
15	Shoal Cove	203	32	33	5	170-171	14-Jun-18	21-Jul-18	37	moored in water column				x	x	x

Notes:

[a] Data available in raw format only from DFO.

3.4.2 Currents

Current data were collected at each sea farm for a minimum of one month (ranged from 30–90 days) at various depths including near surface, mid-depth, and near-bottom (typically +5 m above the seafloor) (Figure 3.1; see Table 3.2). Thirty days is the minimum time period required to support the federal AAR; however, MCE has begun to adopt a self-imposed 90-day period to support re-engineering of sea farm infrastructure. Measurements were made using one or two Acoustic Doppler Current Profilers (ADCP) and Aquadopp current meters. To measure the near-surface, mid-depth, and near-bottom currents, either an upward or an upward and a downward-looking ADCP were used, which were moored in the water column or at the ocean floor. For some sites, an Aquadopp was used to measure the mid-water column and near-bottom currents. An Aquadopp can provide data for a single depth and was useful for deep sites where the two ADCP's may not provide sufficient coverage for the water column as needed. The locations of current meters were selected to ensure the data were relevant to site operations and fit the requirements necessary for depositional modelling. Data were collected near the centre of the proposed sea cage array. The moored ADCP(s) measured the water column velocity with a vertical resolution of 2 m and a time resolution of 15 minutes in the upper water column and typically 60 minutes in the lower water column. Tandem acoustic releases were used for instrument recovery.

The ADCP uses the Doppler shift of echo returns from scatterers in the water column to calculate the beam current speed. Measurements along the four acoustic beams allow the ADCP to calculate the current velocity in east, north, and vertical coordinates. By time-gating the echo returns, the ADCP can measure the current profile over a range of up to several hundred metres, depending on the frequency. The ADCP has a short blanking distance where no data are received due to ringing of the transducers. There is also a 6% loss at any air/water/seabed boundary due to contamination from side lobe energy returns. Non-ferrous mooring components were used to further reduce magnetic effects on the compass.

The ADCP current data were inspected for data quality and processed using Matlab software. The time channel was corrected for clock drift and a magnetic declination of approximately 17° West was corrected for by subtracting to convert current directions from degrees magnetic to degrees true. Single, double, triple, and quadruple despiking was conducted consistent with that applied to the ADCP data. Water current data were extracted from the raw data files and cropped to the in-water portion of the deployment. Records were flagged that met the following conditions:

- Error velocity >10–30 cm/s (depending on what site was analyzed);
- Average beam correlation <64 counts; and
- Average beam echo amplitude <50 counts.

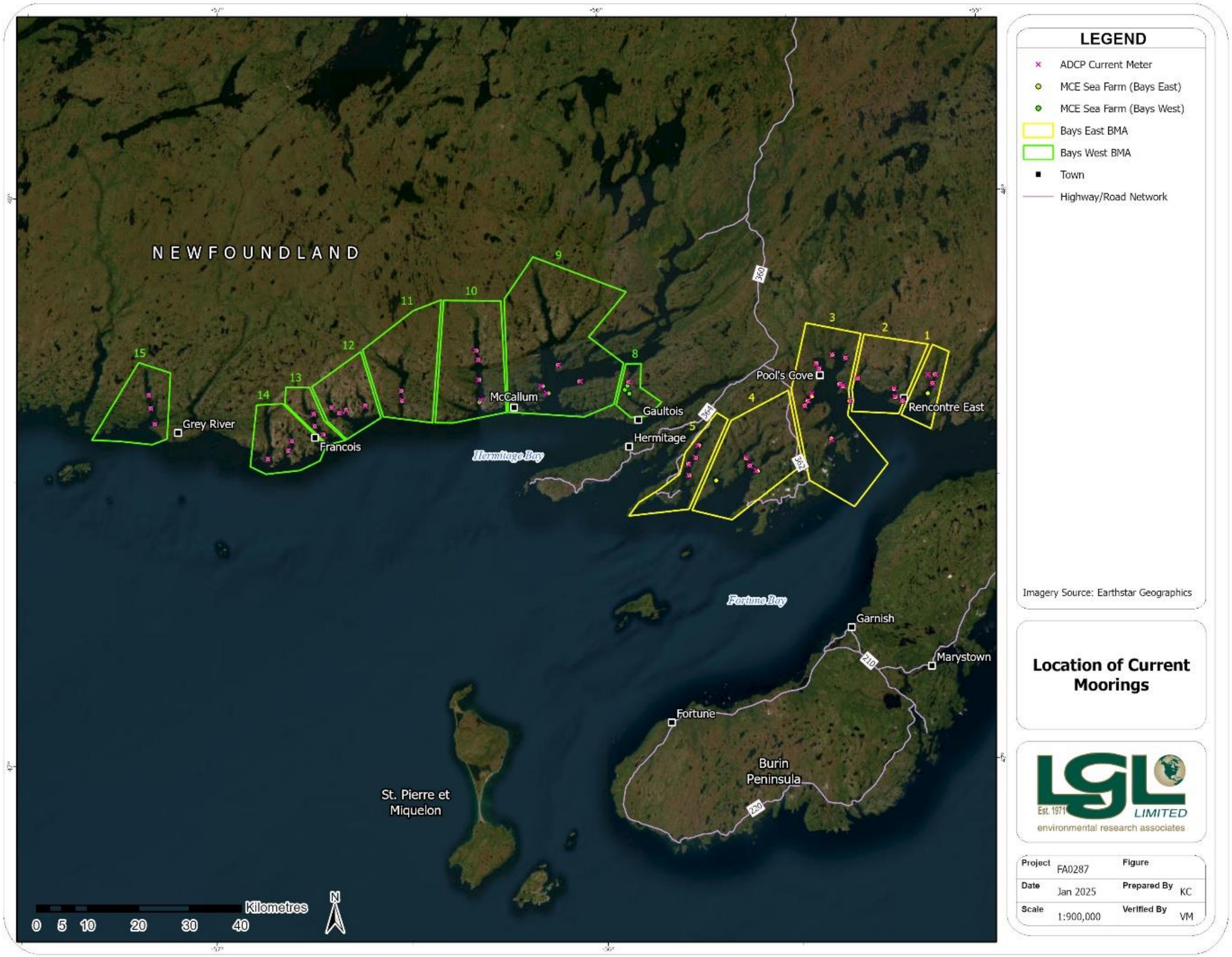


Figure 3.1. Locations of current moorings (ADCP or Aquadopp) used to collect current data in MCE sea farms.

To further reduce doppler noise in the measurements, the 15-minute ensembles were time averaged to 30 minutes. The upward-looking ADCP current time series data were then reviewed at various depths, and the mid-depth bin and near-bottom from the Aquadopps were selected to look for and edit erroneous data. Then anomalous data records were automatically identified and interpolated. These data points were identified as having a high error velocity (Verror) relative to other data or were associated with a local spike in the echo amplitude. Erroneous data can be caused by a variety of reasons including poor scattering conditions, debris, schools of fish in the water, and orbital velocities due to wave action. The bin depths were based on depth below mean water level (MWL), calculated over the data record.

3.4.3 Wind and Waves

Several methods have been employed to collect wind and wave data at 11 of the 13 BMAs: real-time measurements of wave height; wave period and wave direction with a Spotter buoy; and calculations with a numerical wave calculation tool. In addition, hindcast data generated by the Meteorological Service of Canada (MSC) for wind and waves was used. Hindcast wind and wave data at MSC50 grid points near the MCE BMAs were summarized. Wind and wave data are currently unavailable for BMA 8 and 11; these BMAs were acquired by MCE in 2018 through purchase of assets from previous finfish producers and to date, have not been utilized for production. Table 3.2 (earlier) summarizes with the wind and wave measurement data available for each sea farm.

3.4.3.1 Modelling (MSC50 Hindcast Approach) for Atlantic Canada

As noted previously, the MSC has created a dataset (MSC50) using the hindcast approach for numerous grid points in Atlantic Canada[6]. The hindcast approach consists of the application of numerical wind and wave models together with historical meteorological data to simulate the evolution of surface winds and ocean wave response in an area of interest. This wind and wave dataset is calculated from hourly reanalysis data of historical surface winds and ocean surface waves in Atlantic Canada during 1954–2018. These data are used to characterize marine surface wind and wave climate conditions, trends and variability, and to assist with coastal and offshore operations/risk management. Grid points from the MSC50 dataset (n=18) nearest each BMA (Figure 3.2; Table 3.3) were accessed for data to calculate 10-year mean and maximum wind speeds (m/s) and wave heights (m) for most sea farms. Grid points were not located near BMA 8 and BMA 11 so were excluded from the analysis.

[6] See https://open.canada.ca/data/en/dataset/f3f0312d-d28b-400c-b14a-28f51ff7f08a

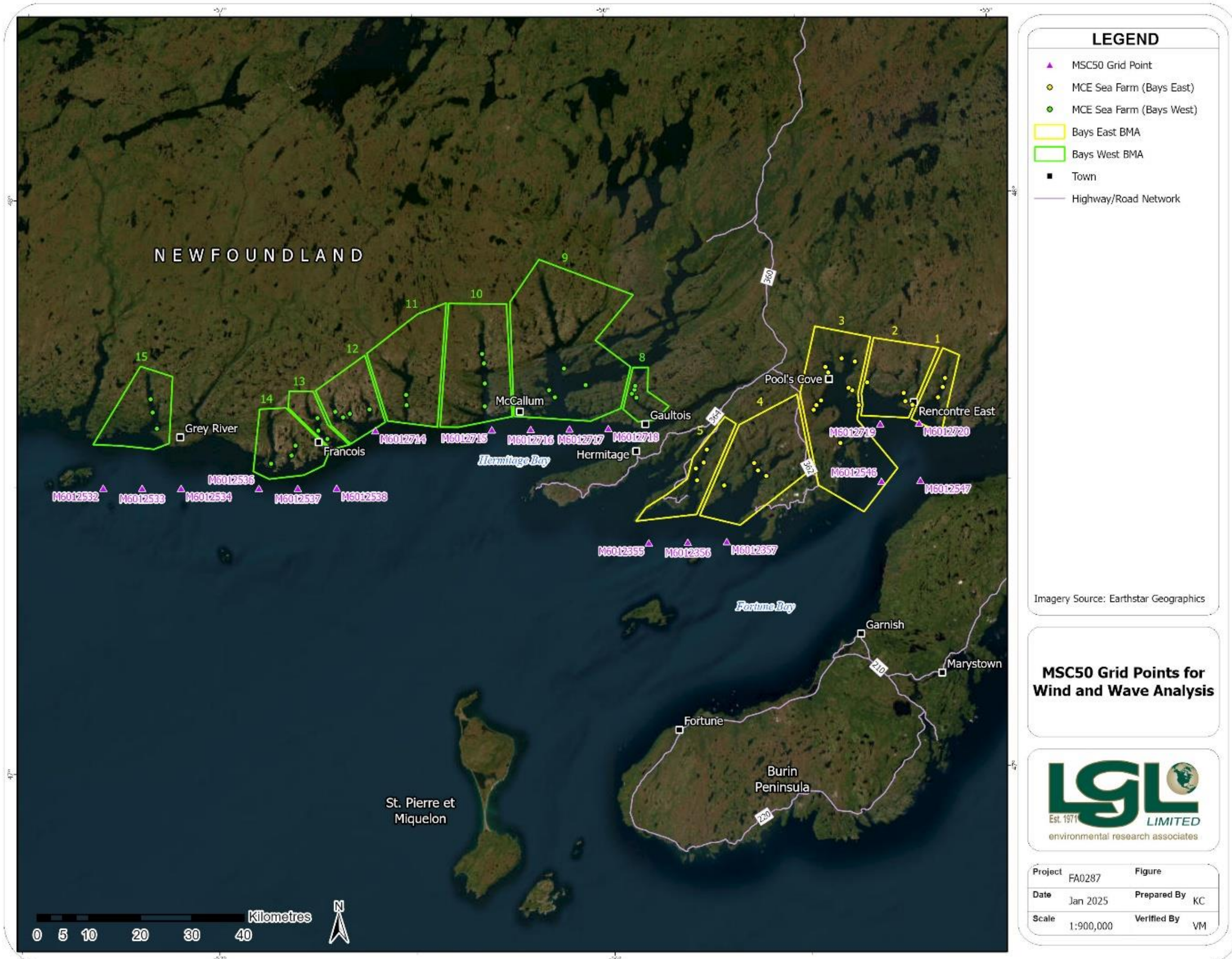


Figure 3.2. Locations of MSC50 grid points used to summarize wind and wave data in MCE sea farms.

Table 3.3. Locations and proximity of MSC50 grid points relative to MCE sea farms.

Grid Point	Area	Closest BMA	Coordinates		Depth (m)	Distance to Closest Sea Farm (km)
			Latitude	Longitude		
M6012720	Fortune Bay-Belle Bay	1 & 2	47.6	-55.2	226.76	Rencontre East Island: <4
M6012719	Fortune Bay-Belle Bay	2 & 3	47.6	-55.3	159.24	Belle Island: 5.5
M6012546	Fortune Bay	3	47.5	-55.3	299.28	Ironskull Point: 12
M6012547	Fortune Bay	3	47.5	-55.2	260.08	Ironskull Point: 15
M6012357	Fortune Bay-Harbour Breton	4	47.4	-55.7	108.17	Murphy Point: 11
M6012355	Fortune Bay-Harbour Breton	5	47.4	-55.9	193.82	Broad Cove: 16
M6012356	Fortune Bay-Harbour Breton	5	47.4	-55.8	133.52	Broad Cove: 12
M6012716	Bay d'Espoir	9	47.6	-56.2	175.62	Jervis Island: 8
M6012717	Bay d'Espoir	9	47.6	-56.1	212.66	Jervis Island: 7
M6012718	Bay d'Espoir	9	47.6	-56	272.03	Jervis Island: 12
M6012715	Bay d'Espoir	10	47.6	-56.3	208.5	Wild Cove: 5
M6012714	Bay d'Espoir	12	47.6	-56.6	150.15	Devil Bay: 5
M6012536	South Coast of NL	14	47.5	-56.9	204.43	Foots Cove: 6
M6012537	South Coast of NL	14	47.5	-56.8	183.48	Aviron South: 6.5
M6012538	South Coast of NL	13 & 14	47.5	-56.7	210.32	Shooter Point: 10
M6012532	South Coast of NL	15	47.5	-57.3	127.55	Denny Island: 16
M6012533	South Coast of NL	15	47.5	-57.2	207.01	Denny Island: 13
M6012534	South Coast of NL	15	47.5	-57.1	200.55	Denny Island: 15

3.4.3.2 *Sea Farm Specific Wave Calculations*

Wave calculation conditions may be determined by using two different methods; (1) a fetch length method in accordance with the Scottish standard (fetch length is measured with Olex marine charts) and (2) numerical wave calculation [e.g., Simulating Waves Nearshore (SWAN)] based on bathymetry, wind strength and directions, and possible swell. The wave calculation method is considered more accurate, as it considers the bathymetry of the sea farm. For sea farms without accurate bathymetric data, the wave parameters were calculated using the fetch length method. If the SWAN program was used with missing bathymetry, a very simplified, and usually conservative bathymetry, (assuming 250–500 m was used for all depths). In some areas, both the SWAN and fetch length method have been considered for the wave calculations. In general, the SWAN calculation yields higher waves for shorter fetch length, since the waves tend to "curve" around land formations/islands. For longer fetch lengths, the fetch length method typically overestimates the wave size. In the Bays East area, tidal data for the nearest Government of Canada station (Belleoram; GC 2024a) were used for the model along with sea farm specific current measurements collected by MCE. In determining current speed with a 50-year return period, a precautionary factor was applied from *Marine Scotland – A technical standard for Scottish finfish aquaculture* (SG 2015). For the 10-year return period the velocity is reduced by 10.8% (multiplied by 1.65/1.85 = 0.8919). Wind conditions were determined using the National Building Code of Canada, Volume 1 (NRC 2022). Wind speed that has a "one in n-year" return period is determined by combining the values for hourly wind pressure with wind velocity. The wind values for the nearest location (Grand Bank) for 10- and 50- year return periods were used. Table 3.2 indicates the sea farms with wave calculation data.

3.4.3.3 Sea Farm Specific Wave Measurement

Wave data were collected using a SOFAR Spotter wave buoy. Real-time measurements of wave height, wave period, and wave direction were acquired through the SOFAR Dashboard. Full wave spectra data were obtained from the memory card when the buoy was recovered. The wave buoy measures waves based on the GPS northing, easting, and elevation. Accuracy is stated as approximately +/- 2 cm under good conditions. The Spotter wave data, as output by the buoy, were reviewed for data quality. The spectra of the largest wave events were plotted and assessed.

3.5 Ice Conditions

Ice conditions in and near the BMAs were examined based on Canadian Ice Service (CIS) data and from general observations noted by MCE personnel at the sea farms. An analysis of the CIS 30-year median (1990/1991–2019–2020) of weekly ice in and near the BMAs was undertaken to provide information on the spatial extent and temporal occurrence of ice. To provide more up-to-date and detailed sea ice information, daily sea ice charts for the area in and near the BMAs, were selected to represent each week and then analyzed for the past 10 years (2015–2024) for the presence, type, and frequency of sea ice. A summary of the percent frequency of ice conditions within the region is provided.

General information on ice conditions specific to each MCE sea farm was gathered based on an interview with a senior sea farm manager.

3.6 Storms

Information on historical hurricanes and tropical storms were acquired from the U.S. National Oceanic and Atmospheric Administration (NOAA) database for 1962–2024.[7] Storm tracks of tropical systems that passed within 150 nm (278 km) of the BMAs were reviewed and summarized. Key literature sources were also reviewed for information on storms.

3.7 Tides and Floods

The Government of Canada maintains tidal stations for time and height prediction of high and low water in Canada including several along Newfoundland’s south coast (DFO 2024a). To summarize the tidal conditions for the south coast of Newfoundland, the 2024 predicted hourly tidal heights for two stations in Bays East (Belleoram and Harbour Breton) and four stations in Bays West (Francois, Gaultois, McCallum, and Pushthrough (Figure 3.3) were accessed to

[7] See: https://coast.noaa.gov/hurricanes/#map=4/32/-80

calculate the mean, range, minimum, and maximum tide heights for the daily higher-high through lower-low predicted tides for 2024 in the area. Where historical observed data were available, the highest and lowest tides observed for the tide stations are also presented. Tidal predictions use astronomical, and not meteorological effects on tides (DFO 2024a); therefore, the data at three of the Bays West tidal stations where historical information was available were also included to summarize the range and frequency of high and low tides in the area. Although presented, these historical datasets are limited (Francois – June 1998; Gaultois – April–May 1996; and McCallum – December 1995 and July–August 1998) and represent a time period more than 25 years ago.

Tidal heights are affected by meteorological and climatological events beyond that which is captured in the predicted and limited historical data within the immediate vicinity of the south coast of Newfoundland. To assess extreme events, the frequency of tidal heights greater than 3 m (extremely high tides) that occurred in the historical data due to storm surge, precipitation and run-off, spring freshet, and changing sea levels was analyzed. Time-series plots of the historical data showing the exact dates, times, and tidal heights for tides that exceeded 3 m as well as time-series showing the full range of tidal heights recorded at stations with historical data available were extracted to help contextualize the frequency and magnitude of tides that exceeded 3 m. In addition, data from three long-term tidal stations adjacent to Fortune Bay (Port aux Basques, Cabot Strait – 1935–2024; Great St. Lawrence, Burin Peninsula, 1972, 2005–2024; and Argentia, Placentia Bay 1971–2024) were assessed and compared to a 3-m extreme high tide.

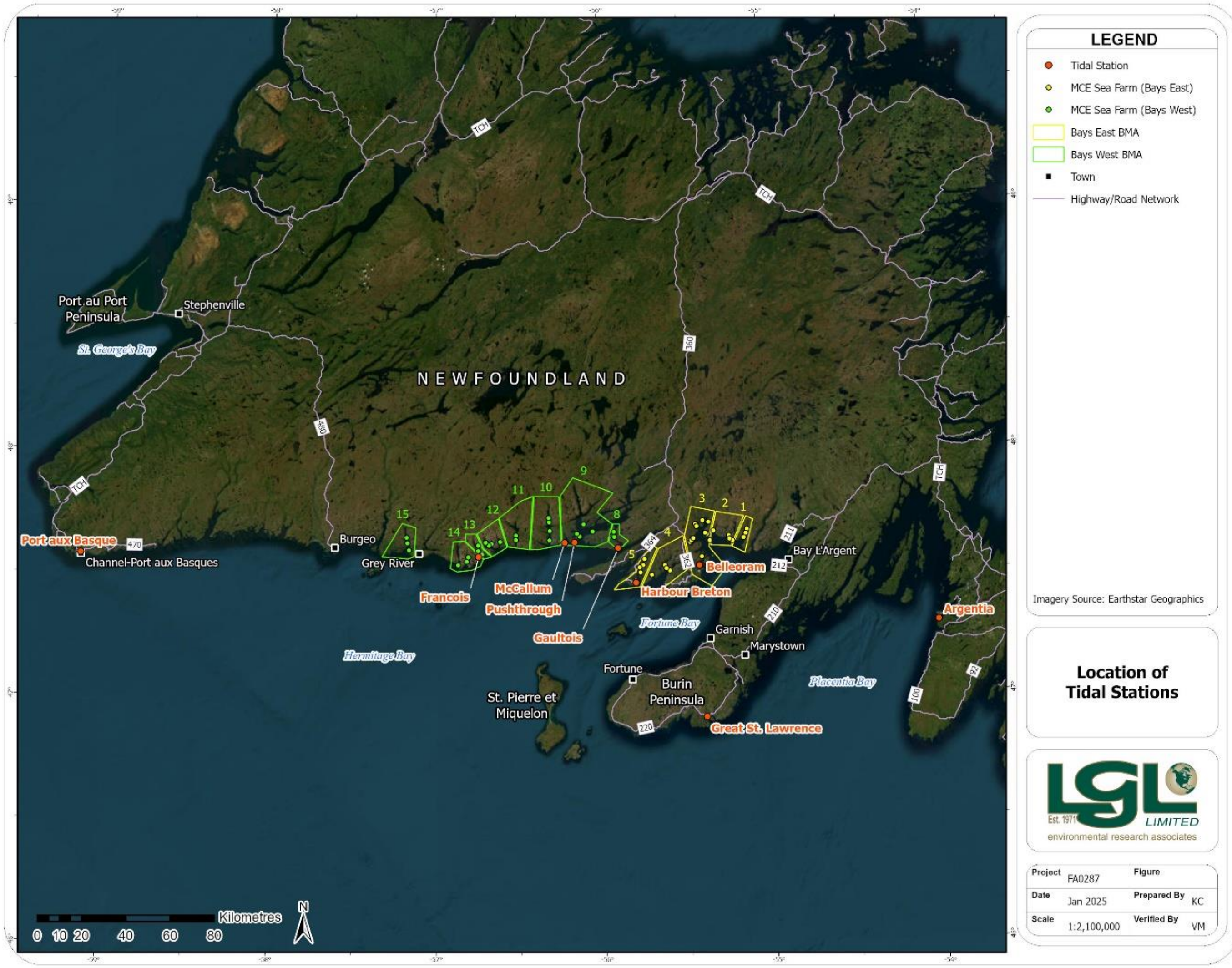


Figure 3.3. Locations of Government of Canada tidal stations used to summarize tidal data (observed and predicted) along the south coast of Newfoundland and near MCE sea farms. Long term stations with historical observed data are Port aux Basque (1935), Great St. Lawrence (2005) and Argentia (1971).

3.8 Performance of Sea Farms with a Previous Production Cycles

Atlantic salmon aquaculture operations have been active in Newfoundland since the 1980s (GNL 2014). In 2018, MCE acquired many of its currently held aquaculture licenses from a previous owner (see Section 1.1.3 in LGL 2025a for additional details). Summaries provided for the sea farms that have completed a production cycle were compiled based on publicly reported data, 2016–present or provided by MCE (See Sections 4.8; 5.8; 6.8; 7.8; 8.8; 11.8; 13.8; and 14.8). These summaries provide an overview of each BMA’s historical performance including monitoring, management, and reporting to regulators.

3.8.1 Fallowing Periods

In 2014, FFA partnered with aquaculture operators in the salmonid sector to draft an agreement in support of a Bay Management Strategy. As part of this strategy, industry participants agreed to stocking strategies that would reduce or eliminate the occurrence and spread of pathogens and disease. One of these strategies was site fallowing whereby all sea farms following each production cycle would be fallow (not stocked with fish) for a minimum period as per the BMA principles (FFA 2019). As per the agreement with the province, the 53 MCE sea farms rotate stocking schedules to ensure fallowing requirements are met or exceeded.

3.8.2 Benthic Deposition Modelling and Monitoring

For aquaculture operators in Canada, the protection of benthic habitat falls under the mandate of DFO primarily through the AAR. Applicants are required to survey new aquaculture sites (and expansion of existing sites), which includes predicting depositional contours for carbon (C) per meter squared per day for 1, 5, and 10 grams (gC/m^2/d). Once operational, finfish aquaculture operators are required to conduct monitoring of the benthos during a period in the production cycle that is close to peak feeding for indicators of BOD matter.

3.8.2.1 Benthic Deposition Modelling

Finfish aquaculture license applications require depositional modelling to predict the extent and intensity of deposition of solid waste (uneaten feed and feces) from fish farms and associated environmental impacts of a carbon footprint on the seafloor. This modelling may also be required to support requests for changes to existing licenses for any activity that is likely to increase the predicted contours of the footprint of the BOD matter deposited by the facility. Depositional models use information on the rates of fish feeding, feces, and the hydrodynamics of the sea farm to predict the deposition of particles that contribute to carbon on the sea floor. These depositional contours must be calculated using the rate of deposition of BOD matter from the sea farm during a period that represents maximum daily quantity of feed usage. Available modelling predictions for MCE sea farms (i.e., for new licenses or amendments to existing licenses) are summarized with detailed results provided in LGL (2025c, Volume 3).

3.8.2.2 Benthic Deposition Monitoring

The AAR, which was introduced in July 2015, requires that once a sea farm is operational, benthic monitoring is required at least once during the production cycle. In Newfoundland, this should occur between July 1 and October 31 at a time that is close to peak feeding (DFO 2018). Operational monitoring must follow the procedures as outlined in the AAR Monitoring Standard (DFO 2018) and can be either via benthic substrate samples (grab samples) for soft bottom locations or video monitoring with a camera for hard bottom substrates. Both sampling methods require sample collection in a standardized transect pattern. MCE has utilized both sampling methods during AAR monitoring of its sea farms. Benthic substrate samples are analyzed for free sulfide and redox while visual monitoring with a camera provides a means to evaluate the nutrification effects from deposition of BOD matter (fish feces, uneaten feed, and naturally occurring biofouling material). Performance-based indicators such as the presence of bacteria *Beggiatoa* or marine worms serve as indicators of elevated sulfide levels and are considered a valid visual indicator of benthic changes due to aquaculture activities. Thresholds for both benthic grabs and visual monitoring are established, and any exceedance of these thresholds (>70% of samples representing the survey area) requires a resample prior to restocking. DFO must be notified within 14 days after the day on which sampling was conducted if thresholds have been exceeded. Restocking of a sea farm can only occur if a site has not exceeded the limits (concentration for sediment samples or presence of indicator species for visual monitoring) or if a previous sample did not receive a pass, the resample must indicate concentrations have returned to an acceptable level. BOD monitoring data are summarized for 2016–present for MCE sea farms with available data.

3.8.3 Publicly Reported Performance at Sea Cages

To promote transparency of the aquaculture industry, public reporting has begun on many operational indicators including events for abnormal mortality, fish health (federally reportable diseases), fish escape, sea lice, and also the use of drugs or pesticides for aquaculture operators in Canada (FFA 2019). Performance reports including events such as mass mortality, federally reportable disease, and escapes are available for all salmonid operators in Newfoundland through the Newfoundland Aquaculture Industry Association (NAIA) website with a temporal coverage of 24 April 2019–present day. Early reports (2019) did not reflect sea farm level information for all events but are available on the NAIA website. In addition, monthly reports of sea lice counts are also maintained through NAIA when environmental conditions permit sampling of the fish in consideration of health and welfare. These monthly average reports are an average for all sea farms (not at an individual sea farm level). In Newfoundland, reporting coverage for sea lice abundance numbers are available from May 2021–present.

Notices are provided to DFO in advance of any deposits of drugs or pesticides at sea farms and information pertaining to the chemical as well as the quantity of drugs or pesticides is reported to DFO on an annual basis. These data are compiled by DFO and reported each year on the sea farm-level usage of drugs and pesticides. At the time of writing, data are available from 1 January 2016–31 December 2022 for all aquaculture operators in Canada.

3.8.3.1 Incident Events (Mortality, Health, Escapes, and Sea Lice)

Incident events that include abnormal or mass mortality, federally reportable diseases, and fish escapes are reported to the public within 24 hours (FFA 2019). This reporting requirement became effective with the release of the FFA *Aquaculture Policy and Procedures Manual* in 2019 (FFA 2019). Reporting of these events for all salmon farmers in Newfoundland is through the NAIA website. Abnormal mortality is defined as mortality that is more than 10% of the stock held at a sea farm. Fish health events are reported as either 'suspect' or 'confirmed'. Samples collected as part of the passive screening for health of the fish are collected in duplicate with one sample sent for analysis and a duplicate retained by FFA. Should a sample have a positive result for a federally reportable disease (i.e., ISA, IPN), a duplicate sample is provided to the Canadian Food Inspection Agency (CFIA) laboratory for confirmation analysis. Only following confirmation of the duplicate sample results will the fish health concern be confirmed.

In addition, sea lice abundance numbers are reported monthly on the NAIA or a corporate website (FFA 2019). Sea lice counts are conducted only when environmental conditions are conducive for the health and welfare of the fish. Typically, in Newfoundland, this period is May–December. Sea lice abundance numbers are reported as an average number per fish for all active sea farms for each company and not on a sea farm level.

NAIA Website (2019–2022)

Reporting requirements were initially met with "Industry Statements" posted on the NAIA website as industry and NAIA developed and implemented a more formal Aquaculture Portal. Any incident events that were publicly reported during the period 2019–2022 are available at https://naia.ca/.

Aquaculture Portal (May 2022–Present)

In 2022, an Aquaculture Portal dedicated to public reporting for industry was launched. This portal provides individual company reports for fish health, pest management, and containment as well as any other reportable events. The portal reports those incident events that occurred during 2022–present and can be found at https://aquacultureportal.ca/.

3.8.3.2 Deposits of Drugs and Pesticides

The use of sea cages in the ocean provides access to sea water for the culture of Atlantic salmon that correlates to its natural environment. One disadvantage of this production method is any introduced substances such as pesticides or drugs are released into the surrounding environment exposing the nearby biota, benthos and water. As per the EIS Guidelines, MCE is required to provide historical information on use of drugs and pesticides and to include a discussion of exposure zone modelling for pesticides, therapeutants, and disinfectants.

National Aquaculture Public Reporting

Under the AAR, aquaculture operators in Canada are required to submit notifications and an annual report to the minster of DFO detailing the use of drugs and pesticides at sea farms. Notifications are required to be submitted in advance (72 hours) and post deposit (if there is fish mortality observed within 96 hours). In addition to the notification, annual reports are submitted to the Minister of DFO that include the use of any drugs or pest control products, any morbidity, unhealthy fish or mortality events observed in wild fish during and following a treatment. This information is publicly available on the National Aquaculture Public Reporting website[8].

All products administered by MCE have previously been assessed for risk and authorized for use by Health Canada and the CFIA (GC 2010). These products may only be used after it has been determined that these are the most suitable and effective means of treating a fish pest or pathogen, and that failure to use these treatments would result in negative effects for fish health and disease transfer. A number of products, like Erythromycin and Ivermectin, are not listed explicitly for aquaculture use but are used legally according to Emergency Drug Registrations (EDR) or when prescribed by a registered veterinarian for extra-label use. Pesticides administered as a bath treatment [Azamethiphos (Salmosan) and Hydrogen peroxide] and drugs administered in-feed [Emamectin (SLICE), Erythromycin, Florfenicol, Ivermectin, Oxytetracycline] have been used on sea farms currently owned by MCE since records have been maintained and available (i.e., 2016–2022).

3.9 Exposure Zone Modelling

3.9.1 Background

Exposure zone modelling can be used to provide estimates of the size and distribution of areas that may be subject to exposure from various concentrations of substances used during operational treatments for fish health management. These models can be developed using sea farm specific characteristics of the receiving environment (i.e., currents and bathymetry), substance properties (e.g., half life), and method of introduction into the receiving environment (i.e., bath treatment or in-feed). Recently, DFO has used a relatively simplistic Potential Exposure Zone or PEZ model to predict areas which may experience varying concentration levels of fish health treatment substances (see for example, Page et al. 2023). In other jurisdictions with finfish aquaculture, different model types (e.g., dispersion modelling; SEPA 2024) are used.

In NL, aquaculture approvals, regulatory requirements and operational mitigation measures and risk tolerances are managed by federal and provincial governments. DFO (2019) has developed a

[8] https://open.canada.ca/data/en/dataset/288b6dc4-16dc-43cc-80a4-2a45b1f93383

Framework for Aquaculture Risk Management (FARM) to ensure sustainable management of fisheries resources. At the time of this writing, Environment and Climate Change Canada (ECCC) along with DFO monitor the environmental impacts of drugs and pesticides used in aquaculture. As part of the implementation of FARM, the intention is for DFO to assume the lead role in enforcing the use of drug and pesticide compliance under the AAR. Currently, the only federal operational regulatory threshold used in Canadian aquaculture management is the organic deposition threshold of feed and feces from marine finfish farms (see Section 3.8.2.2). A monitoring program for the use of drugs (in-feed products to control pathogens) and pesticides (products applied as a topical or in-bath treatment) during aquaculture operations is being developed (Hamoutene 2023; DFO 2021). Hamoutene et al (2023) reviewed toxicity and impact data from multiple sources that could be considered to support the development of Canadian Environmental Quality Standards (EQS). The approach used multiple toxicity endpoints and encompassed the water, sediment and biota. Burridge and Holmes (2023) have reviewed the hazards associated with the use of pesticides and drugs in finfish aquaculture.

Pest control product use such as bath treatments (i.e., Azamethiphos, Hydrogen Peroxide) and in-feed treatments (i.e., Emamectin Benzoate, Ivermectin) is regulated by Health Canada's Pest Management Regulatory Agency (PMRA). Since 2016, the substances used by MCE on its sea farms include Azamethiphos, and Hydrogen Peroxide for bath treatments and Emamectin Benzoate, and Ivermectin for in-feed treatments (see Sections 4.8.3.5, 5.8.3.5, 6.8.3.5, 7.8.3.5, 8.9.3.5, 13.8.3.5, and 14.8.3.5). Azamethiphos and Hydrogen Peroxide are pest control products that are currently registered in Canada for aquaculture use (Hamoutene et al. 2023). Emamectin Benzoate and Ivermectin are approved for use in Canada. Emamectin Benzoate, also referred to as Slice, is fully registered for use in Canada while Ivermectin is available through Health Canada's Emergency Drug Release (EDR) program. Through the EDR program, the Designated Aquaculture Veterinarian (DAV) for MCE can request authorization to access these drugs for emergency veterinary use.

3.9.2 Modelling

A discussion of PEZ modelling by DFO for BMAs 9 through 15 is provided, and new dispersion modelling was conducted for a bath treatment at MCE sea farms in each of the 13 BMAs.

3.9.2.1 PEZ Model

As part of the assessment of proposed new finfish sites and expansion of finfish sites by MCE, DFO undertook PEZ modelling to estimate the potential zones of exposure for bath pesticides and in-feed drugs that may be released from 14 sea farms proposed in BMAs 9, 10, 11 and 12 (Page et al. 2023), three sea farms in BMA 13 (DFO 2022) and at six sea farms proposed in BMAs 14 and 15 (DFO 2024b). The PEZ modelling completed by DFO has been conducted as part of the DFO science review process for recent aquaculture license applications. In Canada, there are no regulatory standards and/or programs involving PEZ modelling and the scope and treatment parameters used in PEZ models has varied depending on the specific aquaculture license application. A summary of the methods is provided here, and the reader is referred to Page et al. (2023) and DFO (2024b) for details.

Parameters including sea cage array, lease sites, water depths and current speeds from a single mooring in the vicinity of the proposed sea farm were used to estimate the radius and location of the zone of exposure for a sinking particle (in-feed drugs) and with release/discharge of bath treatments (tarp/skirt and well boat). The bath pesticides were considered to be passive particles that did not settle to the seafloor. Maximum and mean PEZ were calculated assuming an estimate of the maximum and mean currents, respectively, persisting throughout the dilution or decay time scale. The properties of the pest products, Azathimphos and Hydrogen Peroxide (bath treatments) were also factored into the modelling. The exposure zone is assumed to have the shape of a circle centered over the center of the sea cage array. For some sea farms located in fjords or close to land, the PEZ area included land surface in which case, the areas calculated were inflated. For well boat treatments, a ten-fold reduction in the concentration of the chemical (10 µg/L) was assumed when released as a result of the entrainment associated with the jet dynamics within the well boat as compared to the release of chemical during a tarp treatment (100 µg/L). Dose concentrations for Azathimphos and Hydrogen Peroxide were assumed to be 100 µg/L and 1800 mg/L, respectively. These dose concentrations are in line with Health Canada recommendations. The PMRA does not set maximum allowable levels of pesticide in the environment but rather sets conditions of use, including application rates, which are considered safe for the environment. The PMRA has established a maximum application rate of 0.1 mg/L (100 µg/L) and a maximum of five applications per fish life cycle for Azamethiphos[9]. The PEZ estimates for Azathimphos and Hydrogen Peroxide were based on toxicity threshold concentrations of 1 µg/L and 188 mg/L, respectively. As noted in Page et al. (2023), PEZ estimates are not zones of impact and are intended to serve as an initial screening tool in combination with biological and socio-economic aspects of an area to gauge potential risk and the potential need for more precise modelling estimates.

3.9.2.2 Dispersion Model

MCE contracted a third-party consulting firm (BMT Ltd.) to model the exposure zone for a fish health treatment product at their sea farms on the south coast of Newfoundland. A numerical hydrodynamic and tracer model was used to support this requirement, specifically dispersion modelling for fish health treatment products (see Appendix B for details). A hydrodynamic modelling study was used to simulate the dispersion of the Azamethiphos[10] bath treatment under spring and neap tide scenarios. In the absence of Canadian Environmental Quality Standards (EQS), Azamethiphos was selected for modelling because it is the preferred bath treatment for

[9] https://www.canada.ca/content/dam/hc-sc/documents/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/registration-decision/2017/rd2017-13-eng.pdf

[10] Azamethiphos is the treatment therapeutant of this study, which is an organo-thiophosphate insecticide. It is a veterinary drug used to control parasites, specifically sea lice. When released into water, it stays in the water until it breaks down into non-toxic derivatives, for which a decay half-life of 5.6 days has been determined (VMD 2014).

MCE's current and foreseeable future operations. The modelling study estimated an exposure profile for each BMA. This profile included a temporal sequence and spatial distribution of Azamethiphos concentrations within the immediate vicinity of the BMA. The assessment of Azamethiphos dispersion was based on PEZ modelling guidance provided by DFO (Page et al. 2023a). Page et al. (2023a) modelled concentrations that highlight dispersion characteristics and concentration values over time. There are examples of EQS applications in finfish aquaculture, which governs the use of drugs and pesticides at sea farms, including those in the Scottish Environment Protection Agency's (SEPA) regulatory framework. In the absence of Canadian standards or regulatory guidance on the matter, the SEPA regulatory framework was used to develop modelling scenarios. The study focuses on the dispersion dynamics in each MCE BMA and quantifies the exposure zones. Additionally, it examines dispersion patterns near sensitive areas to provide background for assessing potential effects.

A numerical hydrodynamic and tracer dispersion approach was used to simulate the fate and transport of Azamethiphos bath treatment at the 53 sea cages using a 3-D hydrodynamic model, TUFLOW FV (see Section 2.0 and 3.0 in Appendix B for details on this model and its parameters and calibration).

The impact of fish health treatment footprints was represented as plumes of dissolved constituents with increased dilution from the point of treatment release. The dispersion of Azamethiphos following treatment was simulated using the calibrated TUFLOW FV hydrodynamic model and the exposure zone of Azamethiphos was investigated through both inert tracer studies and particle tracking module, allowing for a comprehensive exploration of its dispersion dynamics.

To simulate worst-case conditions, dispersion modelling was initially performed using TUFLOW FV-generated flow fields over a 34-day period, focusing on neap tidal ranges from the calibrated hydrodynamic simulations. This scenario was selected as it represents the least dispersive ambient conditions, under which Azamethiphos dispersion would be least likely to meet the required EQS. Additionally, during spring tides, simulations were conducted over a 30-day period, which provided more dispersive conditions with greater water volume exchange, allowing for a better understanding of the dispersion footprint.

The simulation periods varied depending on the number of sea farms within each BMA and the number of cages per sea farm. For BMAs containing four sea farms, each with ten cages, the maximum simulation period was extended to 20 days to complete the treatment cycle, followed by a 14-day monitoring period, resulting in 34 days. This allowed for the detection of any potential concentration peaks. It has been established that the bath treatment medicines used, such as Azamethiphos, are either rapidly degraded or bind to particles in the water, rendering them biologically unavailable (SSFL 2011). Consequently, short-term simulations have been considered sufficient to assess potential environmental impact (SSFL 2011).

An extreme treatment schedule was selected for the purpose of the modelling to demonstrate a worse-case scenario. In the simulated bath treatment, 2.5 kg of Salmosan® was applied per cage, delivering 1245 g of Azamethiphos per cage, with releases occurring daily. For sea farms with 10 sea cages, such as in the Bays West area, a total of 1245 g of Azamethiphos was discharged over a five-day period. In sea farms with seven cages, such as in the Bays East area, 8.715 kg of Azamethiphos was discharged over 3.5 days. Azamethiphos treatment was modelled as a tracer and released over a five-minute period across the top 4 m of the water column, simulating bath volume discharge. A TUFLOW FV-Tracer model was employed to assess environmental compliance through time series exceedance, Maximum Allowable Concentration (MAC) analysis, and spatial footprint mapping in each BMA. Simulated Azamethiphos concentrations were also analysed during and after dosing periods in sensitive areas including Sandbanks Provincial Park, Big Barasway Wildlife Reserve, Fortune Head Ecological Reserve, and Frenchman's Cove Provincial Park.

4.0 Mal Bay (BMA 1)

The Mal Bay BMA (BMA 1) is located in the Bays East Area and includes three licensed sea farms: Benny's Cove, Foshie's Cove, and The Hobby (Table 4.1; Figure 4.1). All sea farms are located in relatively close proximity and the closest community to these sea farms is Rencontre East. Foshie's Cove and The Hobby sea farms have been previously stocked and in production, while Benny's Cove has never been in production. Benny's Cove construction date is yet to be determined. Mal Bay sea farms have been fallow since 2019.

Table 4.1. Mal Bay (BMA 1) sea farm locations and construction status in 2024.

BMA Name	BMA No.	Farm Site Name	AQ Licence No.	Site Coordinates		Construction Status
				Latitude (ºN)	Longitude (ºW)	
Mal Bay	1	Benny's Cove	1084	47.67711	-55.13000	TBD
		Foshie's Cove	1085	47.66131	-55.13681	Existing
		The Hobby	1086	47.64389	-55.14931	Existing

The sea farms in Mal Bay were originally designed with 1x7, 2x6, or 2x7, sea cage array with a net circumference of 90–100 m and a depth of 15 m. Beyond 2025, sea cage systems will be updated to have cages that are either 140 m or 160 in circumference with a minimum depth of 20 m. The maximum number of fish per site ranges from 260,000–900,000 with a maximum stocking density of 15 kg/m^3.

The water depths below the leases range from 2–215 m (Table 4.2). The shallowest sea farm is Benny's Cove where depths range from 3–67 m. Sea farms have bottom sediments consisting of mixed substrates. All sites were classified with the majority having hard substrates with some mixed substrates including silt, sand, or mud for an overall site classification of hard bottom.

Currents were reported at near surface, upper, mid-water, and near bottom depths. In summer, at 15 m water depth, the maximum water current speed at each site was five to ~seven times the mean speed (Table 4.2). There is much vertical variation in the maximum current speed and this variation is larger than the mean current speeds.

Benthic habitat surveys revealed that the predominate flora and fauna observed at sea farms are kelp (i.e., restricted to the photic zone), anemone, coralline algae, and cunners (Table 4.3, Table 4.4, and Table 4.5 later). Two stations in Benny's Cove contained soft corals.

Seasonal water temperatures at 5 m water depth were the same across sea farms with available data (Foshie's Cove and The Hobby) (Table 4.2). Mean water temperatures ranged from 1.6°C in winter to 14.6°C in the summer. Dissolved oxygen levels were consistently lower in the summer and fall than winter and spring with Foshie's Cove having slightly higher average dissolved oxygen levels relative to The Hobby. There were no available data for salinity within the Mal Bay BMA.

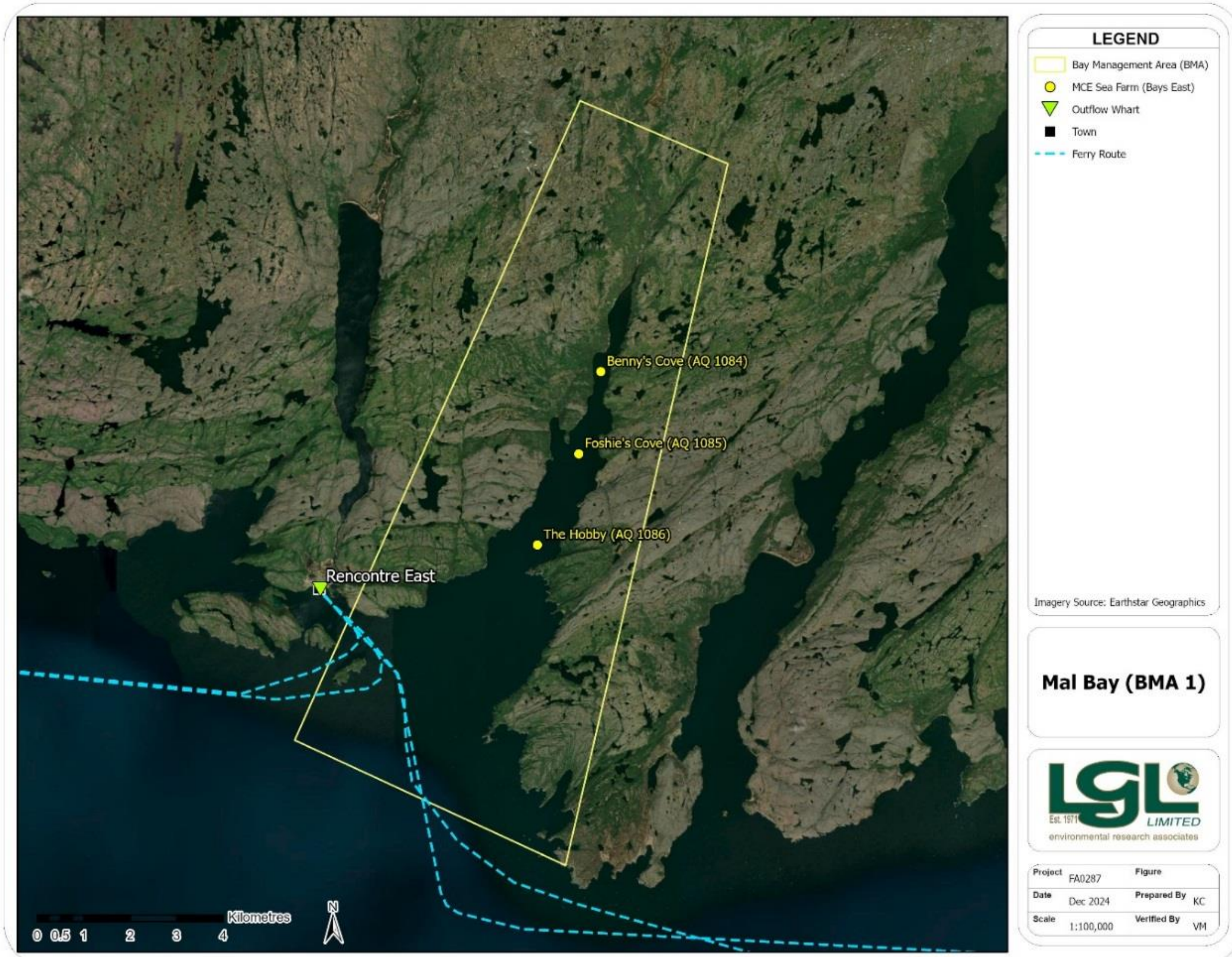


Figure 4.1. Locations of sea farms in the Mal Bay BMA.

Table 4.2. Summary of site-specific sea farm characteristics as originally designed in Mal Bay (BMA 1).

Characteristic	Sea Farm		
	Benny's Cove[a]	Foshie's Cove	The Hobby
Lease area (ha)	12	40	40
Water depth under lease (m)	3–67	2–168	3–215
Water depth under sea cages (m)	n/a	120–127	44–90
Predominant Bottom Type	Hard Bottom	Hard Bottom	Hard Bottom
Water Temperature (Mean °C at 5 m)			
Winter [b]	n/a	1.6	1.6
Spring [b]	n/a	4.3	4.3
Summer [b]	n/a	14.6	14.6
Fall [b]	n/a	8.7	8.7
Dissolved Oxygen (Mean mg/L at 5 m)			
Winter [b]	n/a	13.1	13.0
Spring [b]	n/a	13.0	12.8
Summer [b]	n/a	9.0	8.9
Fall [b]	n/a	10.3	9.8
Currents (cm/s at 15 m) in Summer			
Mean	3.1[c]	3.2	4.6
Maximum	17.0 [c]	22.0	23.3

Notes:

[a] Benny's Cove sea farm has never been in production. Characteristics described as original design.

[b] Winter includes January, February, and March; Spring includes April, May, and June; Summer includes July, August, and September; and Fall includes October, November, and December.

[c] Benny's Cove sea farm recorded at 16 m.

Water temperature and dissolved oxygen data were collected from January 2017–June 2018 in Foshie's Cove and The Hobby. Water depth values may vary by approximately ±2 m depending on tidal influence.

During 2009–2018, average monthly wind speeds ranged from 5.5 m/s in July to 10.8 m/s in January (Table 4.13 later). The maximum wind speed during this period was 21.36 m/s in February. Wind direction in the Mal Bay BMA was predominately westerly. Mean wave height from 2009–2018 ranged from 0.32 m in June to 0.85 m in January. The maximum wave height was 1.97 m in February (Table 4.14 later).

4.1 Sea Farm Site Maps

The MCE sea farms in the Mal Bay BMA were originally designed with either a 1x7, 2x7, or 2x6 sea cage array with a net circumference of 90–100 m and a depth of 15 m. Beyond 2025, sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The sea farms in the Mal Bay BMA are currently third-party certified or will be prior to future stocking [as per FFA policy (FFA 2019)].

4.1.1 Benny's Cove

Benny's Cove has never been in production. Prior to MCE acquisition of the Benny's Cove license, a sea farm design and sea cage layout was provided to regulators (Figure 4.2). The sea farm design has a 1x7 sea cage array with a net circumference of 100 m and a depth of 15 m. A production schedule has not been determined for Benny's Cove and thus the 2012 (Figure 4.2) design does not reflect MCE plans for the sea farm. Once a production schedule has been defined, a sea farm map and third-party certified sea cage layout will be developed.

4.1.2 Foshie's Cove

As originally designed, the Foshie's Cove sea farm has two 2x6 sea cage arrays with a net circumference of 100 m and an original depth design of 15 m (Figure 4.3).

4.1.3 The Hobby

As originally designed, The Hobby sea farm has a 2x7 sea cage array with a net circumference of 90–100 m and an original depth design of 15 m (Figure 4.4).

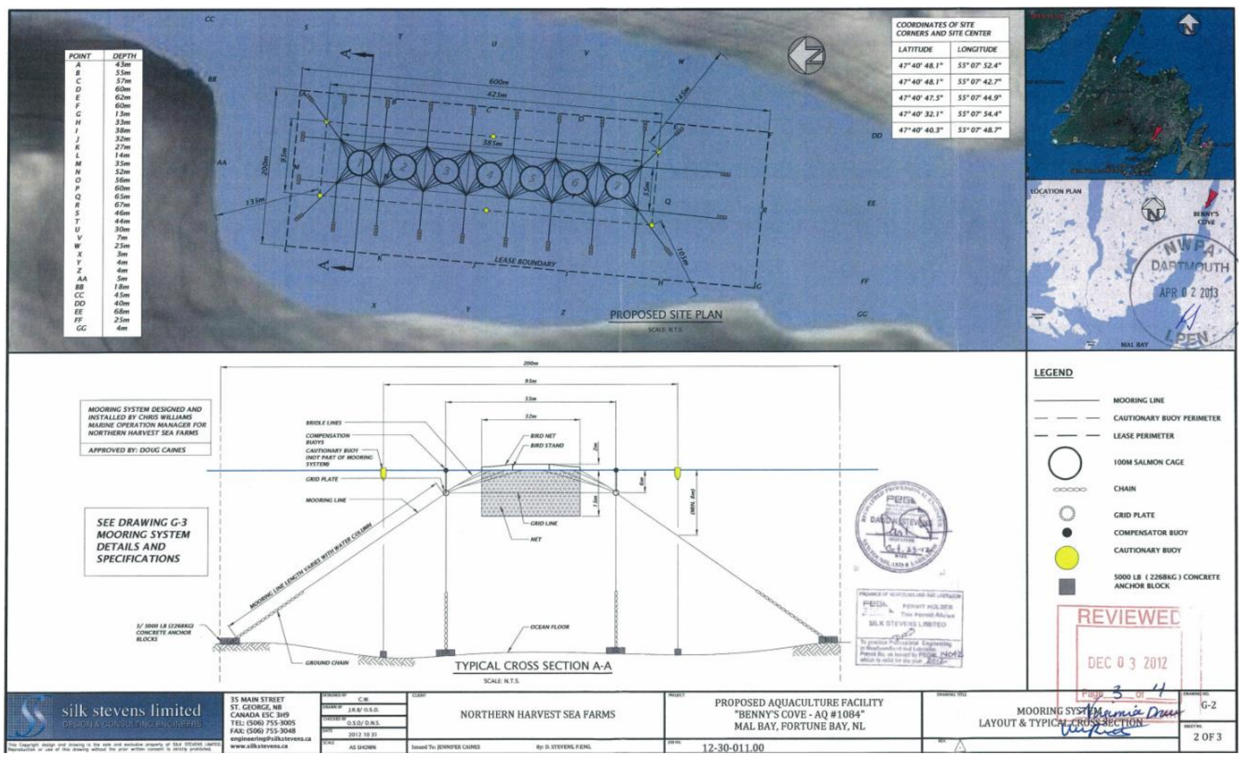


Figure 4.2. Benny's Cove sea farm map and sea cage layout prior to MCE acquisition of Benny's Cove license.

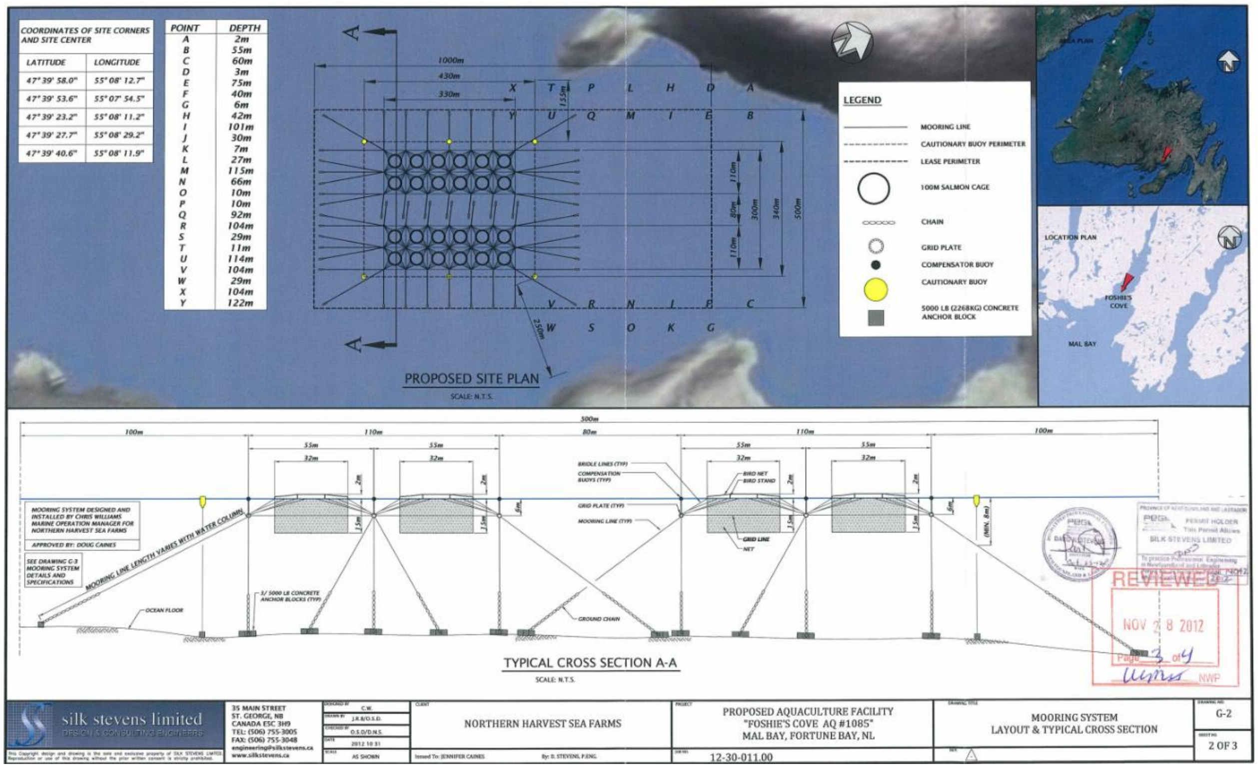
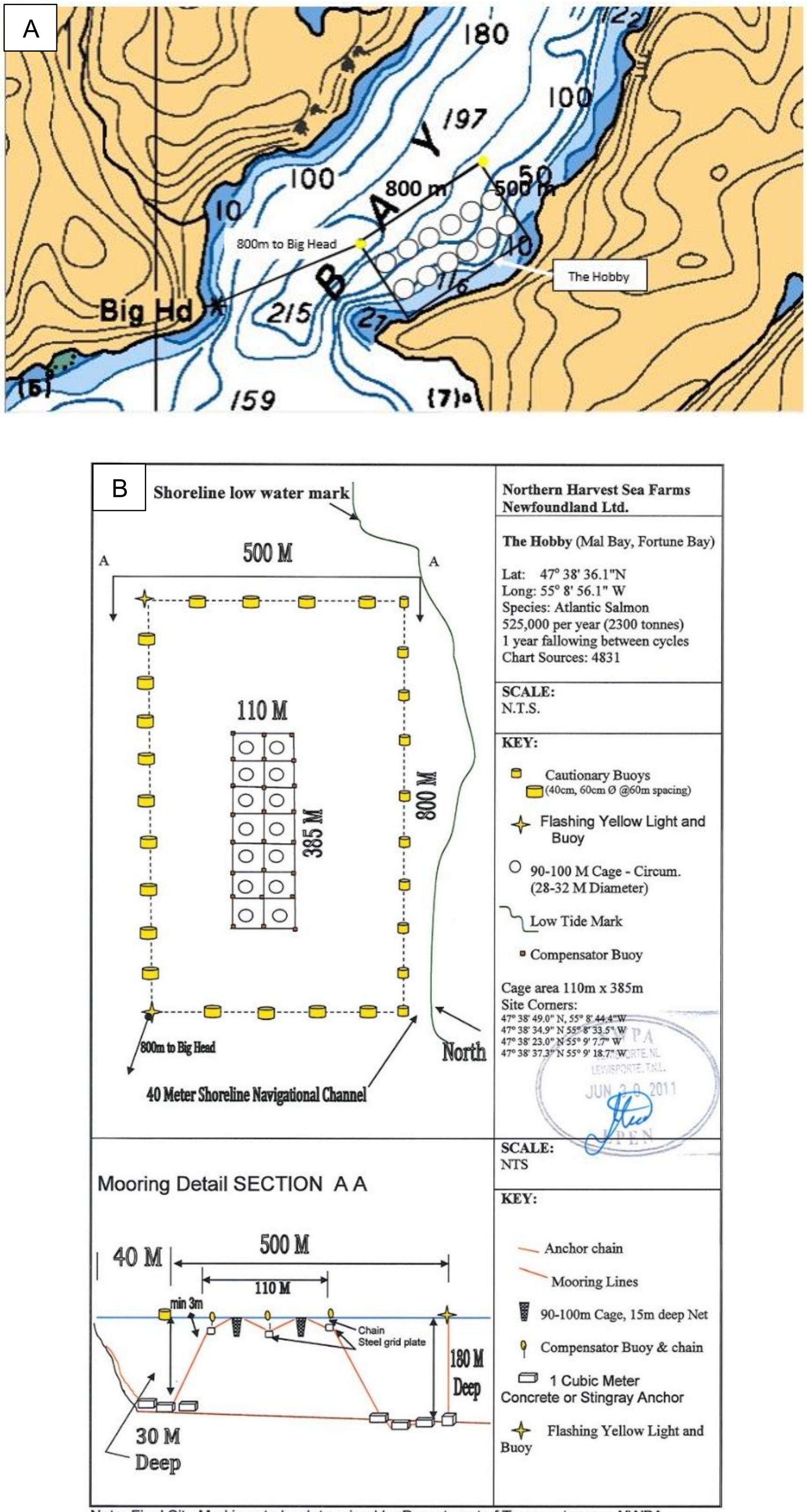


Figure 4.3. Foshie's Cove sea farm map and sea cage layout.



Note: Final Site Markings to be determined by Department of Transport as per NWPA

Figure 4.4. The Hobby (A) general sea farm map indicating the lease boundary and (B) details of sea cage layout.

4.2 Benthic Surveys

Benthic surveys at sea farms in the Mal Bay BMA were conducted in June 2010, prior to enactment of the AAR. Video observations were not made at water depths >100 m, stations with predominant kelp coverage or stations too close to land/gillnets or fishing gear. Stations categorized as hard bottom appeared hard visually or did not produce acceptable grab samples.

4.2.1 Benny's Cove

Based on surveys at 30 of the 35 sampling stations (14% (n=5) were too close to land to sample or 100% kelp coverage), the composition of the seafloor at Benny's Cove is primarily cobble, boulders, and bedrock with mud in the deeper sections (Figure 4.5, Table 4.3). Most stations (29 of 30 with data) were considered hard bottom. The predominant species observed included kelp (restricted to the photic zone), anemone, coralline algae, and cunners (Table 4.3). Soft coral was observed at two stations.

4.2.2 Foshie's Cove

Based on surveys at 18 of the 91 sampling stations (80% (n=73) were too deep (>100 m) or too close to a gillnet to sample) the composition of the seafloor at Foshie's Cove appears to be composed primarily of bedrock, cobble, and boulders (Figure 4.6; Table 4.4). All stations (18 of 91 with data) were considered hard bottom. The predominant species observed included kelp (restricted to the photic zone), anemone, coralline algae, and cunners (Table 4.4). Of note, there is only one sampling station within the boundary of the lease.

4.2.3 The Hobby

Based on surveys at 21 of 63 stations (~67% (n=42) were too deep (>100 m) to sample or too close to fishing gear), the composition of the seafloor in The Hobby sea farm is primarily cobble, boulders, bedrock, gravel and shells at varying depths (Figure 4.7; Table 4.5). All stations (21 of 63 with data) were considered hard bottom. Of those that were sampled, the predominant species observed included kelp, coralline algae, and cunners (Table 4.5).

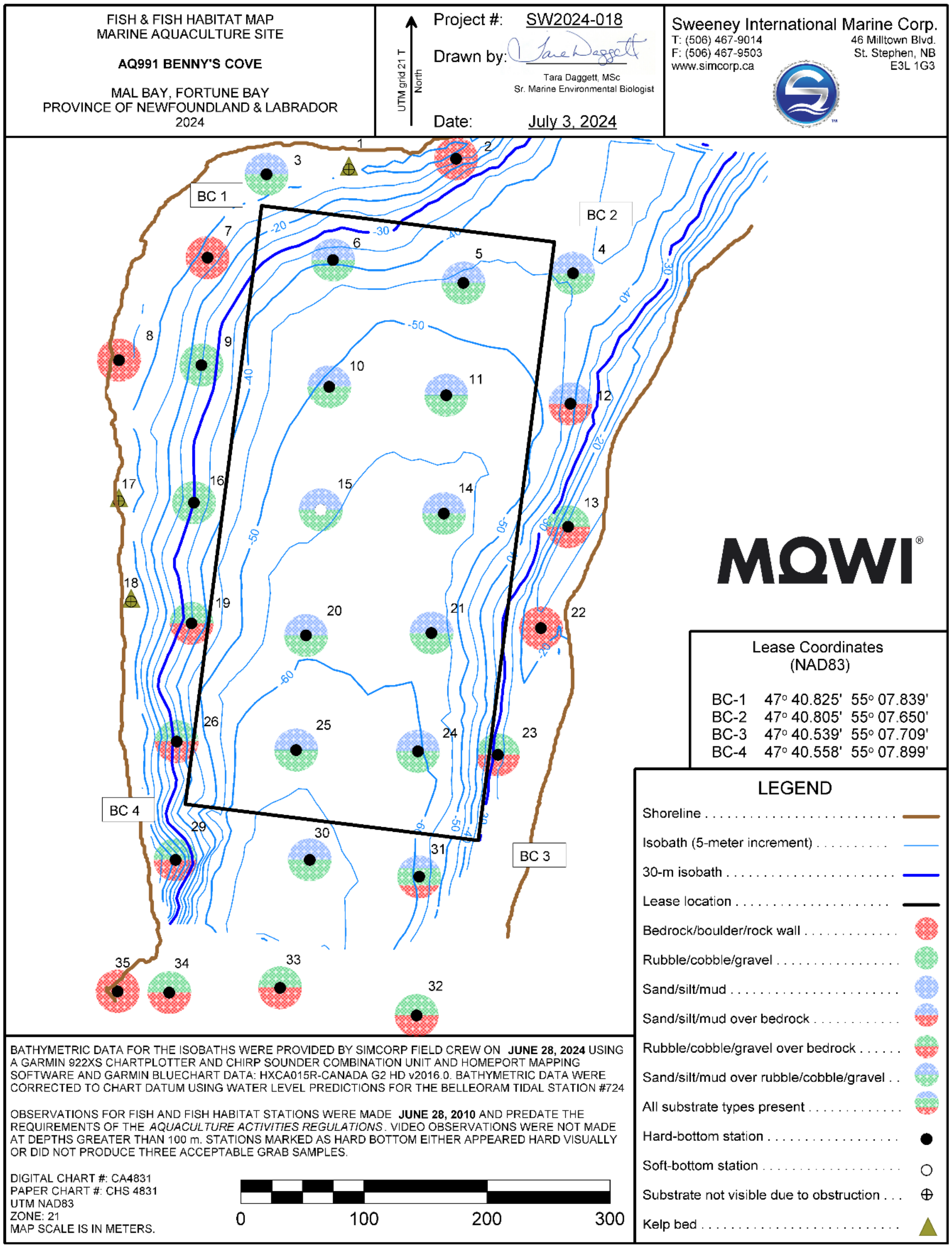


Figure 4.5. Habitat observations at sampling stations in the Benny's Cove sea farm (June 2010).

Table 4.3. Summary of bottom type and observed flora and fauna at the Benny's Cove sea farm (June 2010).

Benny's Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
BC	1	47 40.840	55 07.782	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	kelp (p), cunners	N
BC	2	47 40.844	55 07.713	18	Hard		x	x								kelp (p), coralline algae (s), cunners	N
BC	3	47 40.839	55 07.836	45	Hard						25%	25%	25%			anemone (r), coralline algae (r), kelp (drifting) (r)	N
BC	4	47 40.791	55 07.639	46	Hard					60%			40%			anemone (r), coralline algae (r)	Y
BC	5	47 40.788	55 07.710	48	Hard					60%			40%			anemone (f), coralline algae (r)	N
BC	6	47 40.800	55 07.794	35	Hard					60%	20%		20%			anemone (r), starfish (r)	N
BC	7	47 40.802	55 07.876	14	Hard		x									kelp (p), seaweed (s), scallop shell (r), cunners	N
BC	8	47 40.757	55 07.935	3	Hard		x									kelp (p), *Fucus* (s)	N
BC	9	47 40.754	55 07.881	27	Hard				10%	60%	30%					kelp (p)	N
BC	10	47 40.743	55 07.799	52	Hard					20%			80%			kelp (drifting) (f), anemone (f), flounder (r)	Y
BC	11	47 40.738	55 07.723	55	Hard					25%			75%			anemone (s)	Y
BC	12	47 40.733	55 07.642	44	Hard		x						x			coralline algae (f), kelp (drifting) (r)	N
BC	13	47 40.678	55 07.646	30	Hard		x		x							coralline algae (f), seaweed (f)	N
BC	14	47 40.685	55 07.726	57	Hard								x			anemone (f), soft coral (r)	Y
BC	15	47 40.688	55 07.806	56	Hard					20%			x			anemone (f), seaweed (r)	Y
BC	16	47 40.693	55 07.888	32	Hard					40%	60%					shell debris (f)	N
BC	17	47 40.694	55 07.937	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	kelp (p), cunners	N
BC	18	47 40.649	55 07.931	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	kelp (p), cunners	N
BC	19	47 40.639	55 07.892	38	Hard			x		x						coralline algae (f), shell debris (r), scallop (r)	N
BC	20	47 40.632	55 07.818	60	Hard								x			kelp (drifting) (f)	Y
BC	21	47 40.632	55 07.736	60	Hard								x			shell debris (r), anemone (f), soft coral (r), kelp (drifting) (r)	Y
BC	22	47 40.633	55 07.665	7	n/a		x									kelp (p), red seaweed (f)	N
BC	23	47 40.577	55 07.695	25	Hard			70%		30%						coralline algae (f), seaweed (f), cunners	N
BC	24	47 40.579	55 07.747	62	Hard								x			anemone (p), soft coral (f)	Y
BC	25	47 40.581	55 07.826	65	Hard					25%	25%		x			anemone (f), kelp (drifting) (r)	Y
BC	26	47 40.586	55 07.903	33	Hard		x			10%	10%					coralline algae (f), seaweed (f)	N
BC	27	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	* station too close to land (did not observe)	N

Benny's Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
BC	28	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	* station too close to land (did not observe)	N
BC	29	47 40.533	55 07.906	13	Hard		x	x		x						kelp (p), cunners	N
BC	30	47 40.532	55 07.819	67	Hard					60%			x			anemone (s), soft coral (r), seaweed (drifting) (f), stick (r)	Y
BC	31	47 40.523	55 07.748	60	Hard			75%		25%			x			anemone (f), coralline algae (r), seaweed (r)	N
BC	32	47 40.461	55 07.752	40	Hard		50%	40%		10%						coralline algae (f), seaweed (f), shells (r)	N
BC	33	47 40.475	55 07.840	68	Hard				60%	20%	20%					coralline algae (f), anemone (f), soft coral (r)	N
BC	34	47 40.474	55 07.912	25	Hard				60%	20%	20%					coralline algae (s), seaweed (r), urchin (r)	N
BC	35	47 40.475	55 07.946	4	Hard		x	x								kelp (p), seaweed (s), cunners	N

Notes:

[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.

n/a not available.

x = observed substrate.

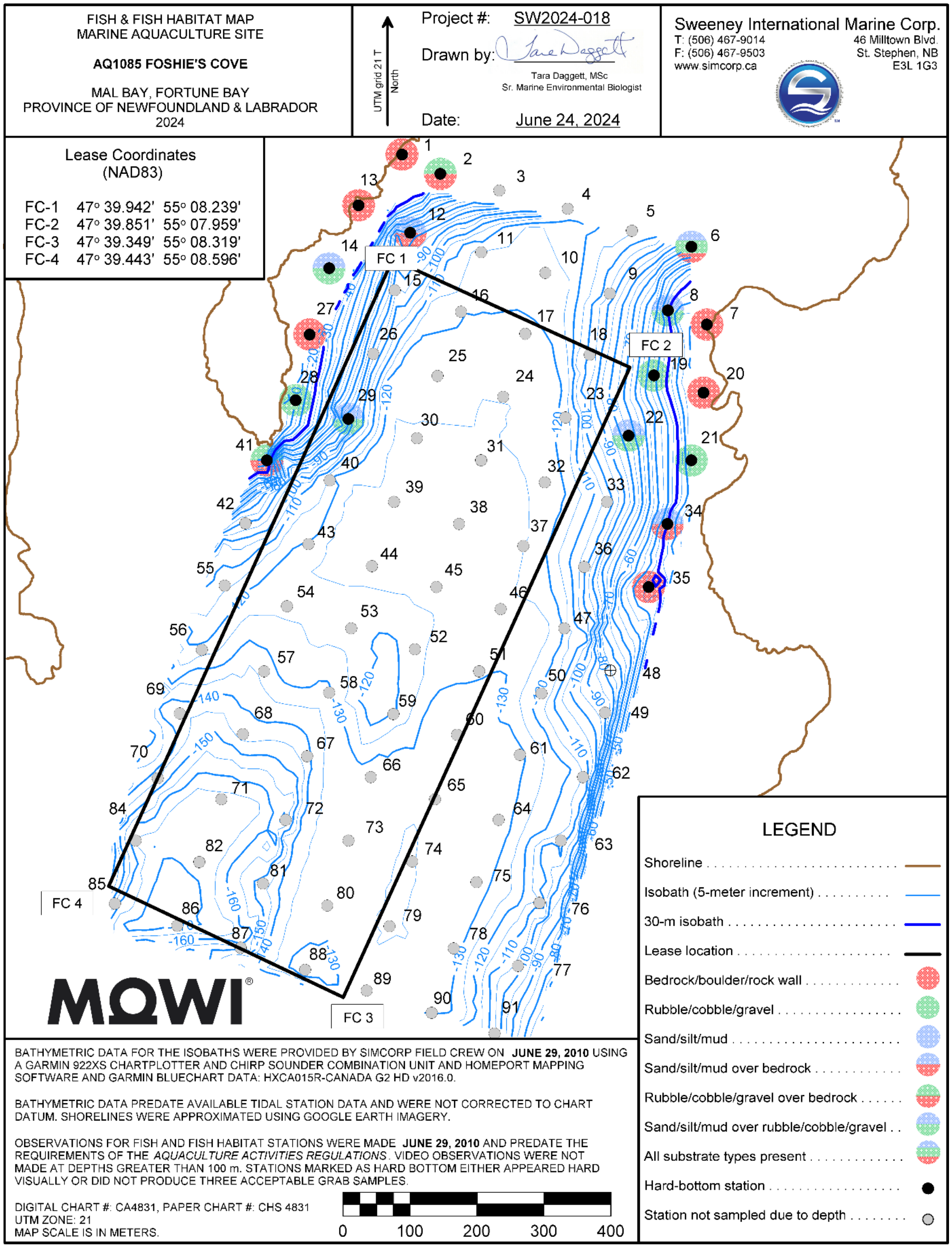


Figure 4.6. Habitat observations at sampling stations in the Foshie's Cove sea farm (June 2010).

Table 4.4. Summary of bottom type and observed flora and fauna at the Foshie's Cove sea farm (June 2010).

Foshie Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
FC	1	47 40.027	55 08.225	2	Hard		x									kelp (p), cunners	N
FC	2	47 40.011	55 08.180	55	Hard			60%		40%						coralline algae (s)	N
FC	3	47 39.996	55 08.110	103	TDTS											TDTS	N
FC	4	47 39.980	55 08.029	111	TDTS											TDTS	N
FC	5	47 39.961	55 07.953	108	TDTS											TDTS	N
FC	6	47 39.947	55 07.882	60	Hard			40%		20%		40%				shells (s), anemone (r), starfish (r)	N
FC	7	47 39.884	55 07.866	6	Hard		x									kelp (p), cunners	N
FC	8	47 39.896	55 07.912	40	Hard					20%	40%	40%				shells (f), coralline algae (s), anemone (r)	N
FC	9	47 39.911	55 07.981	101	TDTS											TDTS	N
FC	10	47 39.929	55 08.057	116	TDTS											TDTS	N
FC	11	47 39.947	55 08.133	116	TDTS											TDTS	N
FC	12	47 39.964	55 08.217	75	Hard		x	x				x				anemone (f), coralline algae (s)	N
FC	13	47 39.987	55 08.278	3	Hard		x									kelp (p), cunners	N
FC	14	47 39.937	55 08.315	42	Hard				x			x				coralline algae (s), shells (f), seaweed (f)	N
FC	15	47 39.918	55 08.237	101	TDTS											TDTS	N
FC	16	47 39.899	55 08.159	120	TDTS											TDTS	N
FC	17	47 39.880	55 08.083	122	TDTS											TDTS	N
FC	18	47 39.862	55 08.007	116	TDTS											TDTS	N
FC	19	47 39.844	55 07.931	30	Hard					50%	50%					red seaweed (f), kelp (f), shells (f)	N
FC	20	47 39.829	55 07.872	7	Hard		x									kelp (p)	N
FC	21	47 39.775	55 07.888	10	Hard					80%	20%					kelp (s), shells (s), cunners	N
FC	22	47 39.796	55 07.963	65	Hard			x		60%		40%				shells (f), kelp (f), coralline algae (f), anemone (r), cod fish	N
FC	23	47 39.812	55 08.037	104	TDTS											TDTS	N
FC	24	47 39.830	55 08.111	124	TDTS											TDTS	N
FC	25	47 39.848	55 08.189	123	TDTS											TDTS	N
FC	26	47 39.867	55 08.265	115	TDTS											TDTS	N
FC	27	47 39.884	55 08.340	27	Hard		x									kelp (p), coralline algae (s)	N
FC	28	47 39.831	55 08.359	10	Hard					x	x					kelp (p), stringy seaweed (s), cunners	N
FC	29	47 39.815	55 08.296	92	Hard				30%	30%		40%				shells (f), anemone (f)	N
FC	30	47 39.798	55 08.215	125	TDTS											TDTS	N
FC	31	47 39.779	55 08.139	125	TDTS											TDTS	N
FC	32	47 39.760	55 08.064	123	TDTS											TDTS	N
FC	33	47 39.743	55 07.990	104	TDTS											TDTS	N
FC	34	47 39.724	55 07.919	29	Hard		x					x				red seaweed (f), coralline algae (f)	N
FC	35	47 39.674	55 07.943	29	Hard		x									red seaweed (s), coralline algae (s)	N

Foshie Cove

Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
FC	36	N 47 39.691	55 08.019	104	TDTS											TDTS	N
FC	37	47 39.709	55 08.091	125	TDTS											TDTS	N
FC	38	47 39.728	55 08.167	126	TDTS											TDTS	N
FC	39	47 39.747	55 08.244	126	TDTS											TDTS	N
FC	40	47 39.766	55 08.320	114	TDTS											TDTS	N
FC	41	47 39.783	55 08.395	11	Hard		x			x						kelp (p), cunners, red seaweed(s), coralline algae (s)	N
FC	42	47 39.733	55 08.422	104	TDTS											TDTS	N
FC	43	47 39.715	55 08.348	122	TDTS											TDTS	N
FC	44	47 39.696	55 08.272	126	TDTS											TDTS	N
FC	45	47 39.678	55 08.196	126	TDTS											TDTS	N
FC	46	47 39.659	55 08.120	126	TDTS											TDTS	N
FC	47	47 39.642	55 08.045	120	TDTS											TDTS	N
FC	48	47 39.607	55 07.991	72	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	too close to gillnet	N
FC	49	47 39.573	55 07.999	104	TDTS											TDTS	N
FC	50	47 39.590	55 08.074	122	TDTS											TDTS	N
FC	51	47 39.609	55 08.148	130	TDTS											TDTS	N
FC	52	47 39.628	55 08.224	123	TDTS											TDTS	N
FC	53	47 39.646	55 08.299	122	TDTS											TDTS	N
FC	54	47 39.665	55 08.375	123	TDTS											TDTS	N
FC	55	47 39.683	55 08.449	114	TDTS											TDTS	N
FC	56	47 39.632	55 08.478	121	TDTS											TDTS	N
FC	57	47 39.613	55 08.404	131	TDTS											TDTS	N
FC	58	47 39.595	55 08.327	129	TDTS											TDTS	N
FC	59	47 39.576	55 08.251	120	TDTS											TDTS	N
FC	60	47 39.558	55 08.176	134	TDTS											TDTS	N
FC	61	47 39.541	55 08.101	132	TDTS											TDTS	N
FC	62	47 39.522	55 08.027	116	TDTS											TDTS	N
FC	63	47 39.471	55 08.055	112	TDTS											TDTS	N
FC	64	47 39.489	55 08.129	132	TDTS											TDTS	N
FC	65	47 39.507	55 08.204	135	TDTS											TDTS	N
FC	66	47 39.526	55 08.280	133	TDTS											TDTS	N
FC	67	47 39.544	55 08.355	142	TDTS											TDTS	N
FC	68	47 39.563	55 08.431	143	TDTS											TDTS	N
FC	69	47 39.581	55 08.506	144	TDTS											TDTS	N
FC	70	47 39.529	55 08.534	147	TDTS											TDTS	N
FC	71	47 39.511	55 08.459	168	TDTS											TDTS	N
FC	72	47 39.493	55 08.383	160	TDTS											TDTS	N
FC	73	47 39.475	55 08.308	138	TDTS											TDTS	N
FC	74	47 39.457	55 08.233	135	TDTS											TDTS	N
FC	75	47 39.439	55 08.157	131	TDTS											TDTS	N
FC	76	47 39.421	55 08.082	108	TDTS											TDTS	N
FC	77	47 39.371	55 08.110	107	TDTS											TDTS	N
FC	78	47 39.386	55 08.186	132	TDTS											TDTS	N
FC	79	47 39.405	55 08.262	134	TDTS											TDTS	N
FC	80	47 39.423	55 08.336	131	TDTS											TDTS	N
FC	81	47 39.442	55 08.412	147	TDTS											TDTS	N

Foshie Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
FC	82	47 39.461	55 08.487	168	TDTS											TDTS	N
FC	83	47 39.479	55 08.562	166	TDTS											TDTS	N
FC	84	47 39.429	55 08.589	166	TDTS											TDTS	N
FC	85	47 39.410	55 08.515	172	TDTS											TDTS	N
FC	86	47 39.391	55 08.440	157	TDTS											TDTS	N
FC	87	47 39.372	55 08.364	128	TDTS											TDTS	N
FC	88	47 39.354	55 08.291	131	TDTS											TDTS	N
FC	89	47 39.335	55 08.214	133	TDTS											TDTS	N
FC	90	47 39.317	55 08.140	104	TDTS											TDTS	N

Notes:

[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.

n/a-not available. TDTS- too deep to sample.

x = observed substrate.

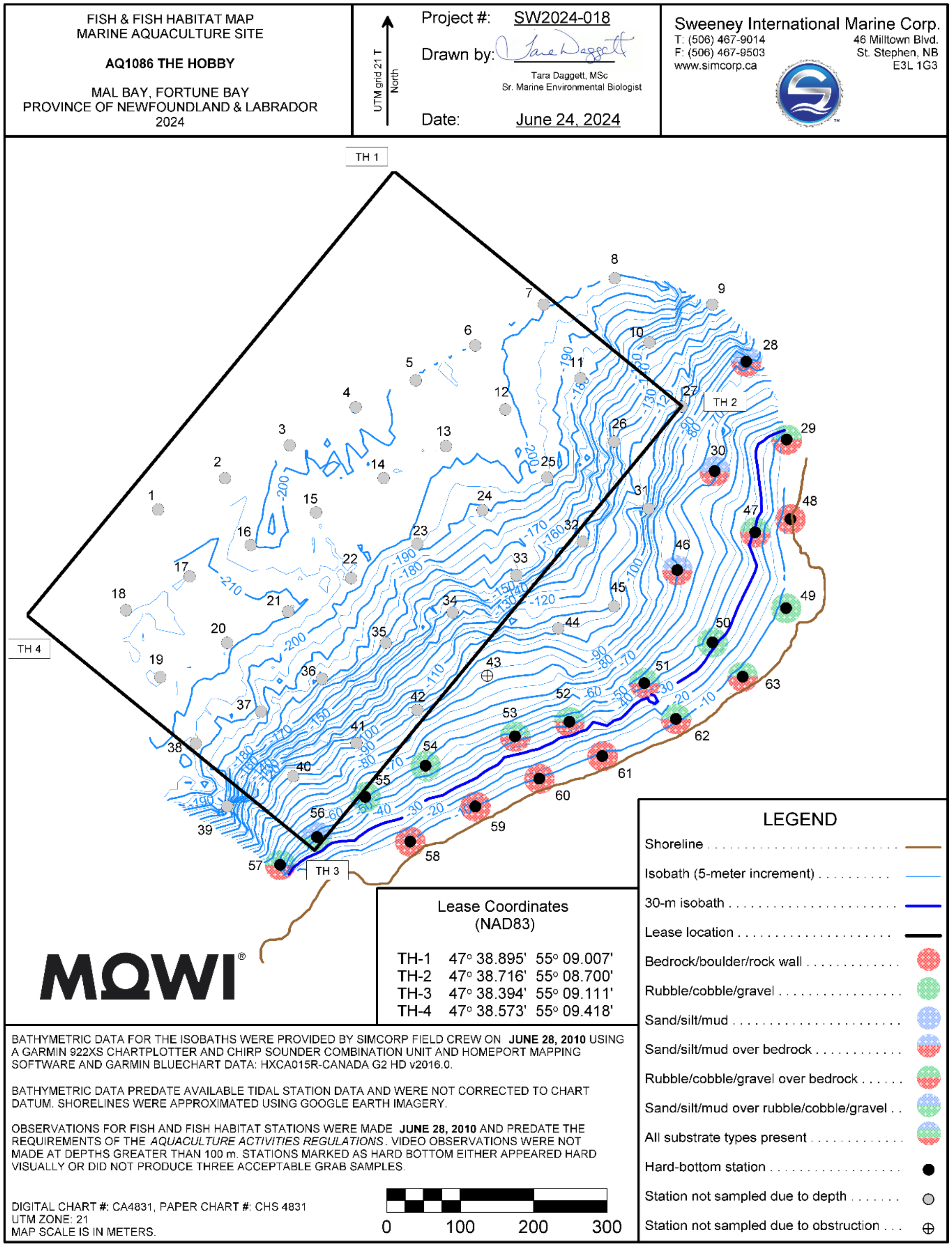


Figure 4.7. Habitat observations at sampling stations in The Hobby sea farm (June 2010).

Table 4.5. Summary of bottom type and observed flora and fauna at The Hobby sea farm (June 2010).

The Hobby																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
TH	1	47 38.649	55 09.272	210	TDTS											TDTS	N
TH	2	47 38.671	55 09.199	201	TDTS											TDTS	N
TH	3	47 38.694	55 09.128	198	TDTS											TDTS	N
TH	4	47 38.721	55 09.055	198	TDTS											TDTS	N
TH	5	47 38.740	55 08.989	202	TDTS											TDTS	N
TH	6	47 38.765	55 08.923	203	TDTS											TDTS	N
TH	7	47 38.794	55 08.848	200	TDTS											TDTS	N
TH	8	47 38.812	55 08.770	202	TDTS											TDTS	N
TH	9	47 38.791	55 08.664	143	TDTS											TDTS	N
TH	10	47 38.764	55 08.734	142	TDTS											TDTS	N
TH	11	47 38.739	55 08.810	184	TDTS											TDTS	N
TH	12	47 38.717	55 08.892	201	TDTS											TDTS	N
TH	13	47 38.691	55 08.958	202	TDTS											TDTS	N
TH	14	47 38.668	55 09.026	202	TDTS											TDTS	N
TH	15	47 38.644	55 09.101	202	TDTS											TDTS	N
TH	16	47 38.621	55 09.173	202	TDTS											TDTS	N
TH	17	47 38.599	55 09.240	215	TDTS											TDTS	N
TH	18	47 38.575	55 09.310	215	TDTS											TDTS	N
TH	19	47 38.525	55 09.274	215	TDTS											TDTS	N
TH	20	47 38.549	55 09.201	211	TDTS											TDTS	N
TH	21	47 38.571	55 09.134	215	TDTS											TDTS	N
TH	22	47 38.595	55 09.064	206	TDTS											TDTS	N
TH	23	47 38.619	55 08.991	200	TDTS											TDTS	N
TH	24	47 38.643	55 08.919	190	TDTS											TDTS	N
TH	25	47 38.666	55 08.848	198	TDTS											TDTS	N
TH	26	47 38.691	55 08.775	127	TDTS											TDTS	N
TH	27	47 38.716	55 08.700	105	TDTS											TDTS	N
TH	28	47 38.748	55 08.629	78	Hard		x					x				shells (f), scallops (f), starfish (r)	N
TH	29	47 38.690	55 08.587	15	Hard			x		x						kelp (p), coralline algae (s), cunners	N
TH	30	47 38.668	55 08.666	63	Hard					50%		50%				seaweed (r), shells (f)	N
TH	31	47 38.641	55 08.739	116	TDTS											TDTS	N
TH	32	47 38.618	55 08.812	145	TDTS											TDTS	N
TH	33	47 38.594	55 08.884	160	TDTS											TDTS	N
TH	34	47 38.568	55 08.955	135	TDTS											TDTS	N
TH	35	47 38.546	55 09.028	163	TDTS											TDTS	N
TH	36	47 38.521	55 09.099	176	TDTS											TDTS	N
TH	37	47 38.498	55 09.166	202	TDTS											TDTS	N
TH	38	47 38.475	55 09.238	201	TDTS											TDTS	N
TH	39	47 38.428	55 09.205	187	TDTS											TDTS	N
TH	40	47 38.449	55 09.132	111	TDTS											TDTS	N
TH	41	47 38.473	55 09.063	106	TDTS											TDTS	N
TH	42	47 38.496	55 08.996	92	TDTS											TDTS	N
TH	43	47 38.520	55 08.919	85	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Too close to fishing gear to deploy camera	N
TH	44	47 38.554	55 08.840	100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Too close to fishing gear to deploy camera	N
TH	45	47 38.569	55 08.779	110	TDTS											TDTS	N
TH	46	47 38.595	55 08.709	75	Hard		x					x				shells (f)	N

The Hobby																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
TH	47	47 38.622	55 08.624	30	Hard		x	x		x						seaweed (s), coralline algae (s), shells (r)	N
TH	48	47 38.631	55 08.585	3	Hard		x									kelp (p), cunners	N
TH	49	47 38.565	55 08.592	8	Hard					x	x					kelp (p), cunners	N
TH	50	47 38.541	55 08.673	36	Hard					60%	40%					shells (f), kelp (f), seaweed (s), coralline algae (s)	N
TH	51	47 38.512	55 08.748	43	Hard			20%		40%	40%					coralline algae (s), shells (s), scallops (f), tunicate (r)	N
TH	52	47 38.485	55 08.831	42	Hard			30%		30%	40%					shells (s), scallops (s), coralline algae (s)	N
TH	53	47 38.475	55 08.890	44	Hard			10%		40%	50%					seaweed (s), coralline algae (s), shells (s)	N
TH	54	47 38.455	55 08.988	56	Hard					50%	50%					shells (f) coralline algae (s), starfish (r)	N
TH	55	47 38.433	55 09.055	57	Hard					50%	50%					shells (f), scallops (f)	N
TH	56	47 38.384	55 09.149	57	Hard			30%		40%	30%					coralline algae (s), shells (f)	N
TH	57	47 38.404	55 09.108	35	Hard					30%	50%	20%				shell debris (f)	N
TH	58	47 38.399	55 09.007	8	Hard		x									kelp (p), starfish (r)	N
TH	59	47 38.424	55 09.935	9	Hard		x									kelp (p), starfish (r), cunners	N
TH	60	47 38.443	55 09.865	7	Hard		x									kelp (p), cunners	N
TH	61	47 38.459	55 09.796	7	Hard		x									kelp (p), cunners, seaweed (f)	N
TH	62	47 38.485	55 09.715	10	Hard		x			x						coralline algae (s), kelp (p), seaweed (f), cunners	N
TH	63	47 38.515	55 09.641	6	Hard			x		x						kelp (p), stringy seaweed (f), coralline algae (s)	N

Notes:

[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.

n/a-not available. TDTS- too deep to sample.

x = observed substrate.

4.3 Water Quality

The amount and temporal coverage of water quality data collected in the Mal Bay BMA are variable (Table 4.6). Seasonal water quality parameters at sea farms in the Mal Bay BMA (Foshie's Cove and The Hobby) are summarized in Tables 4.7, 4.8, and 4.9 for water temperature, dissolved oxygen, and salinity, respectively. Data are not available for the Benny's Cove sea farm, which has never been stocked with salmon.

Table 4.6. Available water quality data for the Mal Bay BMA (2013–2024).

Available Data			
Year	**Water Quality Parameter**	**Water Depth(s)**	**Month(s)**
Foshie's Cove			
2013	Temperature (°C)	5 m	15 Jun–31 Dec
	Dissolved Oxygen (mg/L)	5 m	15 Jun–31 Dec
	Salinity (‰)	n/a	n/a
2014	Temperature (°C)	5 m	1 Jan–31 Dec
	Oxygen (mg/L)	5 m	1 Jan–31 Dec
	Salinity (‰)	n/a	n/a
2015	Temperature (°C)	5 m	1 Jan–24 Aug
	Oxygen (mg/L)	5 m	1 Jan–24 Aug
	Salinity (‰)	n/a	n/a
2016	Temperature (°C)	5 m	7 Jun–31 Dec
	Oxygen (mg/L)	5 m	7 Jun–31 Dec
	Salinity (‰)	n/a	n/a
2017	Temperature (°C)	5 m	1 Jan–31 Dec
	Oxygen (mg/L)	5 m	1 Jan–31 Dec
	Salinity (‰)	n/a	n/a
2018	Temperature (°C)	5 m	1 Jan–25 Jun
	Oxygen (mg/L)	5 m	1 Jan–25 Jun
	Salinity (‰)	n/a	n/a
2019–2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
The Hobby			
2013	Temperature (°C)	5 m	3 Jun–31 Dec
	Oxygen (mg/L)	5 m	3 Jun–31 Dec
	Salinity (‰)	n/a	n/a
2014	Temperature (°C)	5 m	1 Jan–31 Dec
	Oxygen (mg/L)	5 m	1 Jan–31 Dec
	Salinity (‰)	n/a	n/a
2015	Temperature (°C)	5 m	1 Jan–20 Apr
	Oxygen(mg/L)	5 m	1 Jan–20 Apr
	Salinity (‰)	n/a	n/a
2016	Temperature (°C)	5 m	1 Jun–31 Dec
	Oxygen (mg/L)	5 m	1 Jun–31 Dec
	Salinity (‰)	n/a	n/a
2017	Temperature (°C)	5 m	1 Jan–31 Dec
	Oxygen (mg/L)	5 m	1 Jan–31 Dec
	Salinity (‰)	n/a	n/a
2018	Temperature (°C)	5 m	1 Jan–1 Jul
	Oxygen (mg/L)	5 m	1 Jan–1 Jul
	Salinity (‰)	n/a	n/a
2019–2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a

4.3.1 Water Temperature

Seasonal average water temperatures at 5 m water depth were the same across sea farms with available data (Table 4.7). Mean water temperatures ranged from 1.6°C in winter to 14.6°C in summer. Maximum water temperatures for the Foshie's Cove and The Hobby sea farms were 18.6°C and 18.4°C in summer, respectively. Minimum water temperatures were 0.3°C in winter at both the Foshie's Cove and The Hobby sea farms.

Table 4.7. Average, maximum, and minimum water temperatures (°C) at the sea farms in the Mal Bay BMA (2017–2018).

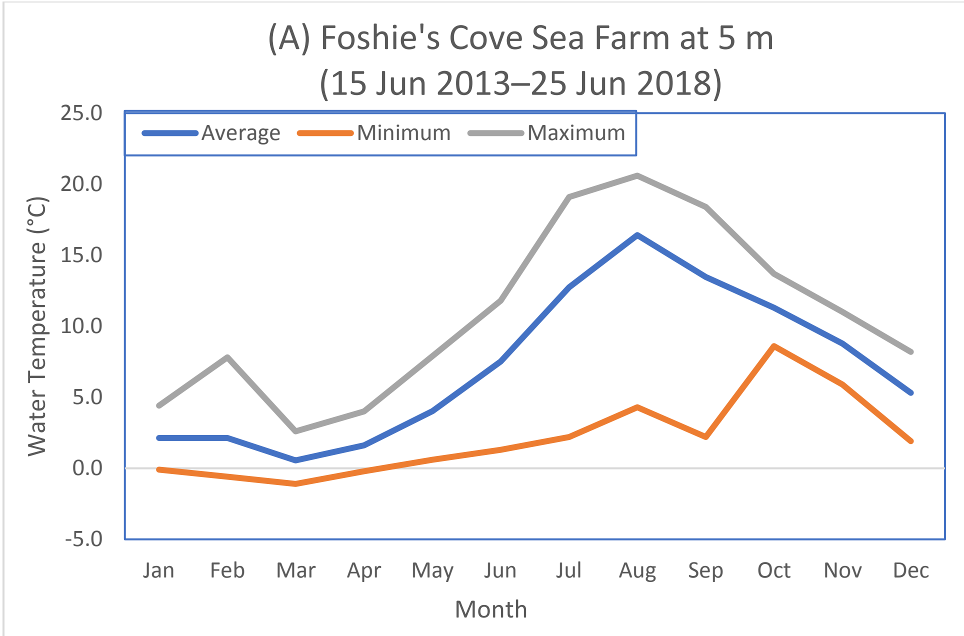
Water Temperature Parameter	Water Depth	Sampling Period	Winter (Jan, Feb, Mar)	Spring (Apr, May, Jun)	Summer (Jul, Aug, Sep)	Fall (Oct, Nov, Dec)
			Temperature (°C)			
Foshie's Cove						
Average	5 m	1 Jan 2017–25 Jun 2018	1.6	4.3	14.6	8.7
Maximum	5 m	1 Jan 2017–25 Jun 2018	4.4	10.1	18.6	13.1
Minimum	5 m	1 Jan 2017–25 Jun 2018	0.3	0.9	9.4	3.7
The Hobby						
Average	5 m	1 Jan 2017–30 Jun 2018	1.6	4.3	14.6	8.7
Maximum	5 m	1 Jan 2017–30 Jun 2018	4.2	10.0	18.4	13.0
Minimum	5 m	1 Jan 2017–30 Jun 2018	0.3	1.0	8.6	3.5

Historical water temperature data collected during 2013–2018 at the Foshie's Cove and The Hobby sea farms showed an increase in water temperatures from April–August and a general decrease thereafter (Figure 4.8). Average water temperatures peaked in August, while the lowest temperatures were recorded in March.

4.3.2 Dissolved Oxygen

Dissolved oxygen levels were consistently lower in summer and fall than winter and spring, with the highest average dissolved oxygen levels observed in the Foshie's Cove sea farm (Table 4.8). Mean dissolved oxygen ranged from 8.9 mg/L in summer at The Hobby sea farm to 13.1 mg/L in winter at the Foshie's Cove sea farm. Maximum observed dissolved oxygen was 16.0 mg/L at The Hobby sea farm in spring, while minimum dissolved oxygen was 5.0 mg/L in summer at the Foshie's Cove sea farm.

Historical dissolved oxygen data collected between 2013–2018 at the Foshie's Cove and The Hobby sea farms showed a general decrease in dissolved oxygen from April/May–September/October, followed by an increase in the cooler months (Figure 4.9). Dissolved oxygen peaked between March and May while the lowest dissolved oxygen levels were recorded in September/October.



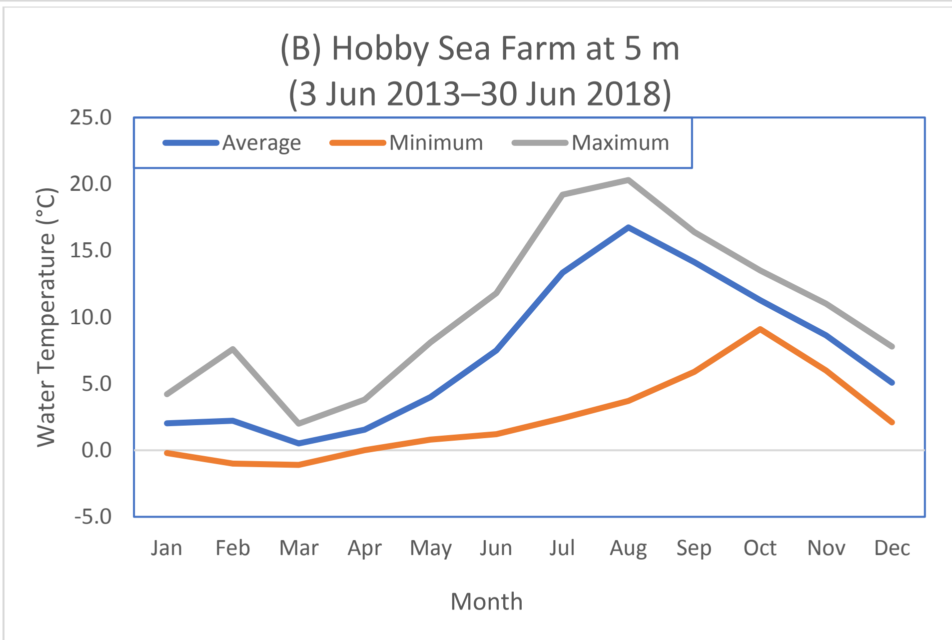


Figure 4.8. Historical water temperature (°C) data at the (A) Foshie's Cove and (B) The Hobby sea farms in the Mal Bay BMA at 5 m depth (June 2013–June 2018).

Table 4.8. Average, maximum, and minimum dissolved oxygen (mg/L) at the sea farms in the Mal Bay BMA (2017–2018).

Dissolved Oxygen Parameter	Water Depth	Sampling Period	Winter (Jan, Feb, Mar)	Spring (Apr, May, Jun)	Summer (Jul, Aug, Sep)	Fall (Oct, Nov, Dec)
			Dissolved Oxygen (mg/L)			
Foshie's Cove						
Average	5 m	1 Jan 2017–25 Jun 2018	13.1	13.0	9.0	10.3
Maximum	5 m	1 Jan 2017–25 Jun 2018	15.0	15.0	11.0	13.0
Minimum	5 m	1 Jan 2017–25 Jun 2018	11.0	10.0	5.0	7.0
The Hobby						
Average	5 m	1 Jan 2017–30 Jun 2018	13.0	12.8	8.9	9.8
Maximum	5 m	1 Jan 2017–30 Jun 2018	15.0	16.0	11.0	12.0
Minimum	5 m	1 Jan 2017–30 Jun 2018	11.0	9.0	7.0	6.0

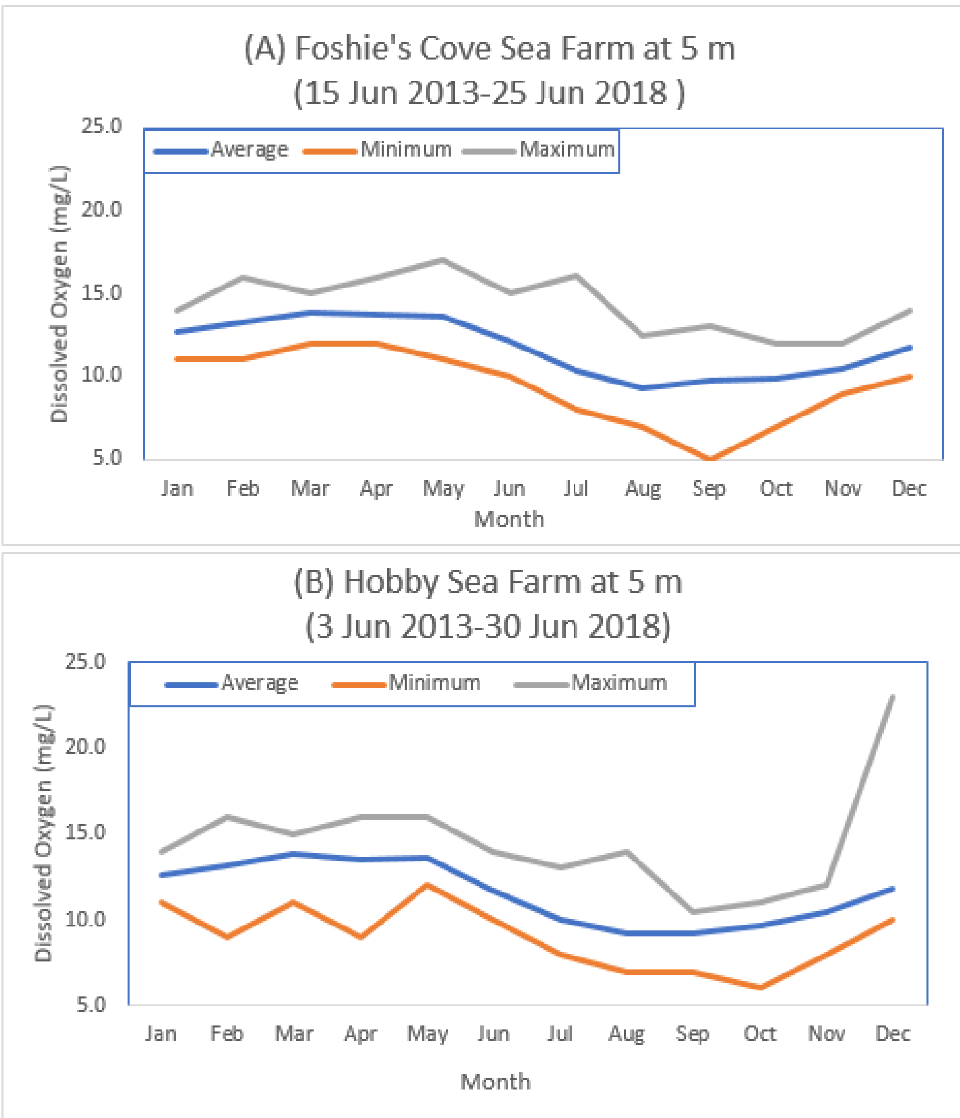


Figure 4.9. Historical dissolved oxygen (mg/L) data at the (A) Foshie's Cove and (B) The Hobby sea farms in the Mal Bay BMA at 5 m depth (June 2013–June 2018).

4.3.3 Salinity

There were no available data for salinity within the Mal Bay BMA.

4.4 Oceanographic and Meteorological Data

Bathymetric, current, wind, and wave data are available for all three sea farms in the Mal Bay BMA.

4.4.1 Bathymetry

Water depths below the leases range from 2–215 m (Table 4.9). The shallowest sea farm is Benny's Cove where depths range from 3–67 m in the lease. Bathymetric data collected in 2024 is shown for Benny's Cove (Figure 4.10) while water depth profiles (3-D) acquired in 2010 are available for the Foshie's Cove and The Hobby sea farms (Figures 4.11 and 4.12).

Table 4.9. Water depth range at sea farms in the Mal Bay BMA.

Site No.	Sea Farm	Lease Depth Range (m)	Sea Cage Array Depth Range (m)
AQ 1084	Benny's Cove	3–67	n/a
AQ 1085	Foshie's Cove	2–168	120–127
AQ 1086	The Hobby	3–215	44–90

4.4.2 Currents

Current data were acquired at Benny's Cove and The Hobby sea farms in June and July 2024 whereas current data from July and August of the same year are available for the Foshie Cove sea farm.

4.4.2.1 Benny's Cove

During June–July 2024, current measurements were collected at six water depths in the Benny's Cove sea farm (Table 4.10). During this period, mean current speeds ranged from 2.58 cm/s (at 26 m water depth) to 4.73 cm/s (at 47 m water depth). Maximum current speeds were recorded within 20 m of the water surface. In the upper 26 m, the currents were bi-directional, south-southwest to north-northeast. The strongest currents tended to be toward the north-northeast at these depths. Below 26 m depth, the currents were generally omnidirectional with a tendency for currents from the northeast (Figure 4.13)[11]. In June and July, the vector-averaged current speed, an indication of the net long-term drift at the measurement site, varied between 0.4 and 1.4 cm/s (Table 4.10). In the upper 26 m, the vector average direction was between north-northwest and northwest. At 47 water depth (near bottom), the vector average direction was toward the north-northeast.

[11] All compass rose plots of current speeds for sea farms are compiled in Appendix E.

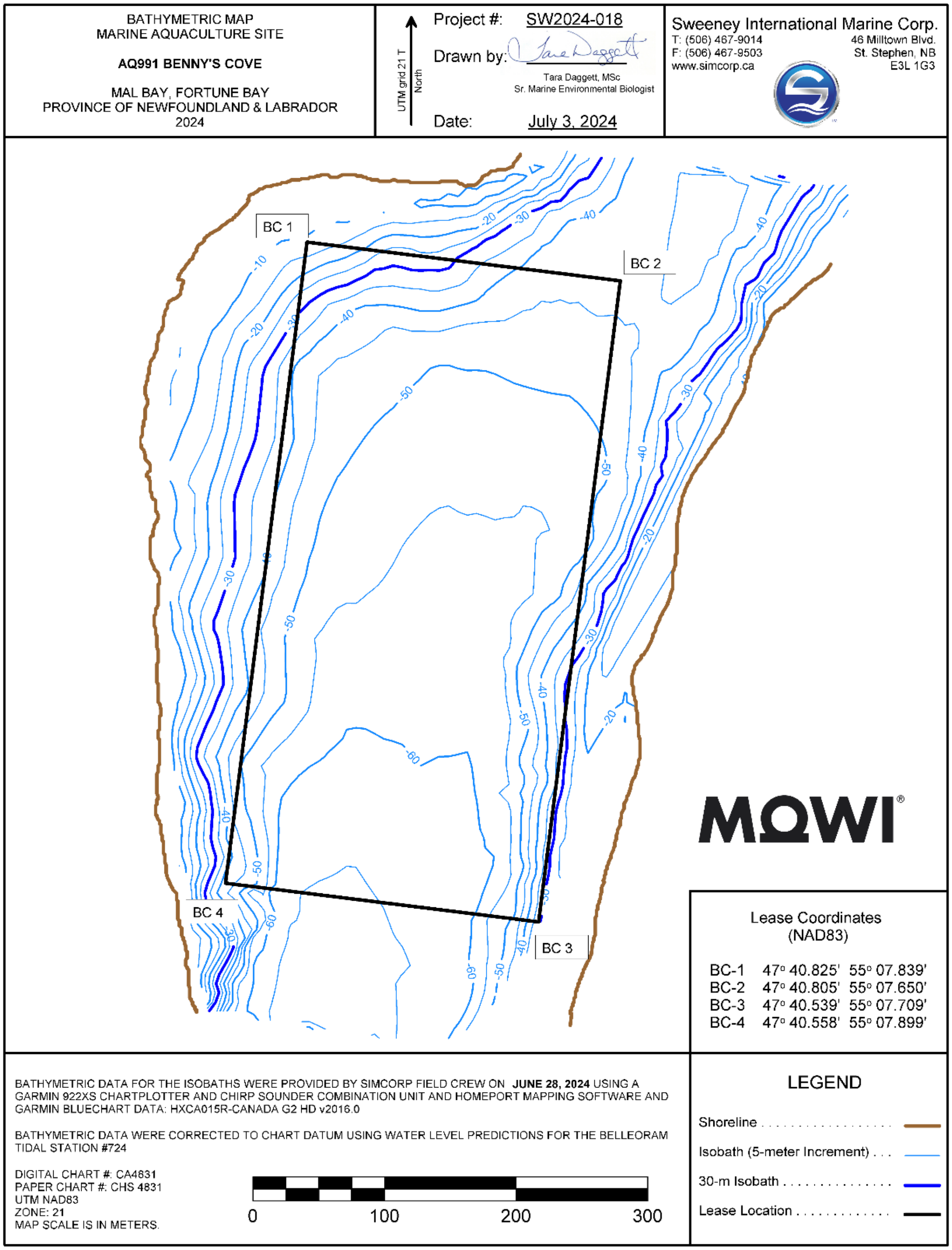


Figure 4.10. Bathymetric map for the Benny's Cove sea farm (June 2024).

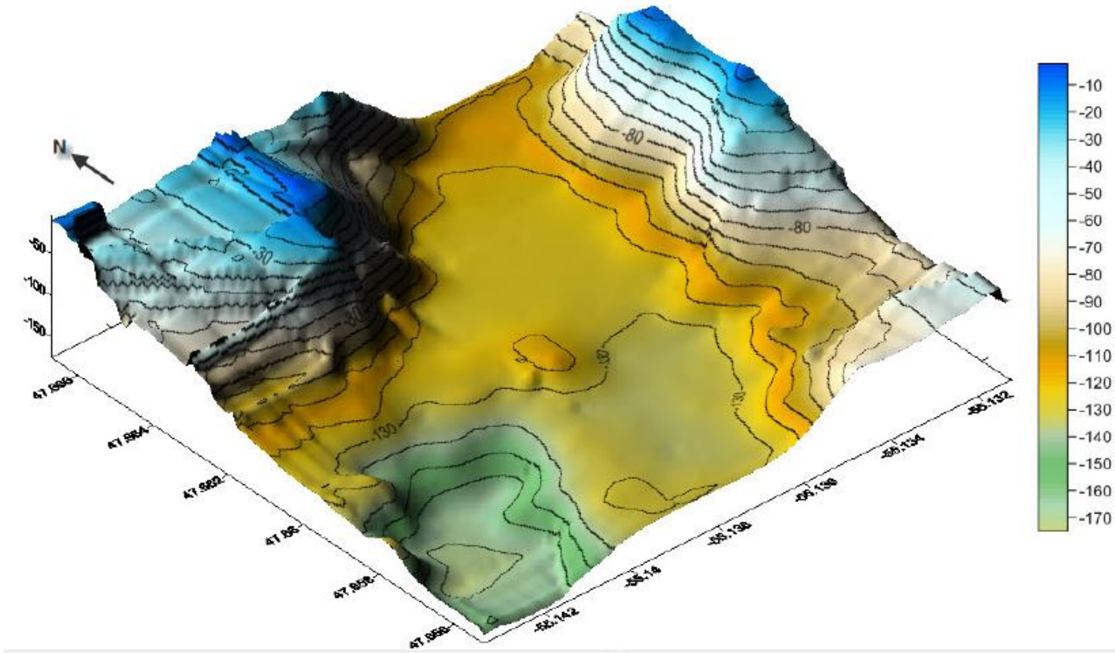


Figure 4.11. 3-D water depth profile of the Foshie's Cove sea farm lease area (acquired in June 2010).

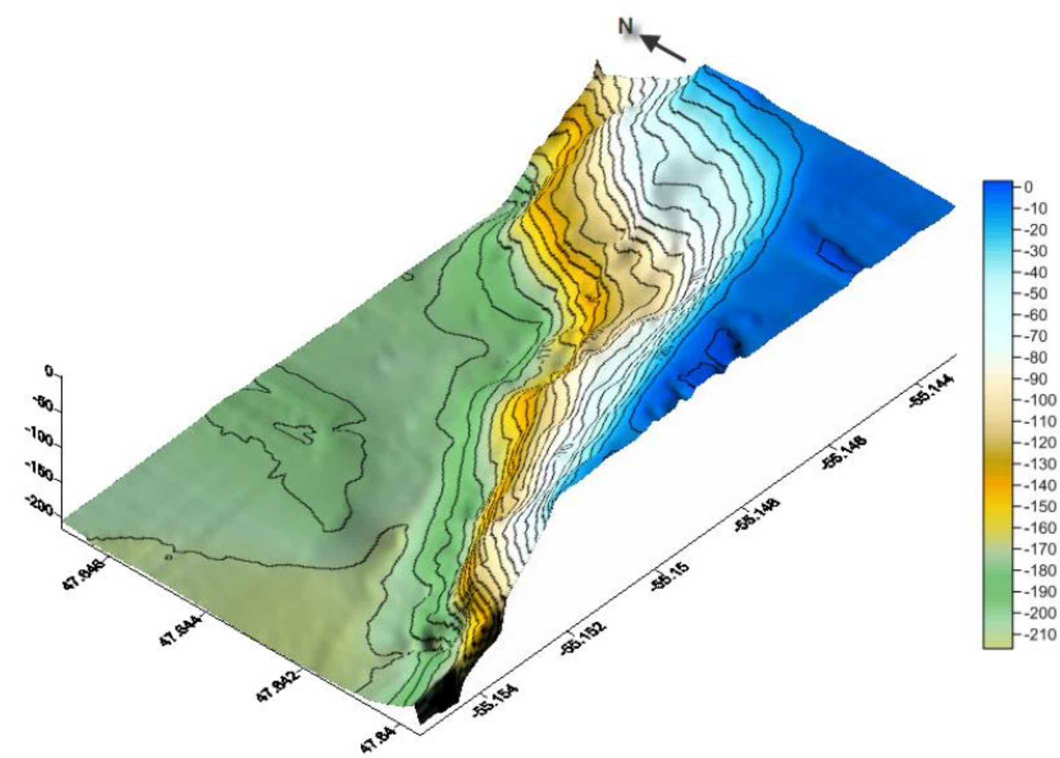


Figure 4.12. 3-D water depth profile of The Hobby sea farm lease area (acquired in June 2010).

Table 4.10. Current speeds (mean and maximum values) and vector-averages at the Benny's Cove sea farm (June–July 2024).

Current Speed (cm/s)			
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
8	4.12	25.11	1.4 @ 359 °
10	3.77	24.49	1.4 @ 358 °
16	3.07	16.97	0.6 @ 354 °
20	2.94	26.83	0.4 @ 344 °
26	2.58	16.91	0.4 @ 320 °
47 (8 m above bottom)	4.73	14.53	1.2 @ 19 °

Notes:
MWL = mean water level.

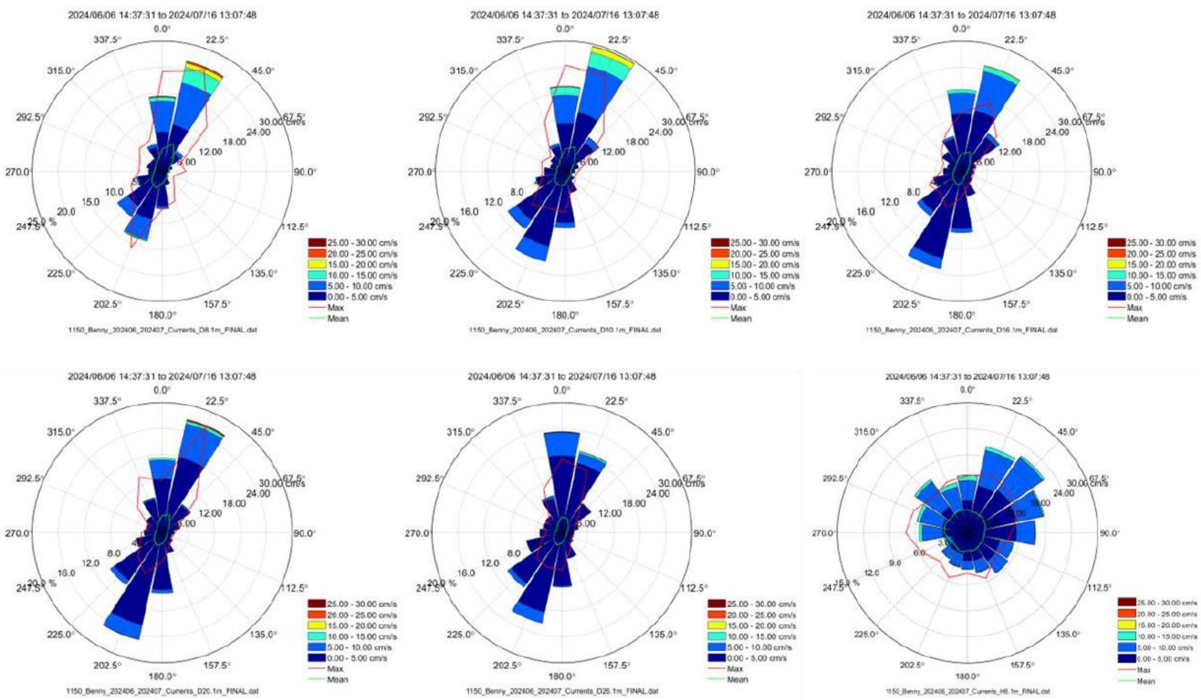


Figure 4.13. Compass rose plots of current speeds at the Benny's Cove sea farm (June–July 2024). Current speeds and directions at 8 m, 10 m, 16 m, 20 m, 26 m (mid-depth), and near-bottom (8 m height) are shown from left to right, top to bottom in the figure.

4.4.2.2 *Foshie's Cove*

During July–August 2024, current measurements were collected at six depths in the Foshie's Cove sea farm (Table 4.11). During this period, mean current speeds were relatively consistent across water depths ranging from on average 3.04 cm/s to 4.58 cm/s. Maximum current speeds remained generally stable ranging from 19.08 cm/s to 23.44 cm/s except for an outlier at 59 m (42.57 cm/s). Current directions were bidirectional north-northeast and south-southwest, with the exception of mid-depth trends being north-northeast and near-bottom traveling south-southwest (Figure 4.14). The vector average currents in the upper 20 m were toward the southwest, north-northwest, north-northeast, and east-southeast ranging from 0.1–0.4 cm/s. At mid-depth the vector-averaged current was 3.6 cm/s towards the north-northeast while near-bottom was 2.2 cm/s towards the southwest (Table 4.11).

Table 4.11. Current speeds (mean and maximum values) and vector-averages at the Foshie's Cove sea farm (July–August 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	4.08	19.08	0.1 @ 265 °
10	3.80	23.44	0.1 @ 344 °
15	3.24	22.00	0.4 @ 36 °
20	3.04	20.91	0.2 @ 101 °
59	4.58	42.57	3.6 @ 20 °
117 (6 m above bottom)	3.78	22.98	2.2 @ 218 °

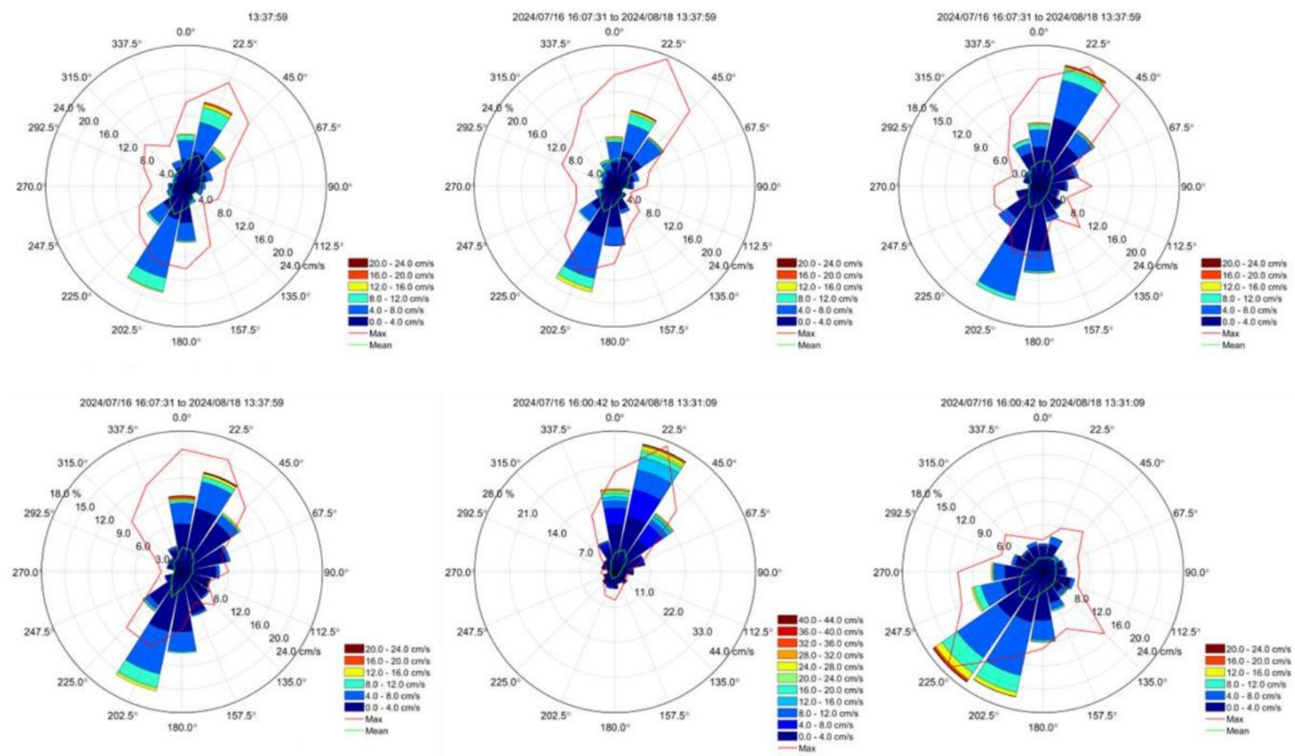


Figure 4.14. Compass rose plots of current speeds at the Foshie's Cove sea farm (July–August 2024). Current speeds and directions at 5 m, 10 m, 15 m, 20 m, 59 m (mid-depth), and near-bottom (6 m height) are shown from left to right, top to bottom. Note that the mid-depth rose plot uses a larger speed scale.

4.4.2.3 The Hobby

During June–July 2024, current measurements at six depths were collected in The Hobby sea farm (Table 4.12). During this period, mean current speeds ranged from 1.72 cm/s mid-depth to 5.46 cm/s near the surface. Maximum current speeds were variable ranging from 11.44 cm/s at mid-depth and 30.18 cm/s near the surface. Current directions were consistently southwest except near-bottom where current flow was predominantly west and west-northwest (Figure 4.15). The vector-average currents in the upper 20 m were towards the south-southwest and ranging from 2.0–2.3 cm/s. At mid-depth the vector-average current was 0.4 cm/s towards the south-southwest. Near bottom, the vector-averaged current was 1.7 cm/s towards the west-northwest (Table 4.12).

Table 4.12. Current speeds (mean and maximum) and vector-averages at The Hobby sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	5.46	30.18	2.3 @ 208 °
10	5.08	28.18	2.0 @ 212 °
15	4.56	23.27	2.2 @ 206 °
20	4.29	24.55	2.1 @ 207 °
65	1.72	11.44	0.4 @ 207 °
123 (5 m above bottom)	2.94	15.20	1.7 @ 288 °

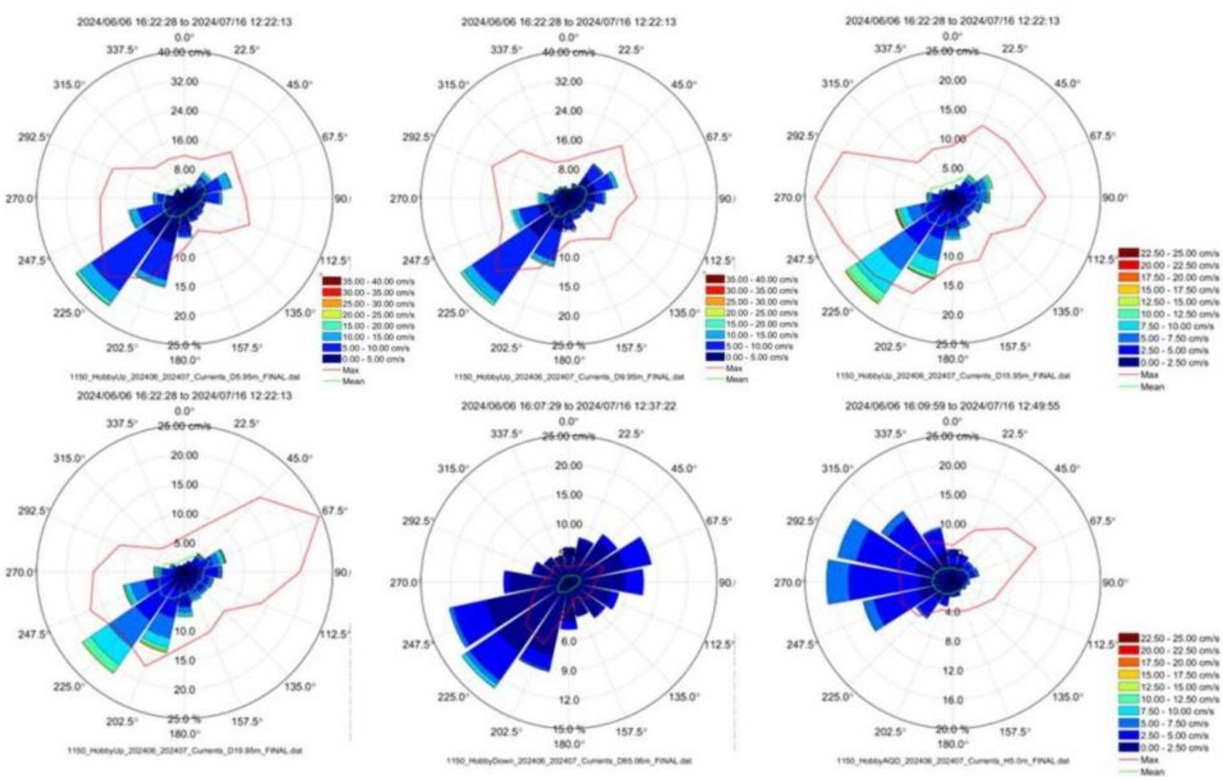


Figure 4.15. Compass rose plots of current speeds at The Hobby sea farm (June–July 2024). Current speeds and directions at 5 m, 10 m, 15 m, 20 m, 65 m (mid-depth), and near-bottom (5 m height) are shown from left to right, top to bottom in the figure. Note that the 5 m and 10 m plots use a larger speed scale.

4.4.3 Wind and Waves

4.4.3.1 Modelling (MSC50 Hindcast Approach) for Atlantic Canada

Mean wind speeds and mean wave heights near the Mal Bay BMA were highest in December through March and lowest in June, July, and August based on 10 years of historical data (Tables 4.13 and 4.14). Maximum monthly wind speeds of ~20–21 m/s (~72–76 km/h) occurred in December, January, February, and March. Similarly, maximum monthly wave heights of 1.83–1.97 m occurred during winter months. Wind directions were predominantly from the west and west-southwest (Figure 4.16) with wind speeds most frequently ranging from ~8–10 m/s (Figure 4.16).

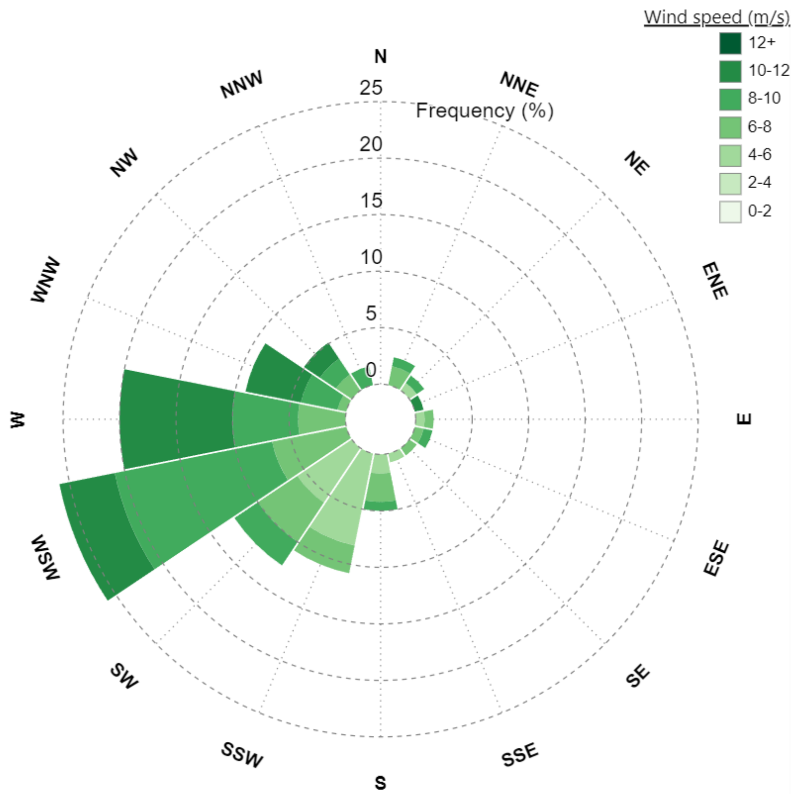
Table 4.13. Monthly wind speeds (mean and maximum) near the Mal Bay BMA (at MSC50 grid point M6012720 during 2009–2018).

Month	M6012720	
	Wind Speed Mean (m/s)	Wind Speed Max (m/s)
January	10.80	19.65
February	10.41	21.36
March	9.49	20.44
April	7.99	18.08
May	6.53	13.77
June	5.85	12.65
July	5.50	11.83
August	6.01	13.83
September	7.70	16.86
October	8.84	18.31
November	9.69	19.17
December	10.60	20.18

Notes:
Grid point M6012720 is ~4 km from the Rencontre East Island sea farm.

Table 4.14. Monthly wave heights (m) (mean and maximum) near the Mal Bay BMA (at MSC50 grid point M6012720 during 2009–2018).

Month	M6012720	
	Wave Height Mean (m)	Wave Height Max (m)
January	0.85	1.83
February	0.79	1.97
March	0.68	1.68
April	0.56	1.61
May	0.40	1.27
June	0.32	1.20
July	0.33	1.15
August	0.36	1.22
September	0.54	1.48
October	0.64	1.73
November	0.74	1.78
December	0.80	1.87



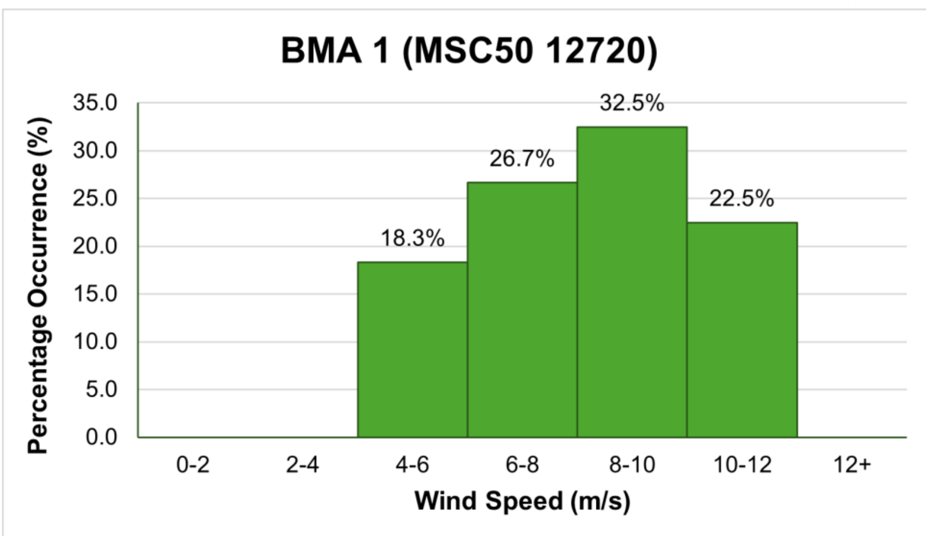


Figure 4.16. Wind rose and wind speed frequency histogram for MSC50 grid point M6012720 near the Mal Bay BMA (2009–2018).

4.5 Ice Conditions

4.5.1 Sea Ice

In comparison to other bays surrounding Newfoundland, the Study Area in and near the BMAs is relatively ice-free due to its location along the south-central coast of Newfoundland. An analysis of the Canadian Ice Service's 30-year median (1990/1991–2019/2020) of weekly ice in and near the BMAs demonstrates that in years when ice is present, it occurs from January until early-April[12].

Figure 4.17 presents a series of weekly maps (January 1–April 9) of the 30-year median of ice concentration when ice is present in the Study Area in and near the BMAs. The likelihood of ice presence is highest during the week beginning February 19. During this week, the median of ice concentration is 9–9+/10 in years when ice is present.

A detailed map with the weekly analysis of 30-year median of ice concentration in the 13 BMAs during the week beginning on February 19 is shown in Figure 4.18. Figure 4.19 indicates that the frequency of sea ice presence in the 13 BMAs is 1–15% during the week beginning February 19 based on the 30-year frequency of ice presence (1991–2020).

To provide more up-to-date and detailed sea ice information, daily sea ice charts for the Study Area in and near the BMAs were selected to represent each week and then analyzed over the past 10 years (2015–2024) for the presence, type, and frequency of sea ice. Table 4.15 contains the percent frequency of ice conditions within the region. The information presented in Table 4.15 represents the worst-case ice conditions which occurred in the area. For example, if half of the area was covered in 1/10th ice, and half classified as ice free, the information was recorded as 1/10th ice for the whole area.

In the last 10 years, the area in and near the BMAs is generally ice free or considered open water until the third week of January when fast ice forms and is present until around the third week of March. Fast ice occurred in the Hermitage Bay-St. Alban's area, with the exception of one year when fast ice formed in the Pool's Cove area.

The concentration of the majority of sea ice present over the last 10 years was less than 1/10th. During this period, sea ice generally occurred in the Hermitage Bay-St. Alban's area. However, on 19 February 2023, a large area in and near the BMAs had 3/10th sea ice concentration. In 2020, the week beginning January 8th had 9+/10ths coverage of sea ice in the McCallum area.

[12] https://iceweb1.cis.ec.gc.ca/Archive/page1.xhtml?lang=en

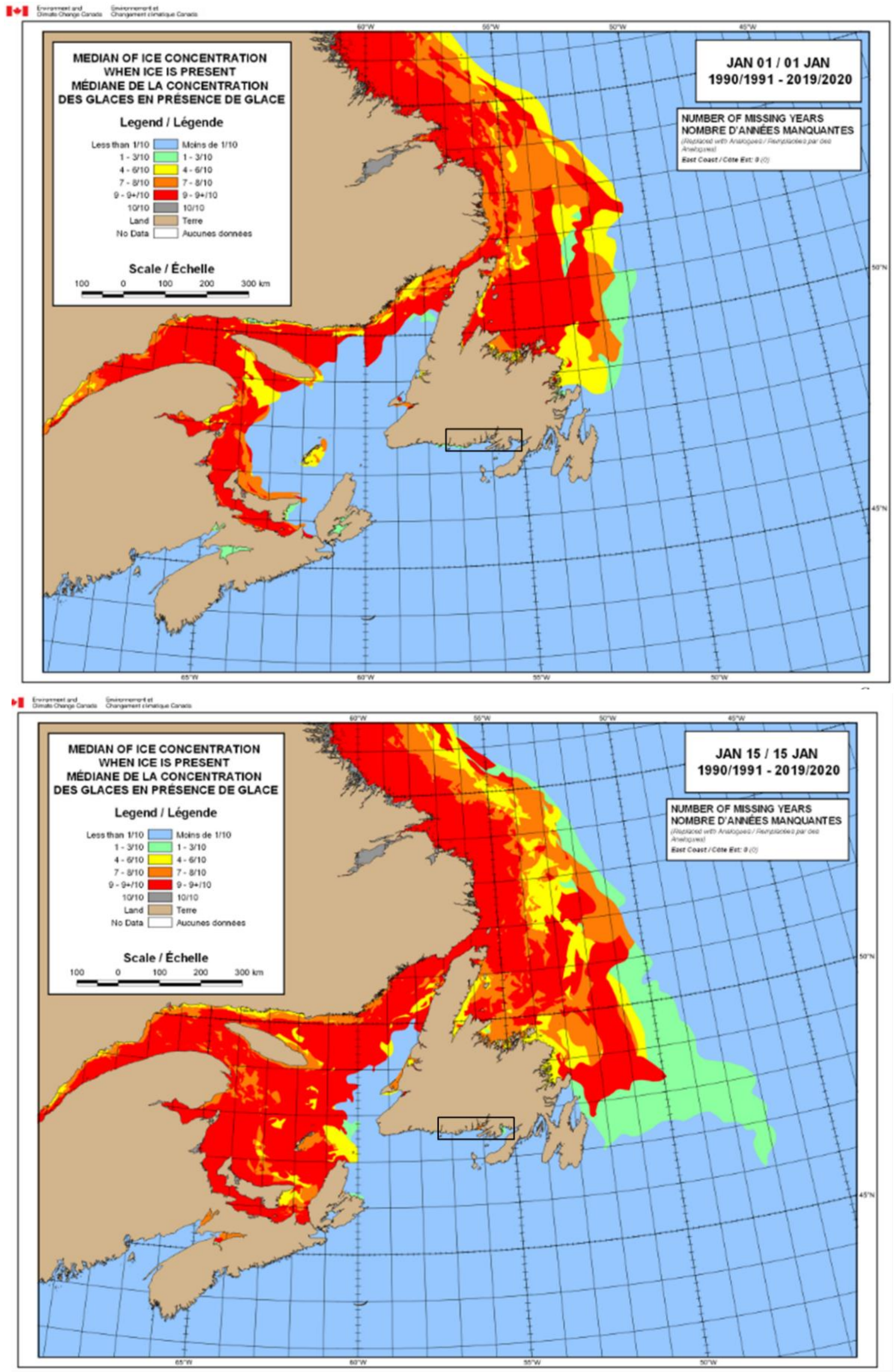
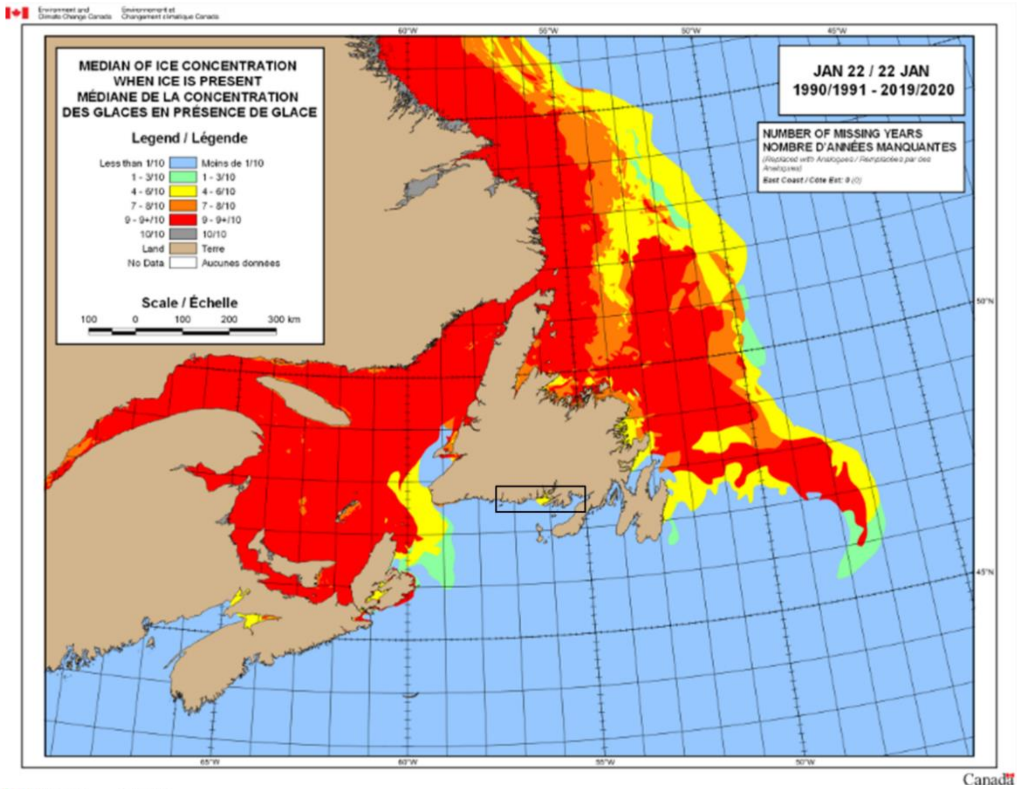


Figure 4.17. Weekly analysis of 30-year median of ice concentration when ice is present in the Study Area in and near the MCE BMAs (black rectangle) from 1991–2020 (Canadian Ice Service).



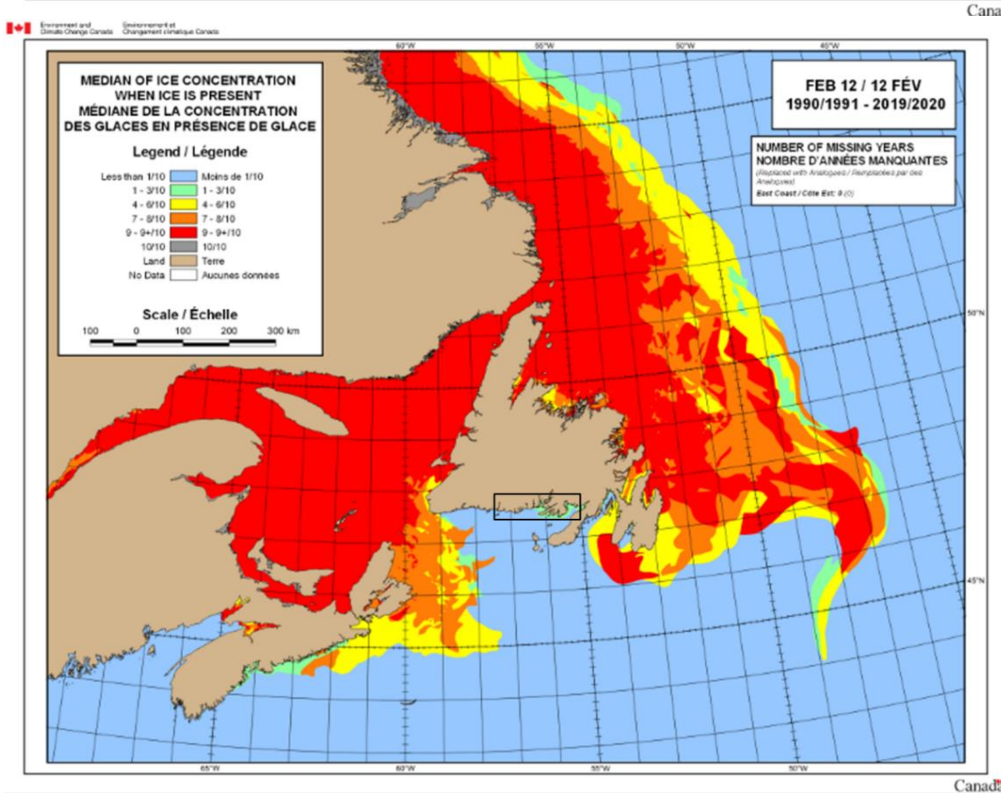


Figure 4.17 (continued). Weekly analysis of 30-year median of ice concentration when ice is present in the Study Area in and near the MCE BMAs (black rectangle) from 1991–2020 (Canadian Ice Service).

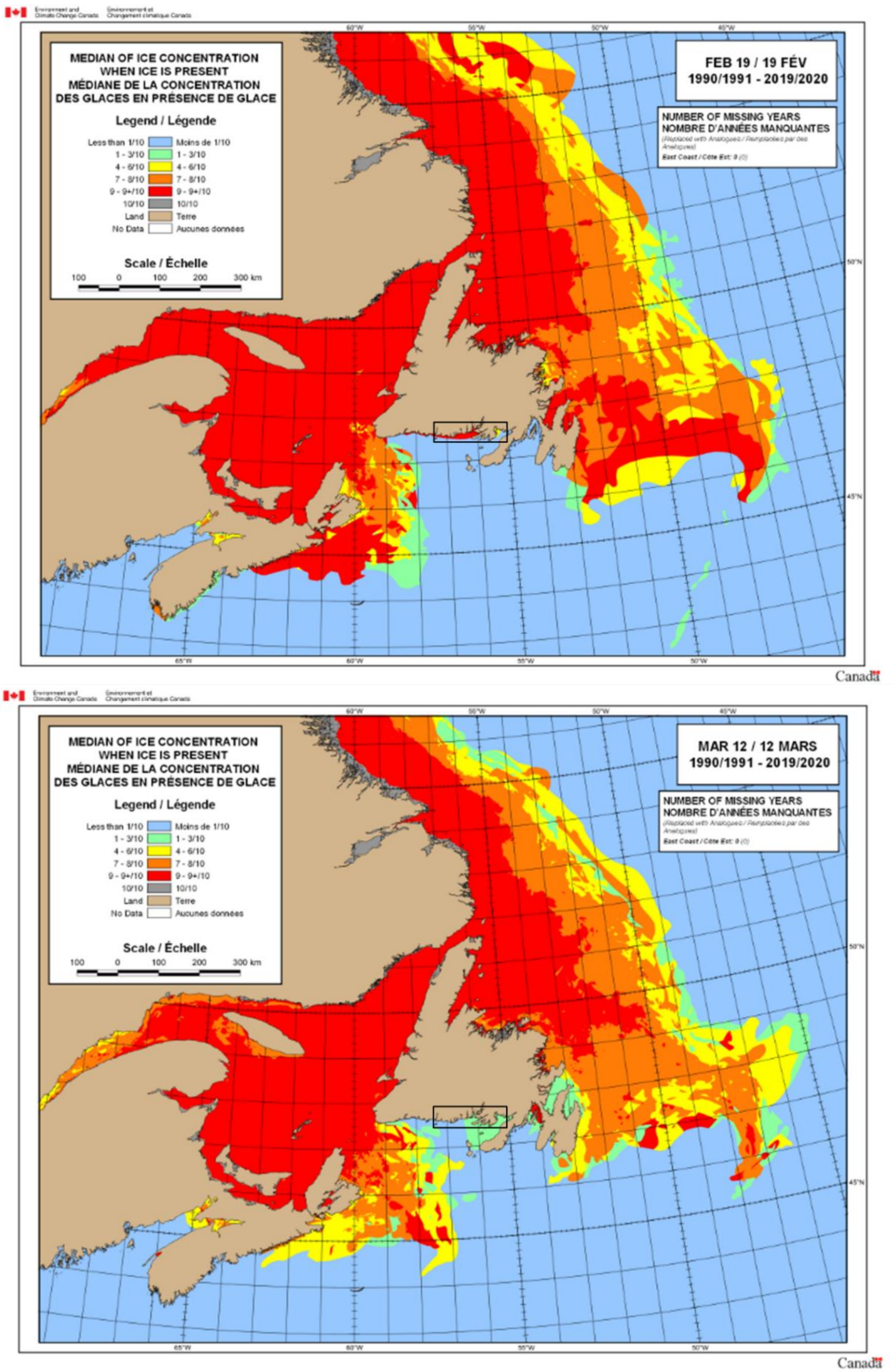
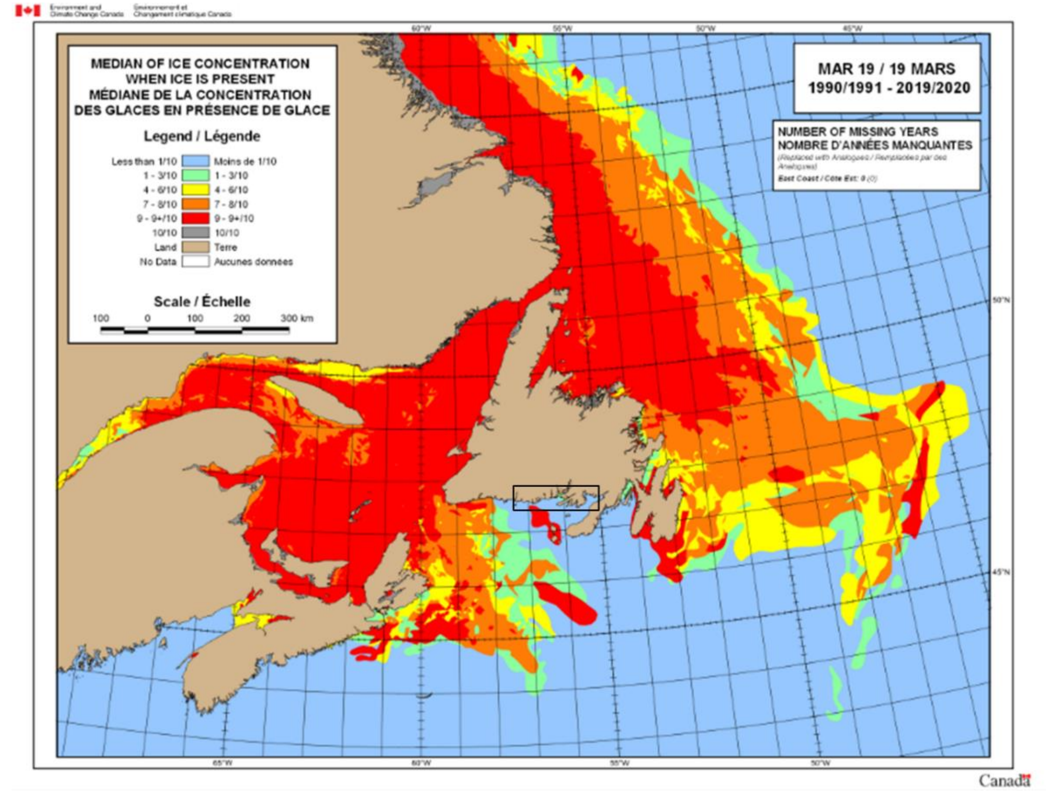


Figure 4.17 (continued). Weekly analysis of 30-year median of ice concentration when ice is present in the Study Area in and near the MCE BMAs (black rectangle) from 1991–2020 (Canadian Ice Service).



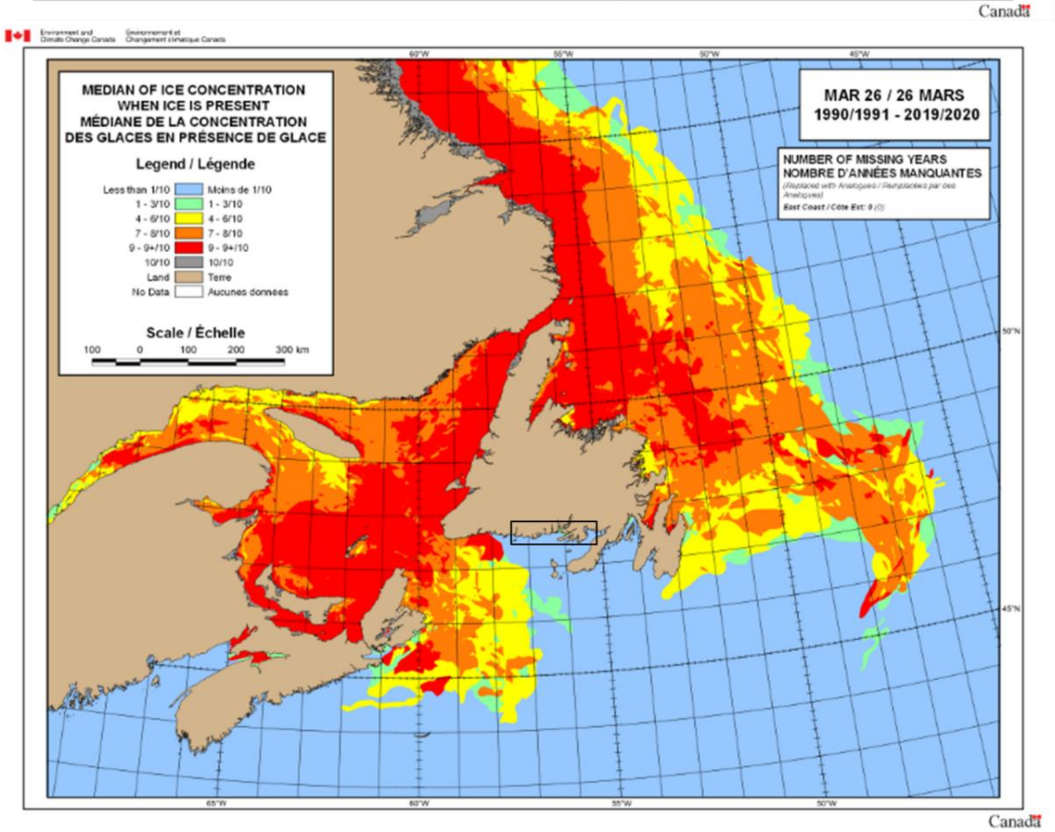
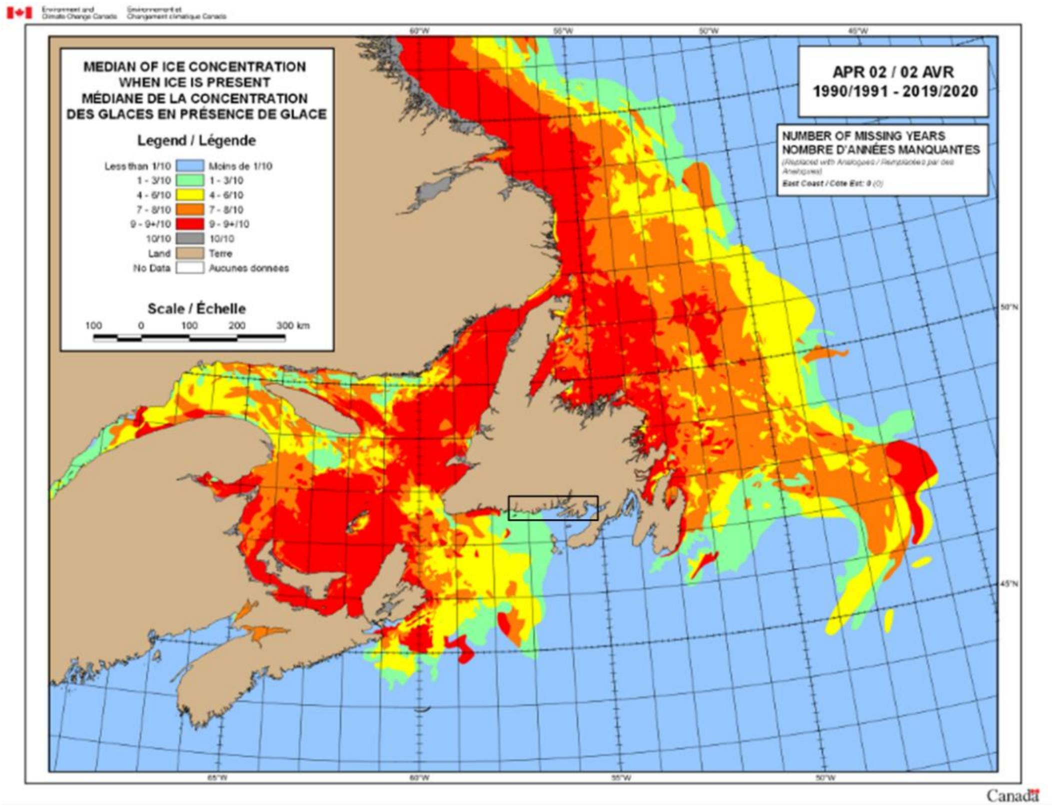


Figure 4.17 (continued). Weekly analysis of 30-year median of ice concentration when ice is present in the Study Area in and near the MCE BMAs (black rectangle) from 1991–2020 (Canadian Ice Service).



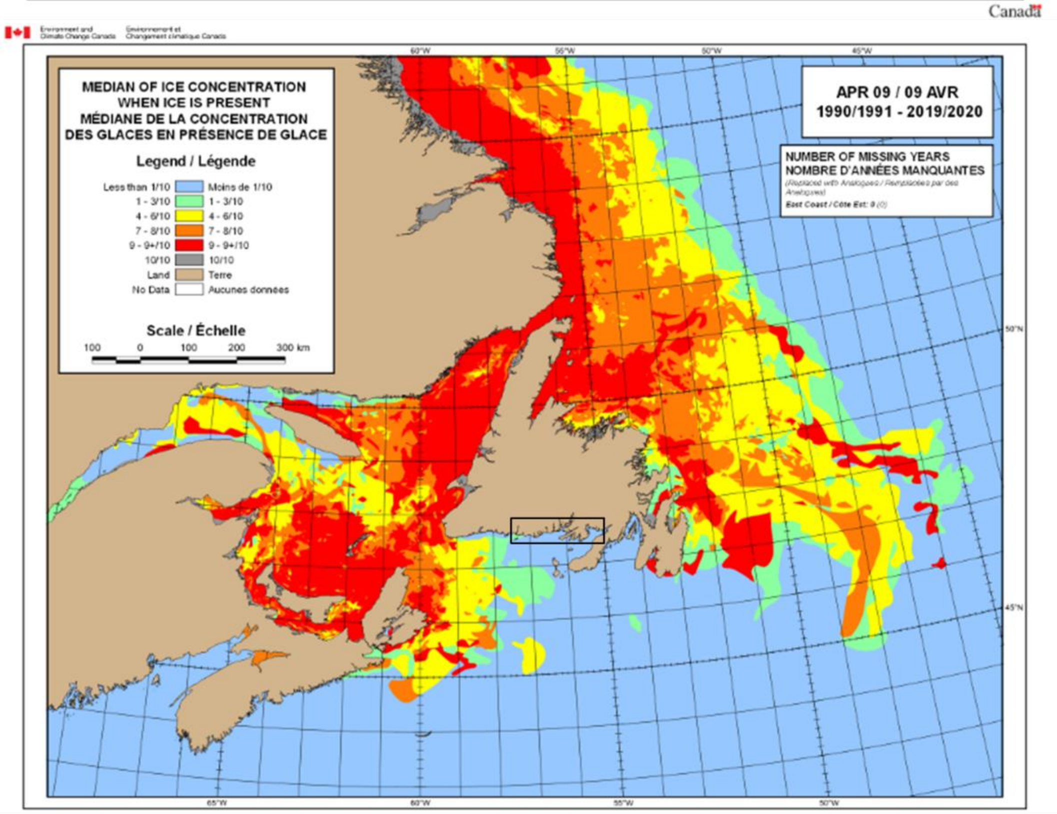


Figure 4.17 (concluded). Weekly analysis of 30-year median of ice concentration when ice is present in the Study Area in and near the MCE BMAs (black rectangle) from 1991–2020 (Canadian Ice Service).

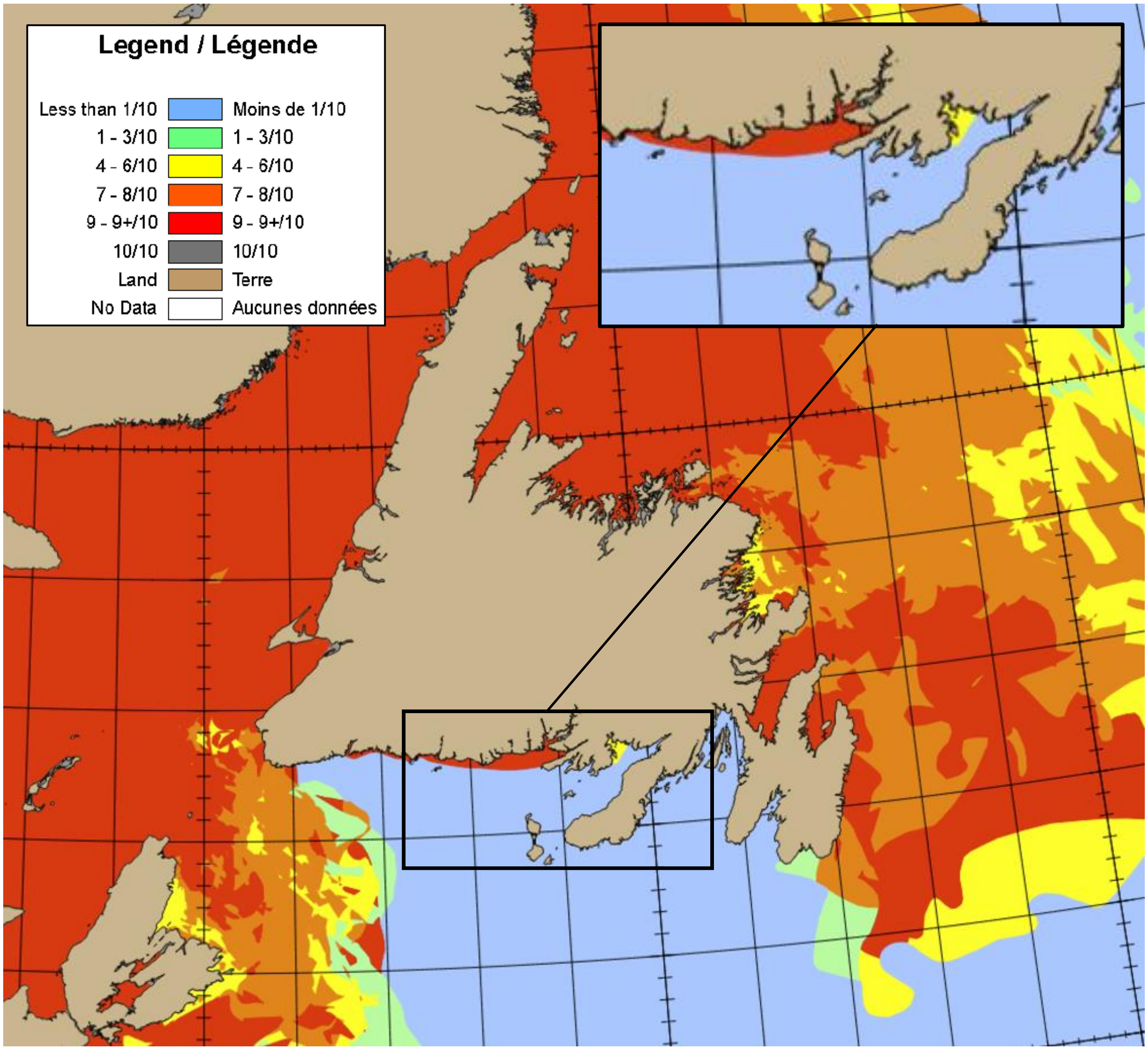


Figure 4.18. Weekly analysis of 30-year median of ice concentration when ice is present in and near the 13 BMAs in the week starting February 19, 1991–2020 (Canadian Ice Service).

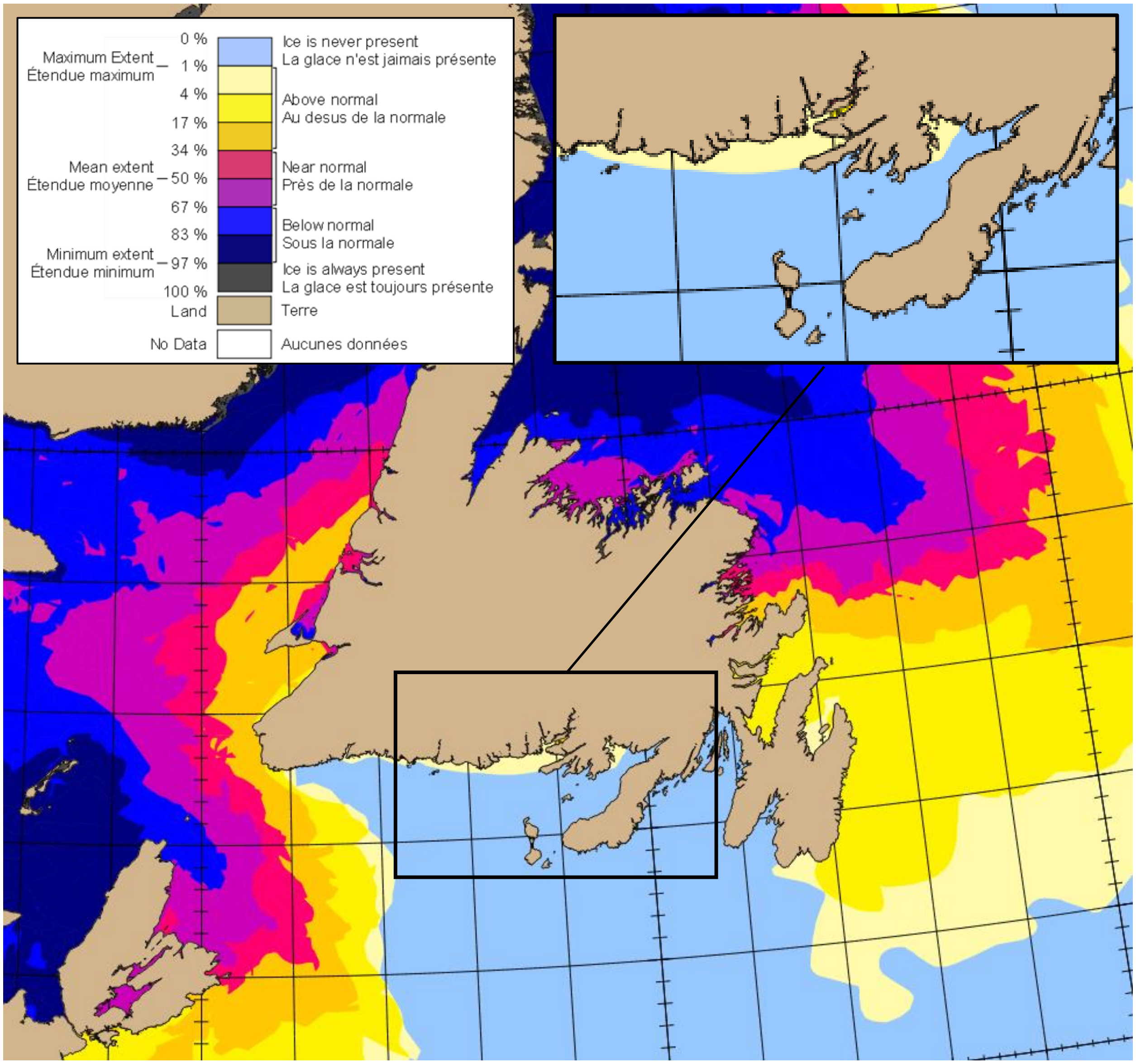


Figure 4.19. Weekly analysis of 30-year frequency of ice presence in and near the 13 BMAs in the week starting February 19, 1991–2020 (Canadian Ice Service).

Table 4.15. Percent frequency of weekly sea ice concentration in and near the BMAs, 1 January 2015–30 April 2024 based on CIS data.

Month	Week Start Date	Percent Frequency of Sea Ice Condition[a]				Percent Frequency Tenth of Sea Ice Concentration									
		Ice Free	Open Water	Bergy Water	Fast Ice	1	2	3	4	5	6	7	8	9	9+
Jan	1	**40**	**60**	**0**	**0**	0	0	0	0	0	0	0	0	0	0
	8	**30**	**30**	**0**	**10**	0	**10**	0	0	**10**	0	0	0	0	**10**
	15	**20**	**50**	**0**	**20**	0	**10**	0	0	0	0	0	0	0	0
	22	**20**	**40**	**0**	**30**	0	0	0	0	**10**	0	0	0	0	0
	29	**20**	**10**	**0**	**70**	0	0	0	0	0	0	0	0	0	0
Feb	5	**10**	**10**	**0**	**70**	0	0	0	0	0	0	**10**	0	0	0
	12	**10**	**10**	**0**	**80**	0	0	0	0	0	0	0	0	0	0
	19	**10**	**0**	**0**	**80**	0	0	**10**	0	0	0	0	0	0	0
	26	**10**	**10**	**0**	**80**	0	0	0	0	0	0	0	0	0	0
Mar	5	**20**	**10**	**0**	**70**	0	0	0	0	0	0	0	0	0	0
	12	**20**	**20**	**0**	**60**	0	0	0	0	0	0	0	0	0	0
	19	**0**	**30**	**0**	**70**	0	0	0	0	0	0	0	0	0	0
	26	**30**	**30**	**0**	**40**	0	0	0	0	0	0	0	0	0	0
Apr	2	**50**	**20**	**0**	**30**	0	0	0	0	0	0	0	0	0	0
	9	**50**	**30**	**0**	**20**	0	0	0	0	0	0	0	0	0	0
	16	**50**	**40**	**0**	**10**	0	0	0	0	0	0	0	0	0	0
	23	**60**	**40**	**0**	**0**	0	0	0	0	0	0	0	0	0	0
	30	**60**	**40**	**0**	**0**	0	0	0	0	0	0	0	0	0	0

Notes:

[a] Definitions for the terms “Ice Free”, “Open Water”, “Bergy Water” and “Fast Ice” as defined in the ECCC Ice Glossary (Environment and Climate Change Canada 2020) are provided below.

Ice Free: No ice present. If ice of any kind is present, this term shall not be used.

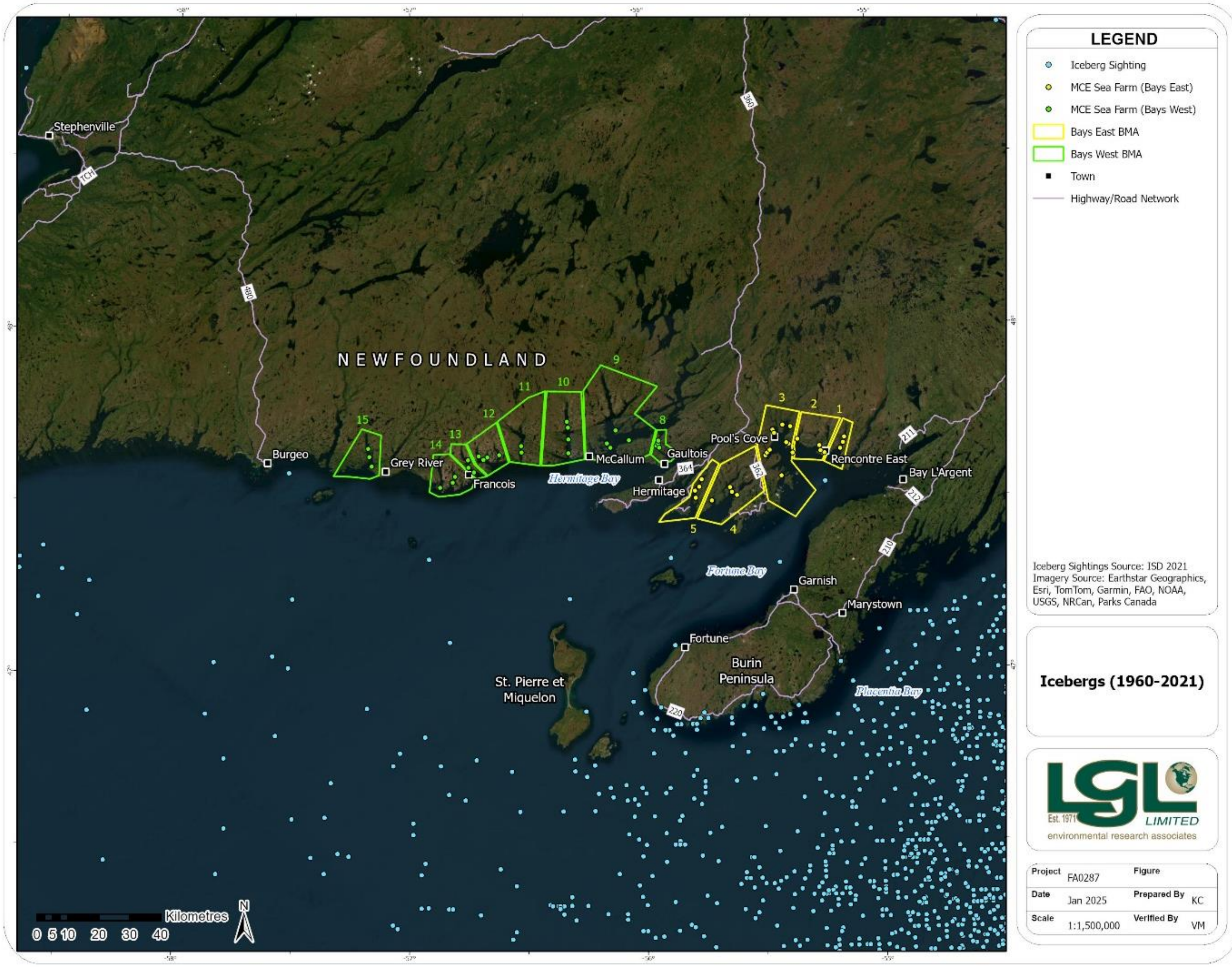
Open Water: A large area of freely navigable water in which ice is present in concentrations less than 1/10. No ice of land origin is present.

Bergy Water: An area of freely navigable water in which ice of land origin is present. Other ice types may be present, although the total concentration of all other ice is less than 1/10.

Fast Ice: Ice which forms and remains fast along the coast. It may be attached to the shore, to an ice wall, to an ice front, between shoals or grounded icebergs. Vertical fluctuations may be observed during changes of sea level. It may be formed “in-situ” from water or by freezing of floating ice of any age to shore and can extend a few metres or several hundred kilometres from the coast. It may be more than one year old in which case it may be prefixed with the appropriate age category (old, second-year or multi-year). If higher than 2 m above sea level, it is called an ice shelf.

4.5.2 Icebergs

From 1960–2021, no icebergs have been sighted in or near the BMAs and there has been one iceberg recorded in the southwestern portion of the Study Area (Figure 4.20). Icebergs in Newfoundland typically originate from Greenland’s glaciers that drift westward and then south; therefore, the south coast of Newfoundland is not an area that icebergs are typically recorded. Iceberg presence in the Study Area is very unlikely and is considered extremely unlikely in the BMAs.



Source: ISD 2021.

Figure 4.20. Iceberg sightings from 1960–2021 in and near the Study Area.

4.5.3 Local Observations

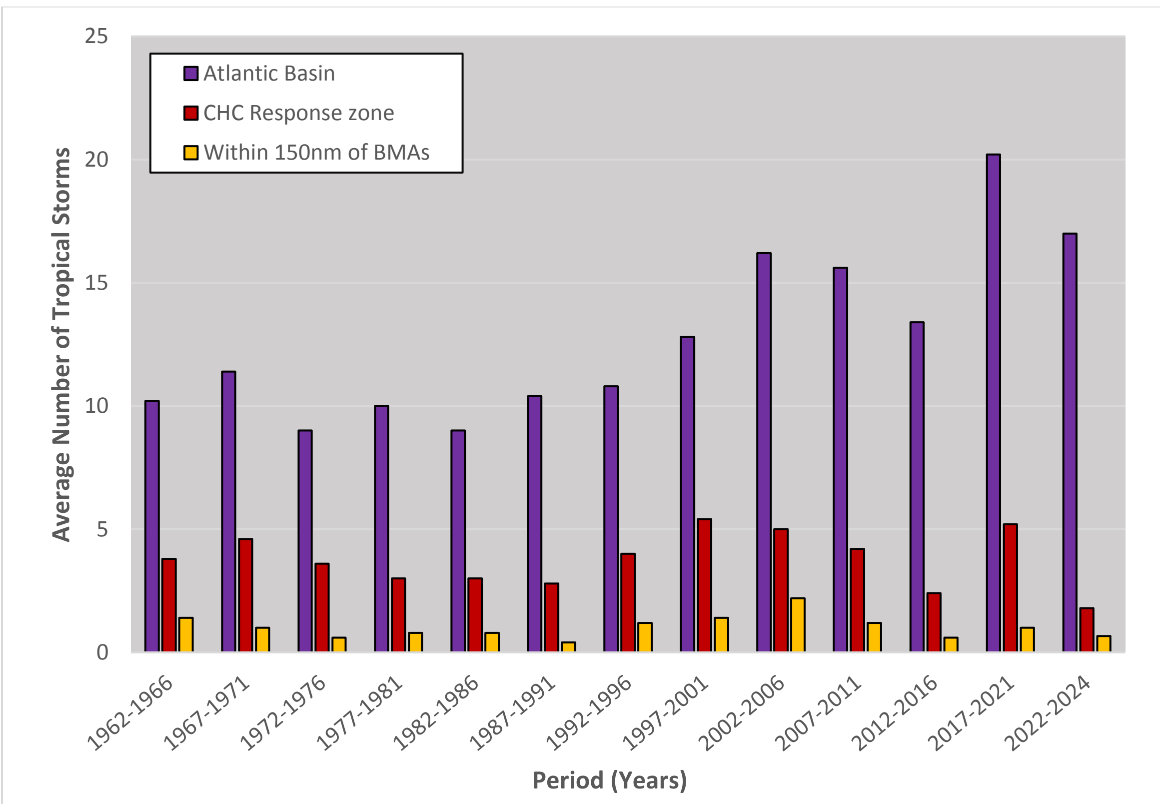
Local observations reported by MCE personnel (Mr. Harvey Jenson, Sea Farm Manager, MCE) at the sea farms in Bays East and Bays West areas provide valuable information at a finer spatial scale. In general, drifting sea ice is rarely if ever observed. There are higher concentrations of shorefast (landfast) ice in the heads of bays that have large freshwater inputs (Table 4.16). MCE's ice management practices are used to minimize the risk of ice affecting sea cage infrastructure and operations (Table 4.16).

Table 4.16. Local ice observations by MCE sea farm personnel and the approach for managing ice in MCE BMAs.

Bay Management Area	Local Observations
Mal Bay (BMA 1)	• Little to no ice. • Some shorefast ice, which may break-off and drift. • Drifting ice pans are thin enough to be left alone, or as needed broken up with the wake of a longliner. • Has not been an issue for infrastructure. • Has not been an issue to navigation and sea farm access.
Rencontre East (BMA 2)	• Little to no ice. • Some shorefast ice, which may break-off and drift. • Drifting ice pans are thin enough to be left alone, or as needed broken up with the wake of a longliner. • Has not been an issue for infrastructure. • Has not been an issue to navigation and sea farm access.
Fortune Bay West (BMA 3)	• Overall, similar conditions as BMA 1 and 2. • Higher concentrations in the head of the bay (Bay du Nord) • Has not been an issue for infrastructure. • Has not been an issue to navigation and sea farm access
Great Bay de l'Eau (BMA 4)	• Little to no ice.
Harbour Breton Bay (BMA 5)	• Little to no ice.
Little Passage (BMA 8)	• General understanding is some shorefast ice in coves. • MCE has not farmed in recent years (actively farmed by Cold Ocean Salmon). • Would not be an issue for infrastructure. • Has not been an issue to navigation.
Outer Bay d'Espoir (BMA 9)	• General understanding is the possibility of drifting ice, originating from outside the BMA from the inner regions of the Bay d'Espoir; however, MCE sea farms are located in the outer areas of the BMA. • MCE has not farmed the area in recent years. • Would not be an issue for infrastructure. • Would not be an issue to navigation and sea farm access.
Facheux Bay (BMA 10)	• Some shorefast ice at the head of the bay, which may break-off and drift. • Drifting ice pans are thin enough to be left alone, or as needed broken up with the wake of a vessel. • Young (fresh) ice will form over cold calm nights. • Has not been an issue for infrastructure. • Has not been an issue to navigation and sea farm access.
Hare Bay (BMA 11)	• Shorefast ice at the head of the bay, associated with rivers, which may break-off and drift to the outer areas of the bay. • Anticipate drifting ice pans thin enough to be left alone, or as needed broken up with the wake of a vessel. • Young (fresh) ice will form over cold calm nights. • Lower risk to farming in outer regions of the bay regarding infrastructure. • Lower risk to farming in outer regions of the bay regarding navigation and sea farm access.
Rencontre West (BMA 12)	• Little to no ice.
Chaleur Bay (BMA 13)	• Little to no ice.
Aviron Bay and La Hune Bay (BMA 14)	• Anticipated little to no ice.
Bay de Vieux (BMA 15)	• Anticipated little to no ice.

4.6 Storms

Since the 1970s, the number of tropical storms that have developed within the Atlantic Basin has increased (NOAA 2024). Figure 4.21 illustrates the 5-year average of tropical storms which have developed in the Atlantic Basin and entered the Canadian Hurricane Centre (CHC) Response Zone, and within ~150 nm of the BMAs since 1962. This rise in activity has been attributed to naturally occurring cycles in tropical climate patterns near the equator, known as the tropical multi-decadal signal (Vecchi et al. 2021). Despite the surge in Atlantic Basin Storms, there has not been a significant increase in the number of storms which have entered the CHC Response Zone, or the number of storms passing through the 150 nm zone surrounding the BMAs.



Source: NOAA 2024.

Figure 4.21. Five-Year average of the number of tropical storms which formed in the Atlantic Basin and entered the CHC Response Zone and within ~150 nm of the BMAs since 1962.

In the north Atlantic Basin between 40–55% of tropical cyclones transform into extratropical cyclones (Chunyong and Lackmann 2023). During this transformation, the system loses tropical characteristics and becomes more extratropical, resulting in an increase in size that produces large waves, gale to hurricane force winds, and intense rainfall (Hart and Evans 2001). The likelihood that a tropical cyclone will undergo transition increases toward the second half of the tropical season; with October having the highest probability of transition (Hart and Evans 2001). In the

Atlantic Basin, extratropical transition occurs at lower latitudes in the early and late hurricane season and at higher latitudes during the peak of the season (Hart and Evans 2001).

The Atlantic Hurricane Season runs from June–November, though storms sometimes form outside of the designated season. The peak of hurricane season for Newfoundland and Labrador, and the Atlantic Basin, is early- to mid-September (NL WRMD 2024). Since 1962, 71 tropical systems have passed within 150 nm of the BMAs. The names are given in Table 4.17 and the storm tracks for the months of June–October are shown in Figure 4.22. Of the five months in which tropical storms affected the region, the month of September was the most active with a total of 24 named storms. There were no storms of tropical origin during the month of November. It should be noted that the values in Table 4.17 are the maximum 1-minute mean wind speeds occurring within the tropical system at the 10-m asl reference as it entered the area within 150 nm of the BMAs.

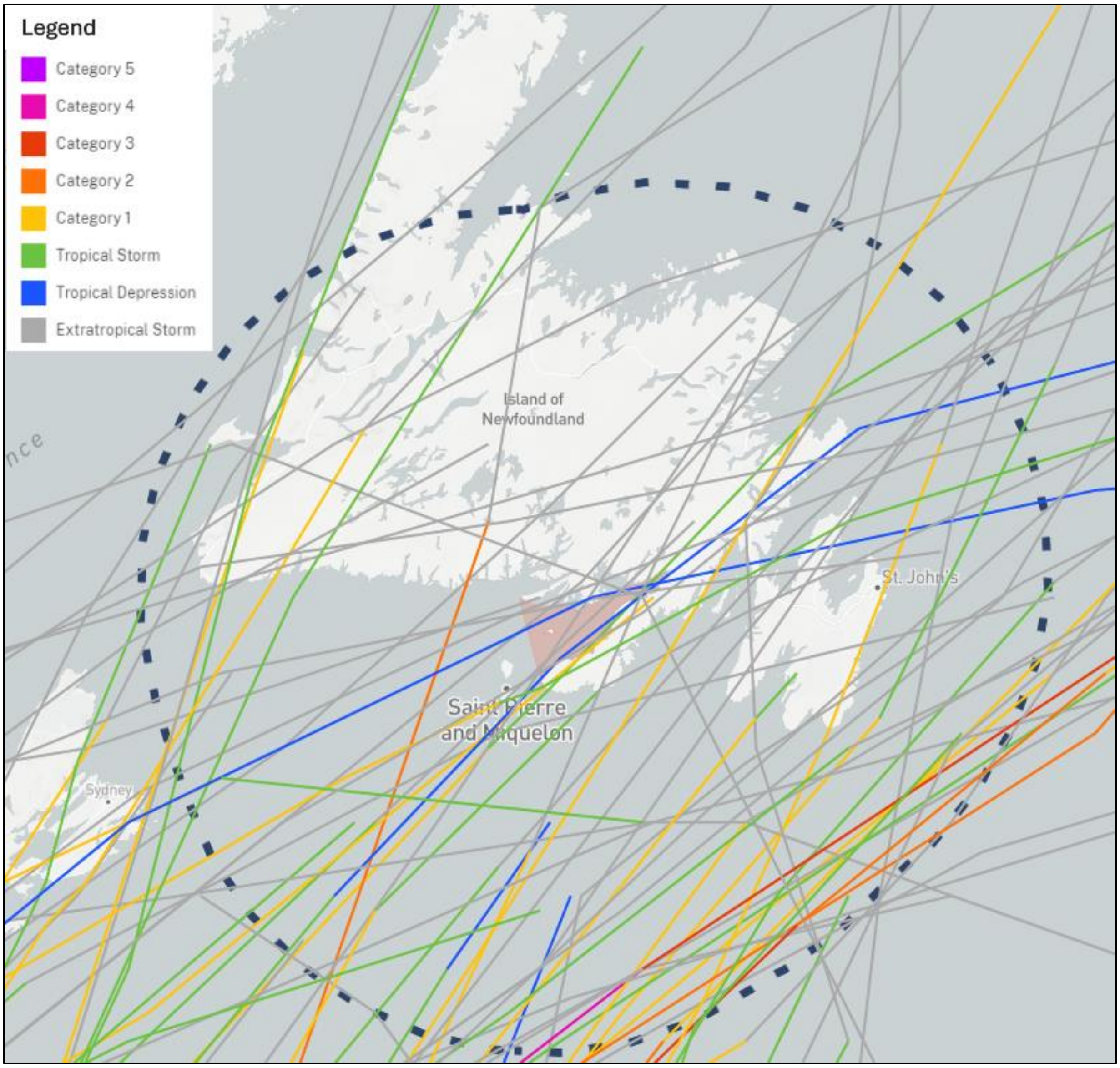
Table 4.17. Tropical systems passing within 150 nm of the Study Area (1962–2024).

Year	Month	Day	Hour	Name	Latitude (ºN)	Longitude (ºW)	Wind (kt)	Pressure (mb)	Category
1962	July	4	0000	Unnamed	47.3	-54.7	40	n/a	Extra-Tropical
1962	October	9	0600	Daisy	46.0	-54.7	50	n/a	Extra-Tropical
1962	October	22	1200	Ella	45.7	-54.0	60	n/a	Extra-Tropical
1964	July	27	1800	Unnamed	47.0	-58.6	35	n/a	Extra-Tropical
1964	September	15	1800	Dora	47.6	-55.5	55	n/a	Extra-Tropical
1964	September	25	0000	Gladys	47.5	-54.5	60	n/a	Extra-Tropical
1966	July	3	1200	Becky	44.7	-57.3	45	n/a	Extra-tropical
1966	July	21	1800	Celia	46.3	-59.6	55	n/a	Extra-tropical
1969	August	12	1800	Blanche	46.2	-54.7	65	n/a	Extra-Tropical
1969	August	24	1200	Debbie	48.0	-51.9	60	n/a	Extra-tropical
1969	September	26	0600	Unnamed	45.4	-53.7	65	n/a	Category 1
1970	August	19	0600	Unnamed	46.0	-51.9	60	n/a	Extra-Tropical
1971	July	7	1200	Arlene	44.7	-56.3	45	n/a	Tropical Storm
1971	August	17	0600	Beth	48.4	-59.0	50	998	Extra-Tropical
1973	July	6	1800	Alice	48.3	-58.8	50	n/a	Tropical Storm
1973	October	28	0000	Gilda	45.4	-55.1	55	n/a	Extra Tropical
1975	October	3	0600	Gladys	43.7	-56.9	85	960	Category 2
1977	October	15	1800	Evelyn	47.4	-59.2	70	999	Category 1
1978	September	5	0000	Ella	45.0	-54.8	105	960	Category 3
1979	August	6	0000	Unnamed	47.5	-55.3	25	n/a	Tropical Depression
1979	September	7	1800	David	50.0	-56.9	55	986	Extra-Tropical
1979	October	25	0600	Unnamed	47.5	-58.1	50	982	Tropical Storm
1982	June	20	1800	Unnamed	45.4	-56.0	60	990	Extra-Tropical
1982	September	19	0000	Debby	45.3	-53.4	90	970	Category 2
1984	September	16	0600	Diana	46.0	-57.7	60	995	Extra-Tropical
1985	July	19	0600	Ana	46.0	-57.6	55	996	Extra-Tropical
1989	August	8	1300	Dean	46.9	-55.9	55	991	Tropical Storm
1990	October	15	0600	Lili	46.6	-56.1	40	994	Extra-Tropical
1995	June	9	0600	Allison	48.1	-55.8	40	996	Extra-Tropical
1995	July	10	0600	Barry	48.5	-59.2	40	989	Tropical Storm
1995	August	22	0600	Felix	44.5	-55.7	50	986	Tropical Storm
1995	September	11	0600	Luis	47.1	-54.1	105	963	Extra-Tropical
1996	July	15	0000	Bertha	48.0	-56.9	50	995	Extra-Tropical
1996	September	15	1200	Hortense	46.3	-59.0	60	982	Tropical Storm
1996	October	10	0600	Josephine	48.5	-57.9	45	985	Extra-Tropical
1998	September	06	0000	Earl	47.0	-53.9	50	979	Extra-Tropical
1999	September	19	0000	Floyd	48.0	-56.2	35	992	Extra-Tropical
1999	September	23	0600	Gert	44.6	-54.4	60	968	Tropical Storm

Year	Month	Day	Hour	Name	Latitude (ºN)	Longitude (ºW)	Wind (kt)	Pressure (mb)	Category
2000	September	17	1800	Florence	45.5	-52.9	50	1002	Tropical Storm
2000	October	08	1200	Leslie	46.0	-57.0	40	1003	Extra-Tropical
2000	October	19	1800	Michael	46.3	-57.3	85	965	Category 2
2001	September	14	1800	Erin	44.7	-55.1	65	984	Category 1
2001	September	19	1800	Gabrielle	46.5	-51.9	60	986	Extra-Tropical
2002	July	17	0600	Arthur	46.5	-53.8	45	999	Extra-Tropical
2002	September	12	0900	Gustav	47.6	-58.5	65	963	Category 1
2004	September	01	1800	Gaston	45.0	-54.9	45	998	Extra-Tropical
2005	July	30	0600	Franklin	44.7	-54.6	45	1003	Extra-Tropical
2005	September	18	1800	Ophelia	47.4	-56.2	45	999	Extra-Tropical
2005	October	26	1200	Wilma	45.0	-54.8	50	986	Extra-Tropical
2006	June	16	1200	Alberto	47.4	-54.9	45	985	Extra-Tropical
2006	July	18	1200	Unnamed	45.5	-58.0	30	1007	Tropical Depression
2006	July	22	1200	Beryl	48.5	-56.4	30	1004	Extra-Tropical
2006	September	13	1200	Florence	45.5	-55.5	70	967	Extra-Tropical
2006	October	02	1800	Isaac	45.5	-53.7	55	995	Tropical Storm
2007	August	01	1200	Chantal	46.0	-54.4	55	990	Extra-Tropical
2008	September	08	0600	Hanna	47.5	-55.3	40	996	Extra-Tropical
2009	August	24	0000	Bill	46.3	-57.9	65	973	Category 1
2010	September	21	1500	Igor	46.6	-53.1	75	950	Category 1
2011	September	16	1800	Maria	46.7	-53.8	60	983	Tropical Storm
2011	October	3	1000	Ophelia	46.9	-55.3	60	990	Extra-Tropical
2012	September	11	1200	Leslie	47.7	-54.8	65	970	Extra-Tropical
2014	October	19	0600	Gonzalo	44.5	-54.8	80	968	Category 1
2015	July	15	1200	Claudette	46.0	-55.8	30	1004	Tropical Depression
2017	October	11	0000	Nate	47.5	-56.0	25	1001	Extra-Tropical
2018	July	17	0600	Beryl	45.5	-55.7	30	1012	Tropical Depression
2018	July	12	1800	Chris	45.7	-56.4	55	989	Extra-Tropical
2018	October	13	0600	Michael	44.8	-55.6	65	975	Extra-Tropical
2020	September	24	0000	Teddy	49.7	-58.2	45	975	Extra-Tropical
2021	September	11	0300	Larry	47.3	-54.6	70	958	Category 1
2023	September	8	0600	Idalia	45.2	-58.3	30	1003	Extra-Tropical
2024	August	20	0600	Ernesto	46.6	-51.4	65	975	Category 1

Source: NOAA (2024).

Tropical systems occasionally maintain hurricane strength as they enter the area within 150 nm of the BMAs. Nine Category 1, three Category 2, and one Category 3 hurricanes entered this area between 1962 and 2024. The most intense of these storms was Hurricane Ella which entered the area on 5 September 1978 with maximum sustained wind speeds of 54.0 m/s and a central pressure of 960 mb. Most tropical systems that traverse in and near the BMAs have been Extratropical Storms and Tropical Depressions.



Source: NOAA 2024.

Figure 4.22. Storm tracks of tropical systems passing within 150 nm (278 km) of the Bay Management Areas (1962–2024).

4.7 Tides and Floods

Predicted tidal heights for tidal stations in the Bays East area (represented by Belleoram and Harbour Breton) had an overall higher mean tide of 1.33 m compared to predicted tide heights in Bays West (represented by Gaultois, Francois, McCallum and Pushthrough) at 1.08 m. In 2024, the mean predicted overall tidal height for Bays East and Bays West representative stations was 1.16 m (Table 4.18).

Table 4.18. Summary of 2024 predicted annual mean tidal heights (m) for nine tidal stations near and adjacent to MCE sea farms. Mean, range, minimum, and maximum tide heights for the daily higher-high through lower-low predicted tides in the Bays East and Bays West areas were calculated. Observed recorded extremes (highest and lowest tides) from historical data are presented where historical data were available (1935–2024).

			Mean Tide Height (m)				Range Tide Height (m)				Min Tide Heights (m)				Max Tide Heights (m)				Recorded Extremes	
Area	Station	Annual Mean (m)	Higher High	Lower High	Higher Low	Lower Low	Higher High	Lower High	Higher Low	Lower Low	Higher High	Lower High	Higher Low	Lower Low	Higher High	Lower High	Higher Low	Lower Low	High	Low
Cabot Strait	Port aux Basques*	1.28																	2.6	0.2
Bays East	Belleoram	1.34	2.1	1.9	0.7	0.7	0.7	0.8	0.9	0.9	1.7	1.4	0.3	0.2	2.4	2.3	1.2	1.0		
	Harbour Breton	1.31	2.0	1.9	0.7	0.6	0.7	0.7	0.7	0.7	1.7	1.6	0.3	0.3	2.4	2.3	1.1	1.0		
Bays West	Francois**	0.99	1.6	1.5	0.5	0.4	0.6	0.6	0.7	0.7	1.3	1.2	0.1	0.0	1.9	1.8	0.8	0.8	1.8	0.2
	Gaultois**	1.09	1.8	1.6	0.5	0.4	0.7	0.8	0.7	0.6	1.5	1.3	0.1	0.1	2.2	2.1	0.8	0.7	2.1	0.2
	McCallum**	1.04	1.7	1.5	0.5	0.4	0.7	0.8	0.7	0.7	1.4	1.2	0.1	0.0	2.1	2.0	0.8	0.8	2.0	0.1
	Pushthrough	1.19	1.9	1.7	0.6	0.6	0.7	0.7	0.6	0.6	1.6	1.4	0.3	0.3	2.2	2.1	0.9	0.9		
Burin Peninsula	Great St. Lawrence*	1.42																	3.6	-0.2
Placentia Bay	Argentia*	1.44																	3.6	-0.3

Notes:

*Extremes for period 1 January 2015 through 1 January 2024.

**Extremes only available for June 1998 (Francois), April–May 1996 (Gaultois), October 1995 and July–August 1998 (McCallum).

Using the historical data available from tidal stations along the south coast of Newfoundland, there were no instances in which tide heights exceeded 3 m in the periods 1995, 1996, and 1998 (Figure 4.23) nor were tidal heights predicted to be greater than 3 m for any station in Bays West or Bays East during 2024 (see Table 4.18). Based on historical observations, there were 28 instances in which tides exceed 3 m at nearby stations (21 events at Argentia, 7 events at Great St. Lawrence, 0 events at Port aux Basques) during the period 1971–2024, 1972 and 2005–2024, and 1935–2024, respectively (Figure 4.24; Table 4.19). The average tidal height exceeding 3 m at Argentia and Great St. Lawrence stations was 3.12 m with the largest tide (3.63 m) occurring at Great St. Lawrence on 11 September 2021 (Figure 4.25).

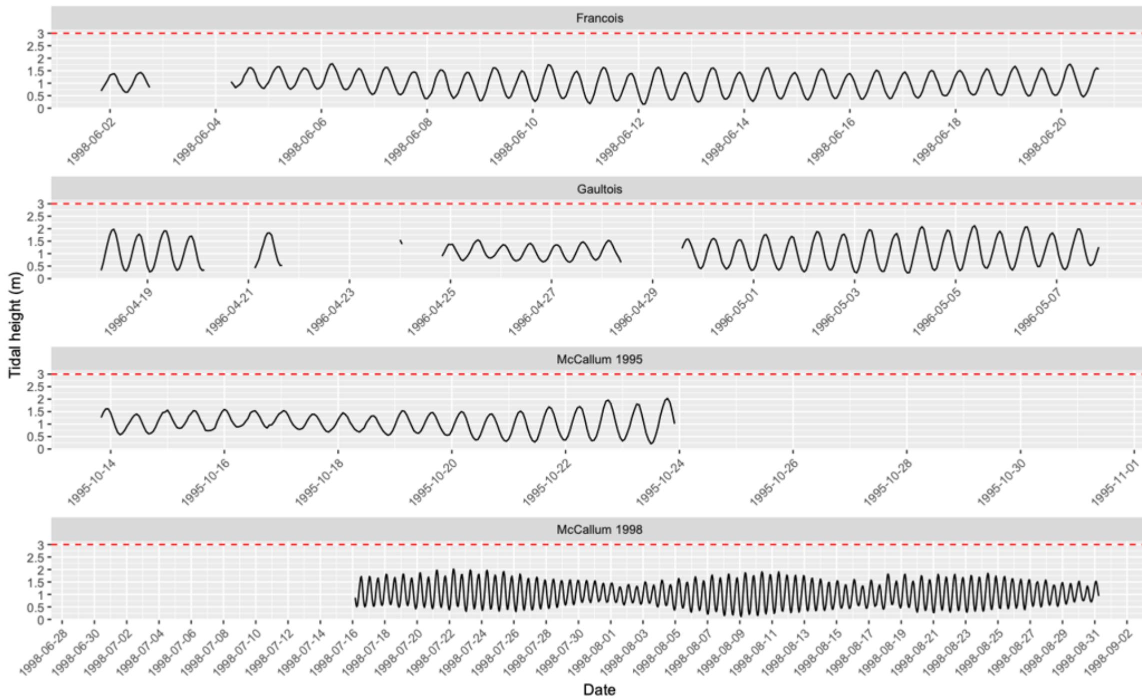


Figure 4.23. Historical observed hourly tide heights (m) for three reporting Stations in Bays West (Francois, 1998; Gaultois, 1996 and McCallum, 1995 and 1998) compared to a 3-m extreme high tide (red dashed line).

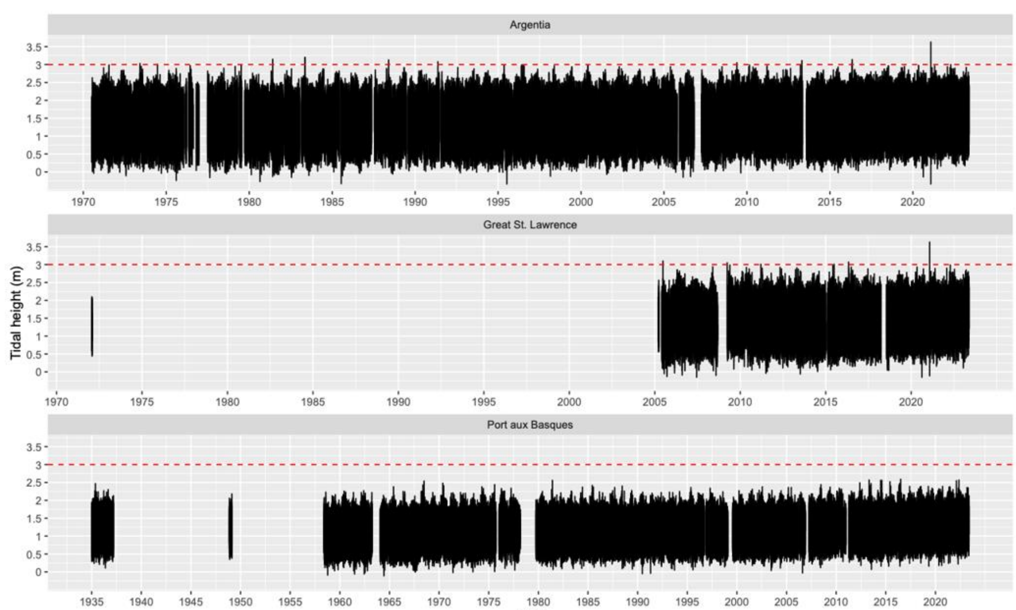


Figure 4.24. Historical observed hourly tidal heights for three reporting tide stations adjacent to Fortune Bay on the south coast of Newfoundland (Port aux Basque, Great St. Lawrence, and Argentia) compared to a 3-m extreme high tide (red dashed line).

Table 4.19. Recorded events where tidal height (m) exceeded 3-m at tidal stations ‘Argentia’ (1971–2024) and ‘Great St. Lawrence’ (1972 and 2005–2024) on the south coast of Newfoundland. Port aux Basque tidal station did not record any events exceeding 3 m during the period historical data was available (1935–2024).

Date (and Time) Tides Exceeded 3 m	Observed Tidal Height (m)	
	Argentia Station	Great St. Lawrence Station
10 Jan 1974 (09:00)	3.03	
30 Jan 1975 (10:00)	3.01	
10 Jan 1982 (10:00)	3.15	
10 Jan 1982 (10:00)	3.08	
22 Dec 1983 (09:00)	3.01	
22 Dec 1983 (10:00)	3.19	
22 Dec 1983 (11:00)	3.2	
25 Dec 1983 (11:00)	3.0	
25 Dec 1983 (12:00)	3.2	
05 Jan 1989 (07:00)	3.13	
25 Dec 1991 (12:00)	3.08	
01 Feb 2006 (11:00)	3.1	
06 Nov 2009 (12:00)		3.05
03 Jan 2010 (11:00)	3.05	
26 Oct 2011 (07:00)		3.01
04 Dec 2013 (09:00)	3.11	
09 Feb 2016 (09:00)		3.01
13 Dec 2016 (07:00)	3.04	3.03
13 Dec 2016 (08:00)		3.07
15 Dec 2016 (22:00)	3.14	
17 Dec 2016 (11:00)	3.05	
10 Sep 2021 (23:00)		3.63
11 Sep 2021 (00:00)	3.63	3.08
11 Sep 2021 (01:00)	3.08	
25 Nov 2022 (09:00)	3.0	

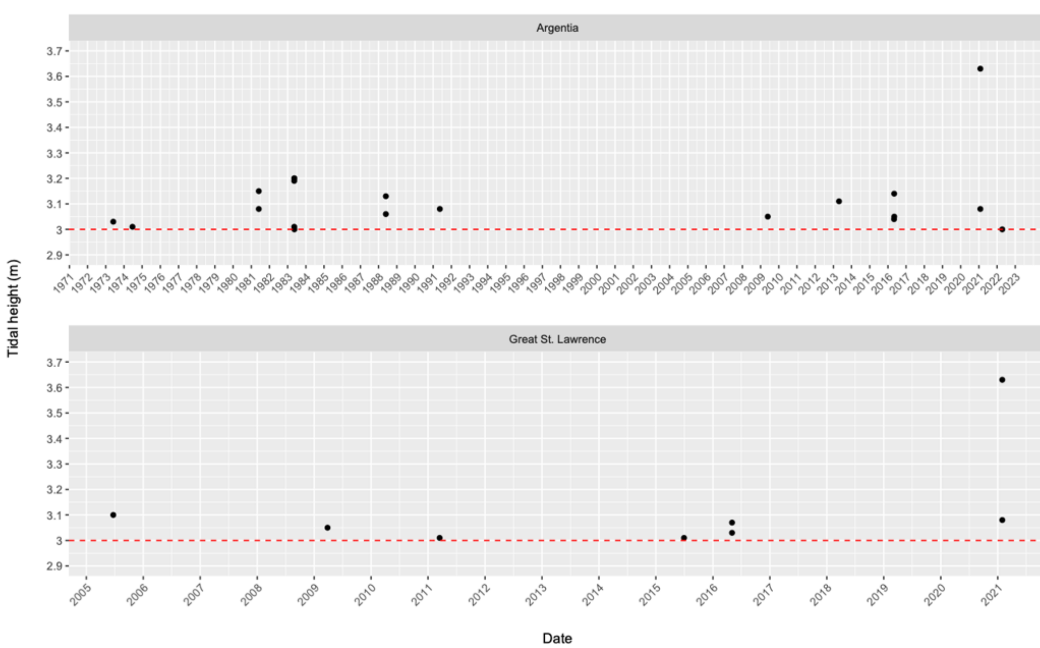


Figure 4.25. Observed tide heights (m) for Argentia (1971–2024) and Great St. Lawrence (1972 and 2005–2024) stations where tides exceeded 3 m (red dash line).

4.8 Performance of Sea Farms with a Previous Production Cycle

The summaries below detail the monitoring, reporting and performance of the two sea farms (Foshie's Cove and The Hobby) that have previously been in production in the Mal Bay BMA during the period that public reporting has been a requirement (2016–present).

4.8.1 Fallowing Periods

MCE sea farms in the Mal Bay BMA (Foshie's Cove and The Hobby) have been fallow since September 2019. The 2019-year class was depopulated in September of 2019 due to a mortality event in August of that year. Mal Bay BMA has remained fallow since this time (Table 4.20). Benny's Cove has never been stocked.

Table 4.20. Summary of the fallow schedule for the Mal Bay BMA sea farms since 2016. Green indicates production (month stocked), red indicates harvesting/depopulation (month sea cages were empty), and blue is fallow (not stocked).

Sea Farm	2016	2017	2018	2019		2020	2021	2022	2023	2024
Benny's Cove										
Foshie's Cove	Jun		Jul	Jun	Sep					
The Hobby	Jun		Jul	Jul	Sep					

4.8.2 Benthic Monitoring

For Mal Bay, regulatory modelling of deposition (i.e., DEPOMOD) has not been required and therefore not completed to date.

As per AAR requirements, benthic monitoring of an active sea farm is required during a period of peak salmon feeding. Depending on bottom type (hard or soft), either video monitoring or bottom grabs are collected to determine the amount of BOD matter. During years with active farming, required benthic monitoring at sampling stations in the Mal Bay BMA was conducted. All sea farms were within the allowable regulatory threshold based on the BOD indicators (Table 4.21). Benthic monitoring will occur at the Mal Bay BMA sea farms in 2026 as per the AAR, if production plans stay the same and stocking occurs in 2025.

Table 4.21. AAR benthic monitoring results for sea farms in the Mal Bay BMA (2015–2023). [Green = within allowable regulatory threshold [a]]

AAR Monitoring Year	BOD Indicator	Sea Farm		
		Benny's Cove	Foshie's Cove	The Hobby
2015	Date			
	%Stations			
2016	Date			
	%Stations			
2017	Date		27 Sep 17	29 Sep 17
	%Stations		58 (28 of 48)	38 (17 of 45)
2018	Date			
	%Stations			
2019	Date			

AAR Monitoring Year	BOD Indicator	Sea Farm		
		Benny's Cove	Foshie's Cove	The Hobby
	%Stations			
2020	Date			
	%Stations			
2021	Date			
	%Stations			
2022	Date			
	%Stations			
2023	Date			
	%Stations			

Source: MCE (2024).
Notes:
[a] If >70% of monitoring stations had the presence of *Beggiatoa* species or similar bacteria, marine worms, or barren substrate (as determined by visual monitoring) and/or if the mean concentration of free sulfide in surficial sediment was >3000 µM (as determined by sediment sampling) this is considered an exceedance (fail) of the allowable threshold.

4.8.3 Publicly Reported Performance

As detailed in Section 3.5.3, sea farm performance reports which include mass mortality, disease, and escape information and sea lice count data are available for recent years. Drugs and pesticide use information at sea farms are available for 2016–2022.

4.8.3.1 Mortality Events

No mass mortality reports have been issued at sea farms in Mal Bay BMA since reporting commenced in 2019. There was an event in September 2019 (prior to public reporting requirements) involving multiple sea farms. MCE has confirmed that the Mal Bay BMA sea farms (Foshie's Cove and The Hobby) were part of this mortality.

4.8.3.2 Disease

No diseases have been reported at sea farms in the Mal Bay BMA for the years publicly available on the NAIA website and the Aquaculture Portal 2019–2024.

4.8.3.3 Escapes

No fish escapes have been reported at sea farms in the Mal Bay BMA for the years publicly reported on NAIA website and the Aquaculture Portal 2019–2024.

4.8.3.4 Sea Lice

Sea lice are reported on the NAIA website as an average number per fish. These results are not reported for each sea farm or each BMA but as an average for all active sea farms operated by MCE (Table 4.22). Sea lice numbers were highest in 2021 with numbers consistently lower in 2022–2024.

Table 4.22. Average sea lice per fish for all active MCE farms 2021–2024.

Year	Month								Average
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2021[a]	1.02	0.39	1.73	2.6	4.65	7.09	14.2	7.9	3.30
2022[b]	0.55	0.08	1.81	0.67	0.89	0.85	1.42	1.45	0.64
2023[b]	1.75	0.23	0.16	0.14	1.06	1.26	1.06	0.82	0.54
2024[b]	0.7	0.048	0.1	0.14	1.05	2.5	1.2	1.2	0.58

Source: [a]naia.ca and [b]aquacultureportal.ca.

4.8.3.5 *Deposits of Drugs and Pesticides*

During 2016–2019, MCE has used pest management products at its sea farms in BMA 1 including bath treatments (Azamethiphos and Hydrogen Peroxide), and in-feed treatments (Emamectin Benzoate and Ivermectin) (Table 4.23). These products have all been approved for use in Canada and three are registered with Health Canada (Azamethiphos, Hydrogen Peroxide and Emamectin Benzoate) while Ivermectin is available through Health Canada's EDR program. All applications are under the control of the DAV and only applied by individuals that have received training and licensing for the application.

During 2016, 2017 and 2019 fish at both active sea farms received treatment from pesticide (bath) and drugs (in-feed) for sea lice. As per the AAR, the total amounts (kg) of each treatment were reported to DFO (Table 4.23).

Table 4.23. Summary of deposits of pesticides and drugs at sea farms in the Mal Bay BMA (2016–2022).

BMA	Sea Farm	Year	Bath Treatment		In-Feed Treatment		
			Azamethiphos (Salmosan) (kg)	Hydrogen Peroxide (kg)	Emamectin Benzoate (Slice) (kg)	Florfenicol (Aquaflor) (kg)	Ivermectin (Ivomec)(kg)
1	Foshie's Cove	2016	0.75		1.14	30.00	0.22
1	Foshie's Cove	2017	56.25		10.71		
1	Foshie's Cove	2019	0.90		0.68		
1	The Hobby	2016				81.55	0.37
1	The Hobby	2017	26.25		8.20		
1	The Hobby	2019	0.80		0.12		

Source: National Aquaculture Public Reporting Data Website (2024)[13].
Notes:
At the time of writing 2023 and 2024 data not available.

[13] https://open.canada.ca/data/en/dataset/288b6dc4-16dc-43cc-80a4-2a45b1f93383

4.9 Exposure Zone Modelling

4.9.1 PEZ Modelling

DFO has not conducted PEZ modelling for BMA 1 sea farms.

4.9.2 Dispersion Modelling

Dispersion modelling by BMT was undertaken to model exposure zones of Azamethiphos (bath treatment) in a worst-case scenario approach (see Appendix B). The modelling study estimated an exposure profile for the entire BMA assuming sea farms were treated in sequence and concentrations were modelled from the first treatment at Benny's Cove sea cages (7 May 2023 for spring tide; 19 June 2023 for neap tide) through final treatment at The Hobby sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 4.24).

Table 4.24. Treatment schedule (assumed dates) for sea farms in BMA 1 during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
Benny's Cove	1	7 May 2023	-240	19 Jun 2023	-240
	2	8 May 2023	-219	20 Jun 2023	-219
	3	8 May 2023	-216	20 Jun 2023	-216
	4	9 May 2023	-195	21 Jun 2023	-195
	5	9 May 2023	-192	21 Jun 2023	-192
	6	10 May 2023	-171	22 Jun 2023	-171
	7	10 May 2023	-168	22 Jun 2023	-168
Foshie's Cove	1	11 May 2023	-147	23 Jun 2023	-147
	2	11 May 2023	-144	23 Jun 2023	-144
	3	12 May 2023	-123	24 Jun 2023	-123
	4	12 May 2023	-120	24 Jun 2023	-120
	5	13 May 2023	-99	25 Jun 2023	-99
	6	13 May 2023	-96	25 Jun 2023	-96
	7	14 May 2023	-75	26 Jun 2023	-75
The Hobby	1	14 May 2023	-72	26 Jun 2023	-72
	2	15 May 2023	-51	27 Jun 2023	-51
	3	15 May 2023	-48	27 Jun 2023	-48
	4	16 May 2023	-27	28 Jun 2023	-27
	5	16 May 2023	-24	28 Jun 2023	-24
	6	17 May 2023	-3	29 Jun 2023	-3
	7	17 May 2023	0	29 Jun 2023	0

Exposure zone modelling of a worst-case scenario for Azamethiphos use in the Mal Bay BMA predicted maximum areas of 4.45 km^2 and 2.56 km^2 during neap and spring tides, respectively, where Azamethiphos concentrations exceeded 100 ng/L (0.1 µg/L) during the treatment duration. The maximum Azamethiphos concentration for the Mal Bay BMA was predicted as 740 ng/L during the simulated neap tide and 670 ng/L during the spring tide. The peak concentration occurred during the treatments of the first sea farm, Benny's Cove, and rapidly decreased shortly after treatments were completed; concentration levels 72 hrs after final treatment were below 100 ng/L (Figures 4.26 and 4.27). The maximum area within BMA 1 where Azamethiphos concentrations exceeded 100 ng/L was larger during the neap tide scenario (4.45 km^2) than during the spring tide scenario (2.56 km^2). The smaller affected area during a spring tide simulation is likely attributable to more extensive mixing and flushing from stronger tidal currents during the spring tide cycle. The increased water movement during this tide cycle can disperse the bath treatment more effectively thereby reducing its concentration and the affected zone.

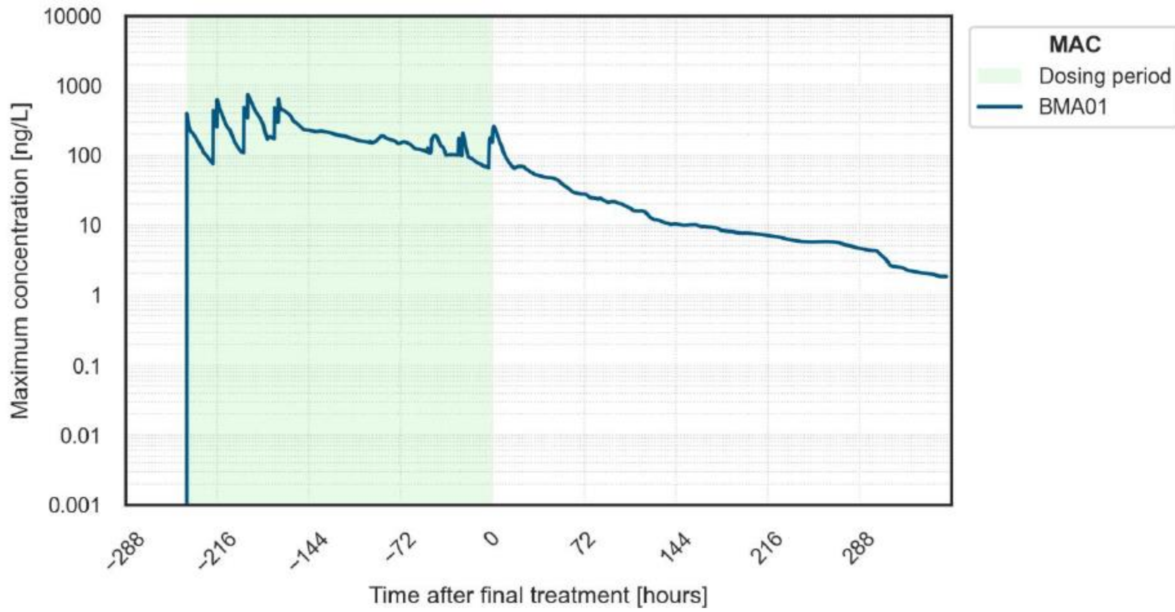


Figure 4.26. Maximum concentrations for Mal Bay during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at Benny's Cove (assumed 19 June 2023) and final treatment was at The Hobby (time=0; assumed 29 June 2023).

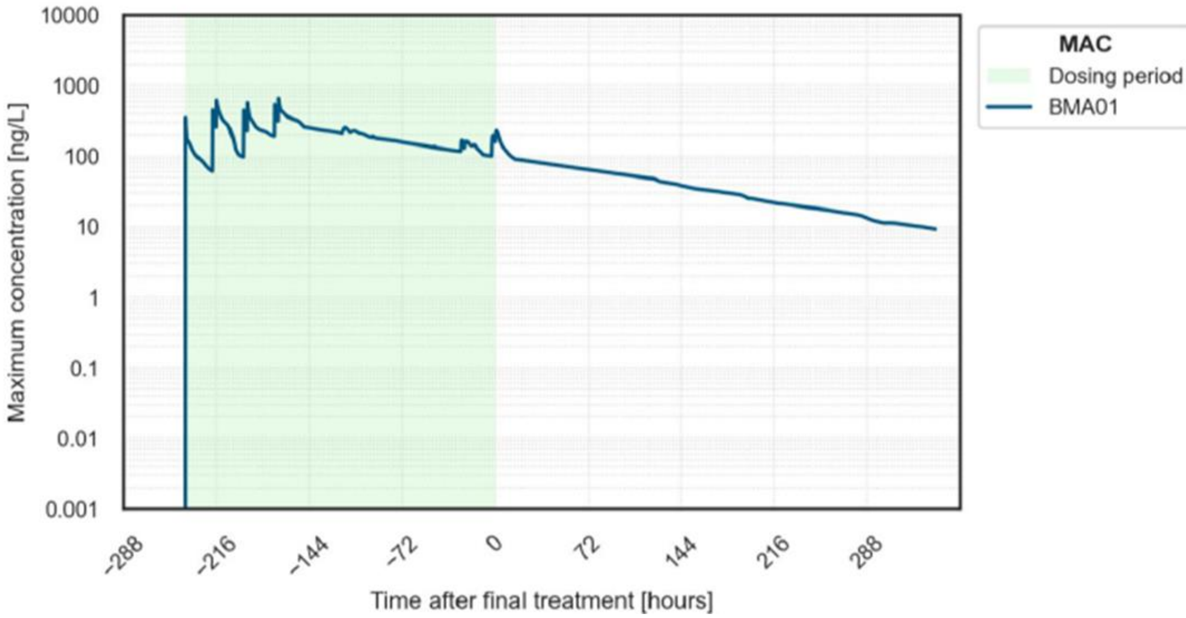


Figure 4.27. Maximum concentrations for Mal Bay during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at Benny's Cove (assumed 7 May 2023) and final treatment was at The Hobby (time=0; assumed 17 May 2023).

5.0 Rencontre East (BMA 2)

The Rencontre East BMA (BMA 2) is located in the Bays East Area and includes four licensed sea farms: Deep Water Point, Rencontre East Island, Old Woman's Cove, and Little Burdock Cove (Table 5.1; Figure 5.1). The closest community to these sea farms is Rencontre East, which is accessible by ferry. Three of the sea farms are located in relatively close proximity whereas the Old Woman's Cove sea farm is located approximately 10 km to the west in Belle Harbour. All sea farms in BMA 2 have been previously stocked. Little Burdock was most recently stocked in June 2024, and the other sea farms are fallow at the time of writing. There are three sea farms owned by Cold Ocean Salmon Inc. located south of MCE's Old Woman's Cove sea farm.

Table 5.1. Rencontre East (BMA 2) sea farm locations and construction status in 2024.

BMA Name	BMA No.	Sea Farm Name	AQ Licence No.	Site Coordinates		Construction Status
				Latitude (ºN)	Longitude (ºW)	
Rencontre East	2	Deep Water Point	1080	47.65319	-55.23769	Existing
		Rencontre East Island	1081	47.63219	-55.21650	Existing
		Old Woman's Cove	1082	47.67269	-55.33169	Existing
		Little Burdock Cove	1083	47.63831	-55.23400	Existing

The sea farms in Rencontre East were originally designed with a 3x8, 2x7, 2x8, or 2x9 sea cage array with a net circumference of 90–100 m and a depth of 15 m. Beyond 2025, sea cage systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The maximum number of fish per site ranges from 525,000–900,000 with a maximum stocking density of 15 kg/m^3.

The water depths below the leases ranges from 3–115 m (Table 5.2). The shallowest sea farm is Rencontre East Island where depths range from 3–42 m. Sea farms have bottom sediments consisting of mixed substrates. All sites were classified with the majority having hard substrates with some mixed substrates including silt, sand, or mud for an overall site classification of hard bottom.

Currents were reported at near surface, upper, mid-water, and near bottom depths. In summer, at 15 m water depth, the maximum water current speed at each site was four to nine times the mean speed (Table 5.2). There is much vertical variation in the maximum current speed and this variation is larger than for the mean current speeds.

Benthic habitat surveys revealed that the predominate flora and fauna at sea farms are seaweed, anemone, coralline algae, scallops, and cunners. Several stations in the Deep Water Point (3 of 50 stations with data), and Old Woman Cove (2 of 40 stations with data) sea farms contained soft corals. There were several kelp beds identified outside of the lease boundaries.

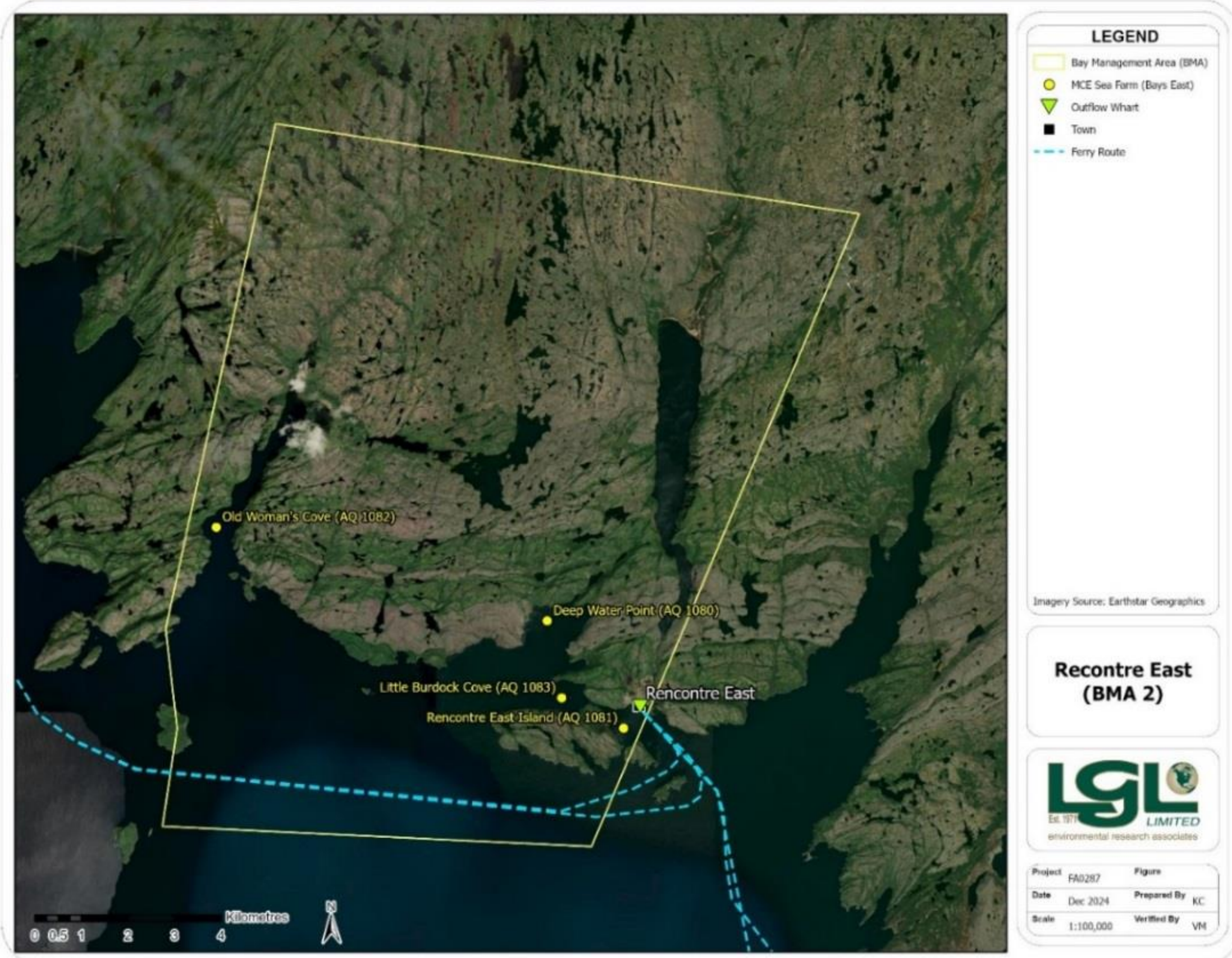


Figure 5.1. Locations of sea farms in the Rencontre East BMA.

Table 5.2. Summary of site-specific sea farm characteristics in Rencontre East (BMA 2).

Characteristic	Sea Farm			
	Deep Water Point	Rencontre East Island	Old Woman's Cove	Little Burdock Cove
Lease Area (ha)	36	28	19	21
Water depth under lease (m)	41–155	3–42	6–115	5–61
Water depth under sea cages (m)	43–111	34–42	58–96	37–57
Predominant Bottom Type	Hard bottom	Hard bottom	Hard bottom	Hard bottom
Water Temperature (Mean °C at 15 m)				
Winter [a]	2.9	1.3	n/a	2.6
Spring [a]	5.3	3.7	n/a	5.0
Summer [a]	13.7	10.8	n/a	12.7
Fall [a]	10.4	7.7	n/a	9.0
Dissolved Oxygen (Mean mg/L at 15 m)				
Winter [a]	10.9	12.4	n/a	10.8
Spring [a]	10.9	11.6	n/a	10.8
Summer [a]	8.5	8.3	10.1[b]	8.2
Fall [a]	8.8	9.3	n/a	9.2
Currents (cm/s at 15 m) in Summer				
Mean	1.5	2.2	1.9	2.2
Maximum	7.8	12.8	7.8	18.6

Notes:

[a] Winter includes January, February, and March; Spring includes April, May, and June; Summer includes July, August, and September; and Fall includes October, November, and December.

[b] The Old Woman's Cove sea farm data are only available for 5 m.

See Tables 5.8, 5.9 and 5.10 for water temperature, dissolved oxygen, and salinity data collection dates for each Rencontre East BMA sea farm, respectively. Water depth values may vary by approximately ± 2 m depending on tidal influence

Seasonal water temperatures at 15 m water depth were similar across sea farms with available data, though the Rencontre East Island sea farm was slightly cooler (see Table 5.2). Mean water temperatures ranged from 1.1°C in winter at Rencontre East Island to 17.2°C in summer at the Little Burdock Cove sea farm. Dissolved oxygen levels were consistently lower in summer and fall than winter and spring with Rencontre East Island generally having the highest average dissolved oxygen levels relative to the other sea farms in this BMA. Salinity was fairly consistent across sea farms and seasons with averages ranging from 28.0–31.6 ppt.

During 2009–2018, average monthly wind speeds ranged from 5.48 m/s in July to 10.8 m/s in January. The maximum wind speed during this period was 21.43 m/s in February. Wind direction in the Rencontre East BMA was predominately westerly. Mean wave height from 2009–2018 ranged from 0.27 m in July to 0.73 m in December/January. The maximum wave height was 1.85 m in February.

5.1 Sea Farm Site Maps

The MCE sea farms in the Rencontre East BMA were originally designed with either a 3x8, 2x7, 2x8, or 2x9 sea cage array with a net circumference of 90–100 m and a depth of 15 m. Beyond 2025, sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The sea farms in the Rencontre East BMA are currently third -party certified or will be prior to future stocking [as per FFA policy (FFA 2019)].

5.1.1 Deep Water Point

As originally designed, the Deep Water Point sea farm has a 3x8 sea cage array with a net circumference of 90–100 m and an original depth design of 15 m (Figure 5.2).

5.1.2 Rencontre East Island

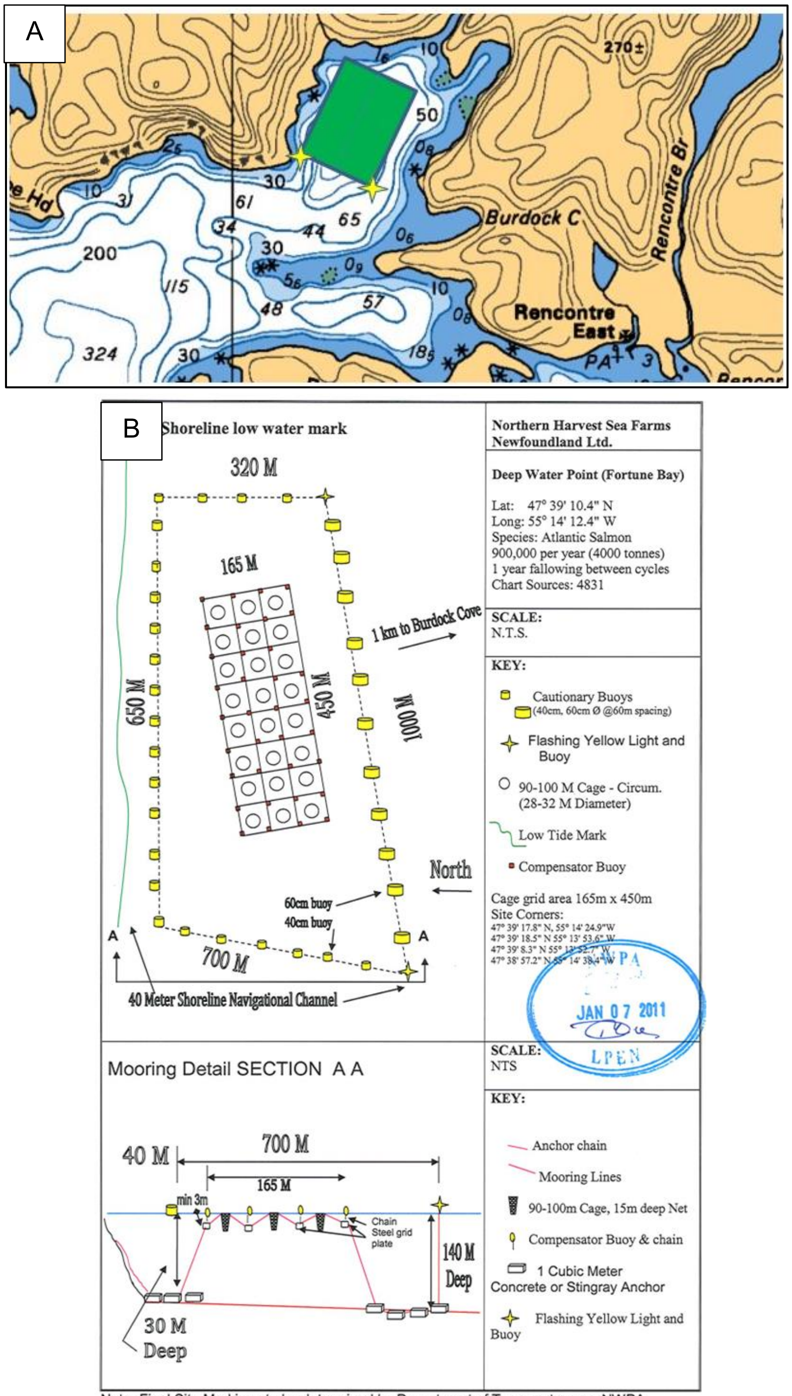
As originally designed, the Rencontre East Island sea farm has a 2x9 sea cage array with a net circumference of 90–100 m and an original depth design of 15 m (Figure 5.3).

5.1.3 Old Woman's Cove

As originally designed, the Old Woman's Cove sea farm has a 2x8 sea cage array with a net circumference of 90–100 m and an original depth design of 15 m (Figure 5.4).

5.1.4 Little Burdock Cove

As originally designed, the Little Burdock Cove sea farm has a 2x7 sea cage array with a net circumference of 90–100 m and an original depth design of 15 m (Figure 5.5). At the time of writing the sea cage depths at Little Burdock are 20m.



Note: Final Site Markings to be determined by Department of Transport as per NWPA

Figure 5.2. Deep Water Point (A) sea farm map and (B) sea cage layout.

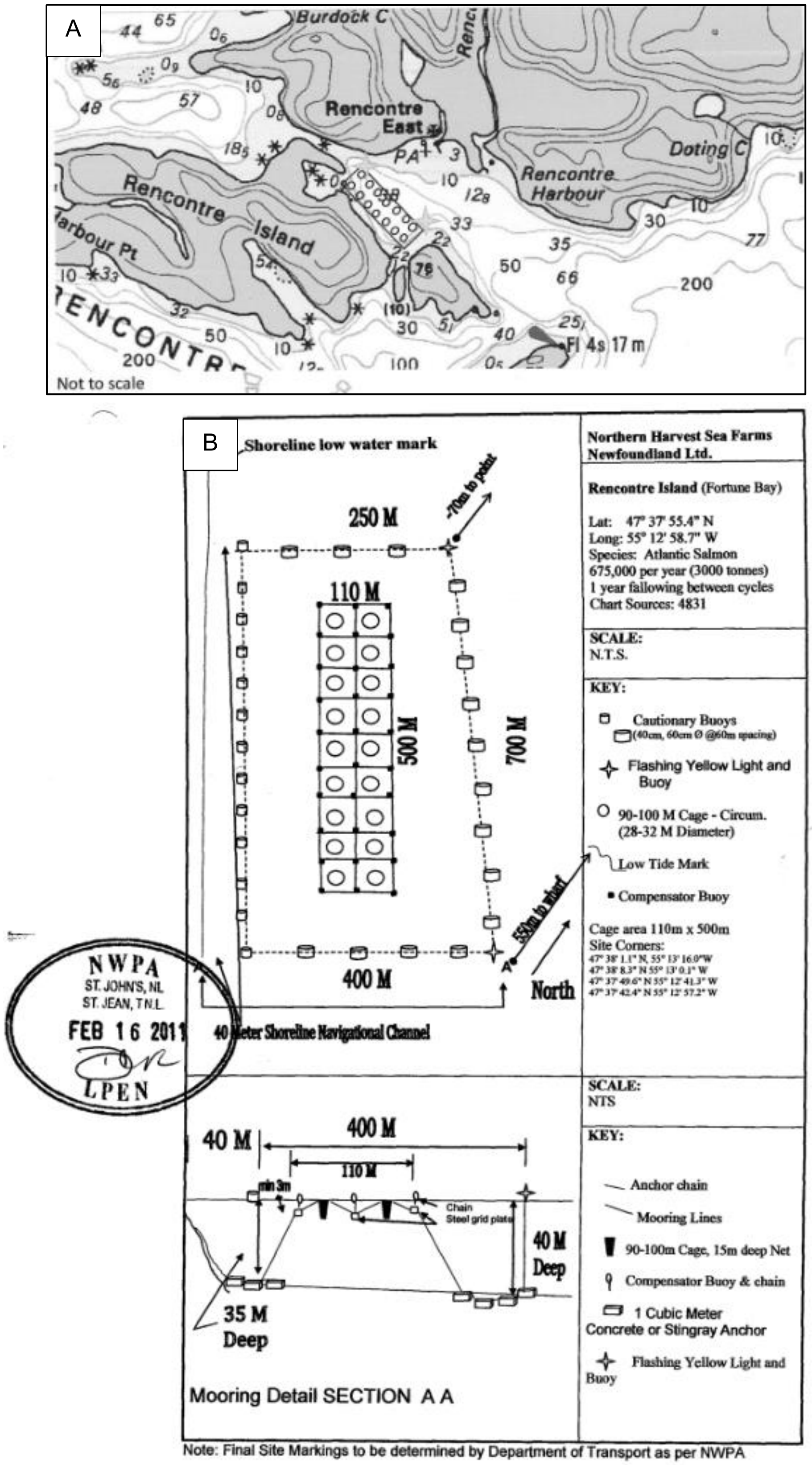


Figure 5.3. Rencontre East Island (A) sea farm map and (B) sea cage layout.

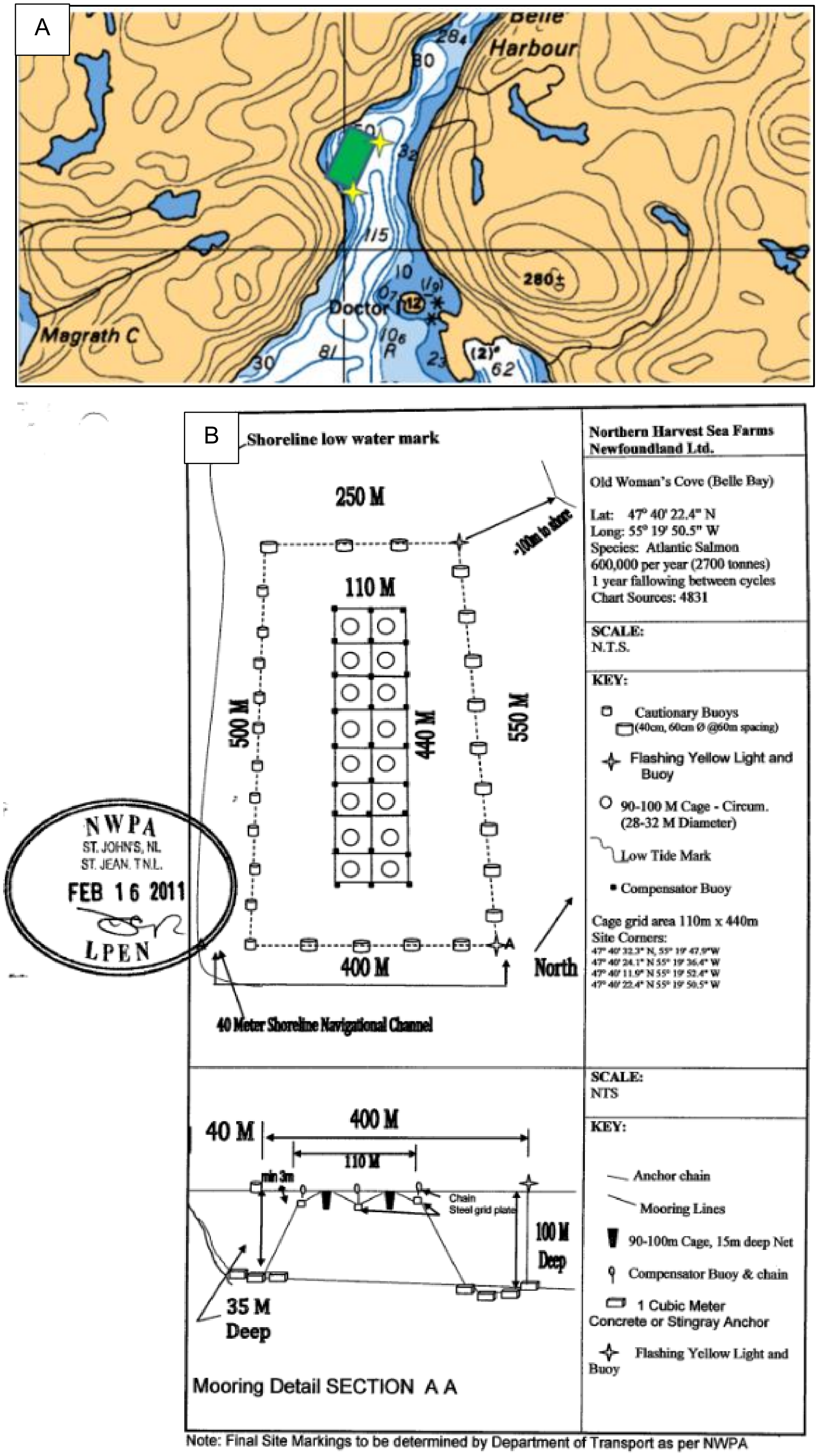


Figure 5.4. Old Woman's Cove (A) sea farm map and (B) details of sea cage layout.

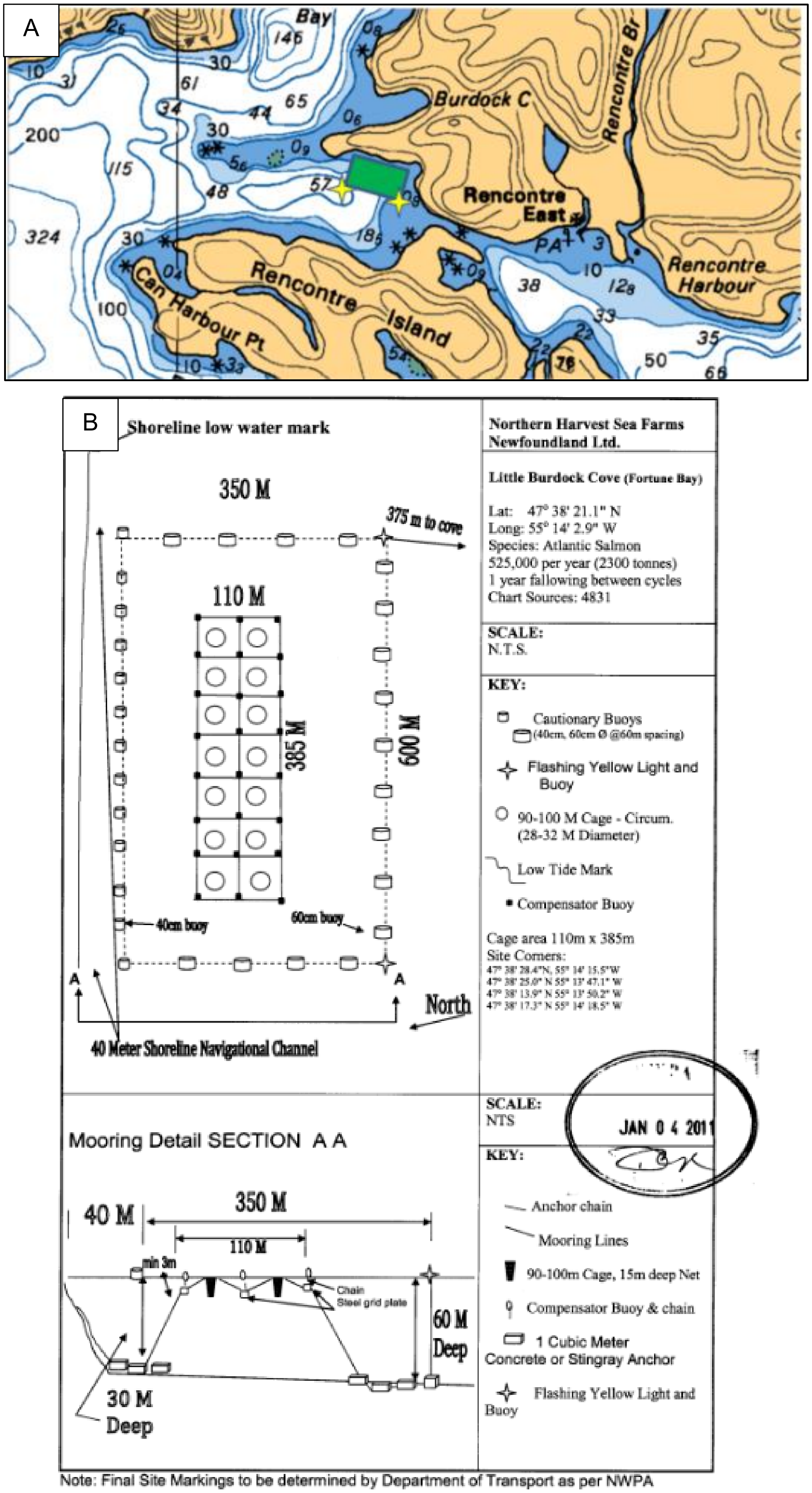


Figure 5.5. Little Burdock Cove (A) sea farm map and (B) details of sea cage layout.

5.2 Benthic Surveys

Benthic surveys at sea farms in the Rencontre East BMA were conducted in June and July 2010, prior to enactment of the AAR. Video observations were not made at water depths >100 m and stations categorized as hard bottom appeared hard visually or did not produce acceptable grab samples.

5.2.1 Deep Water Point

Based on surveys at 50 of the 74 sampling stations (32% (n=24) were too deep (>100 m) to sample), the composition of the seafloor in the Deep Water Point sea farm is primarily cobble, boulders, and bedrock with a thin layer of silt at some deeper stations (Figure 5.6; Table 5.3). The majority of stations (49 of 50 with data) were considered hard bottom. The predominant species observed included seaweed, anemone, coralline algae, scallops, and cunners (Table 5.3). Soft coral was observed at three stations.

5.2.2 Rencontre East Island

Based on surveys at 54 sampling stations, the composition of the seafloor in the Rencontre East Island sea farm is primarily cobble and sand, with mud at some deeper stations (Figure 5.7; Table 5.4). The majority of stations (49 of 54) were considered hard bottom. The predominant species observed included seaweed, scallops, and cunners (Table 5.4).

5.2.3 Old Woman's Cove

Based on surveys at 40 of the 49 sampling stations (~18% (n=9) were too deep (>100 m) to sample or the bottom was not visible because of kelp beds. The composition of the seafloor in the Old Woman's Cove sea farm is primarily cobble, boulders, and bedrock with a layer of silt and mud at some deeper stations (Figure 5.8; Table 5.5). The majority of stations (39 of 40 with data) were considered hard bottom. The predominant species observed included seaweed, anemones, and cunners (Table 5.5). Soft coral was observed at two stations. Three kelp beds were present near the shoreline.

5.2.4 Little Burdock Cove

Based on surveys at 51 of 54 stations (the bottom was not visible because of kelp beds at three stations), the composition of the seafloor in the Little Burdock Cove sea farm is primarily cobble, boulders, and bedrock with silt and mud at some deeper stations (Figure 5.9; Table 5.6). The majority of sampling stations (48 of 51 with data) were considered hard bottom. The predominant species observed included seaweed, anemones, and cunners (Table 5.6). Three kelp beds were present near the shoreline.

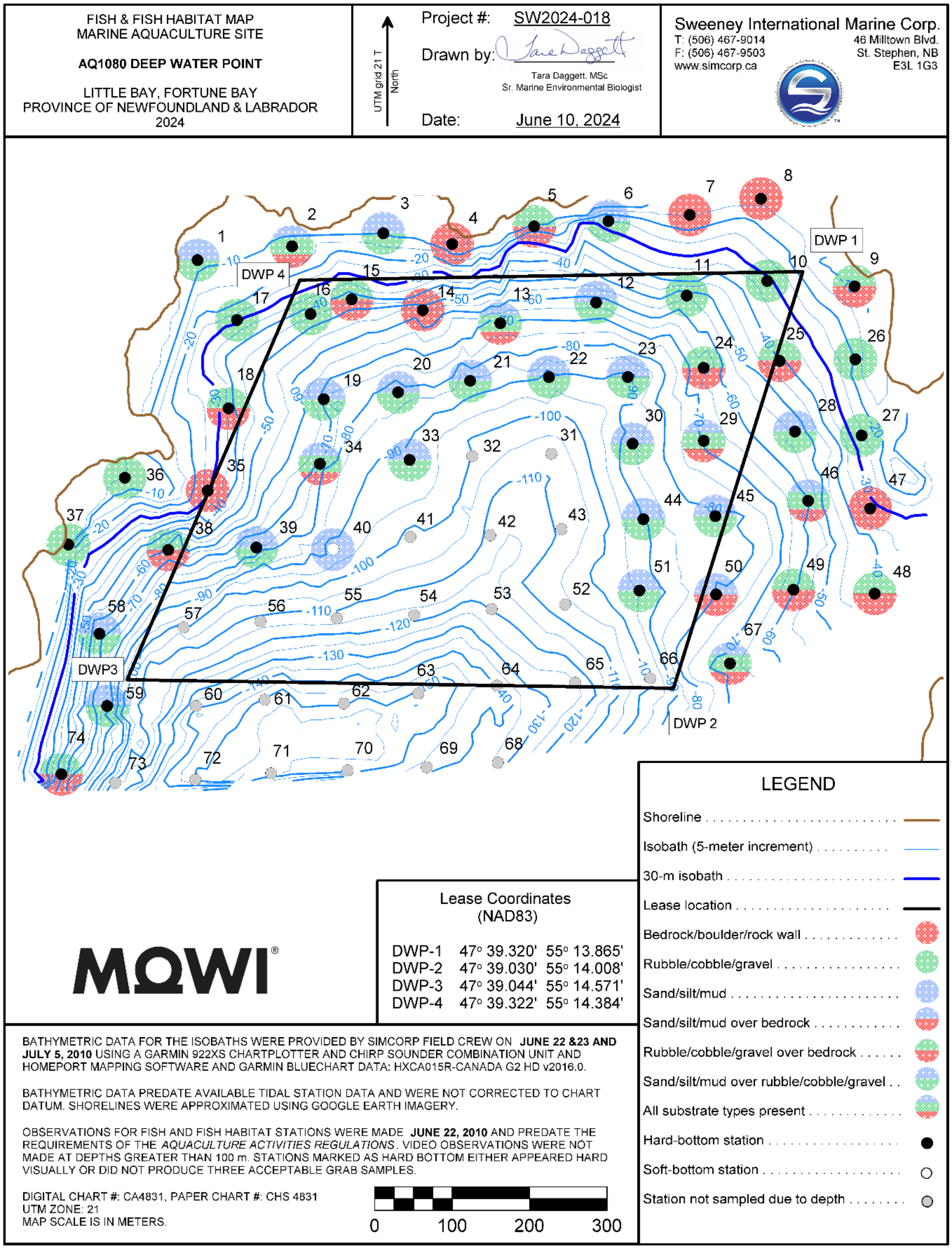


Figure 5.6. Habitat observations at sampling stations in the Deep Water Point sea farm (June and July 2010).

Table 5.3. Summary of bottom type and observed flora and fauna at the Deep Water Point sea farm (June–July 2010).

Deep Water Point																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
DWP	1	47 39.338	55 14.489	8	Hard					70%		30%				shell debris (s), kelp (p), cunners	N
DWP	2	47 39.346	55 14.391	12	Hard			40%		20%		40%				kelp (p), cunners	N
DWP	3	47 39.354	55 14.297	11	Hard					40%		60%				kelp (p), cunners	N
DWP	4	47 39.345	55 14.226	4	Hard		x									stringy seaweed (s), kelp (p), cunners	N
DWP	5	47 39.356	55 14.141	15	Hard			80%		20%						kelp (p), cunners	N
DWP	6	47 39.359	55 14.064	23	Hard					30%		70%				shell debris (p), kelp (s)	N
DWP	7	47 39.362	55 13.980	12	Hard		x									kelp (p), stringy seaweed (s), cunners	N
DWP	8	47 39.372	55 13.906	12	Hard			x								kelp (p), stringy seaweed (s), cunners	N
DWP	9	47 39.309	55 13.812	12	Hard			70%		30%						kelp (p), shell debris (s), cunners, scallops (f)	N
DWP	10	47 39.314	55 13.902	27	Hard					60%	40%					shell debris (s), kelp (s), scallops (f)	N
DWP	11	47 39.305	55 13.985	51	Hard					70%	30%					shells (f)	N
DWP	12	47 39.302	55 14.079	59	Hard					60%		40%				shells (f), anemones (f)	N
DWP	13	47 39.289	55 14.178	68	Hard			x		40%		60%				anemones (s), shells (f)	N
DWP	14	47 39.299	55 14.258	52	Hard		x						x			anemones (p), coralline algae (f)	N
DWP	15	47 39.308	55 14.331	45	Hard			x		60%	40%					shells (f), coralline algae (s)	N
DWP	16	47 39.298	55 14.374	48	Hard					70%	30%					shells (f), scallop (s)	N
DWP	17	47 39.295	55 14.450	28	Hard					50%	50%					shells (f), seaweed (s), scallops (r)	N
DWP	18	47 39.233	55 14.461	38	Hard			x		40%	60%					seaweed (s), coralline algae (s), shells (f)	N
DWP	19	47 39.238	55 14.362	71	Hard					60%		40%				anemones (s), seaweed	Y
DWP	20	47 39.242	55 14.285	82	Hard					20%			80%			anemones (p)	Y
DWP	21	47 39.249	55 14.211	86	Hard					10%			90%			anemones (p), shells (r)	Y
DWP	22	47 39.250	55 14.129	90	Hard					30%			70%			anemones (s)	Y
DWP	23	47 39.249	55 14.048	90	Hard					10%			90%			anemones (s), kelp (r)	Y
DWP	24	47 39.254	55 13.969	63	Hard		x			60%	40%					anemones (s), shells (f)	N
DWP	25	47 39.258	55 13.891	42	Hard		x			60%	40%					seaweed (p)	Y
DWP	26	47 39.258	55 13.813	19	Hard					90%	10%					kelp (p)	N
DWP	27	47 39.204	55 13.808	25	Hard					95%	5%					kelp (s), shells (f)	N
DWP	28	47 39.208	55 13.877	55	Hard					70%		30%				scallops (f), seaweed (r)	N
DWP	29	47 39.203	55 13.971	68	Hard		x	x		30%		70%				anemones (s), coralline algae (s)	N
DWP	30	47 39.202	55 14.045	85	Hard					20%		80%				anemones (f)	N
DWP	31	47 39.196	55 14.129	106	TDTS											TDTS	N
DWP	32	47 39.196	55 14.210	103	TDTS											TDTS	N
DWP	33	47 39.194	55 14.275	90	Hard					10%			90%			anemones (s), soft coral (r)	Y
DWP	34	47 39.193	55 14.368	70	Hard			x		30%			70%			anemones (s)	N
DWP	35	47 39.176	55 14.484	27	Hard		x	x								red seaweed (p)	N
DWP	36	47 39.186	55 14.569	5	Hard					70%	30%					stringy seaweed (s), shells (f), cunners	N
DWP	37	47 39.140	55 14.629	11	Hard					40%	60%					seaweed (p), cunners, shells (f)	N
DWP	38	47 39.135	55 14.526	46	Hard			60%		20%	20%					anemone (f), shells (s), coralline algae (f)	N
DWP	39	47 39.135	55 14.435	76	Hard					30%		70%				anemones (s), shells (s)	Y
DWP	40	47 39.133	55 14.356	89	Soft							100%				anemones (s), soft coral (f)	Y
DWP	41	47 39.140	55 14.276	101	TDTS											TDTS	N
DWP	42	47 39.140	55 14.194	110	TDTS											TDTS	N
DWP	43	47 39.143	55 14.120	109	TDTS											TDTS	N
DWP	44	47 39.149	55 14.035	89	Hard					10%		90%				anemones (s)	Y
DWP	45	47 39.150	55 13.961	78	Hard					10%		90%				seaweed (f), anemones (s)	Y
DWP	46	47 39.159	55 13.865	52	Hard			20%		30%		50%				anemones (s)	N
DWP	47	47 39.153	55 13.801	32	Hard		x									seaweed (p)	N
DWP	48	47 39.093	55 13.798	40	Hard		x	x		50%						seaweed (s), scallops (r), kelp (s)	N
DWP	49	47 39.097	55 13.882	62	Hard			x		50%	50%					coralline algae (s)	N
DWP	50	47 39.095	55 13.962	79	Soft		x					70%				anemones (s), soft coral (r)	N

Deep Water Point																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
DWP	51	47 39.099	55 14.041	93	Hard					20%		30%				anemones (s), soft coral (r)	Y
DWP	52	47 39.090	55 14.118	106	TDTS											TDTS	N
DWP	53	47 39.088	55 14.194	117	TDTS											TDTS	N
DWP	54	47 39.085	55 14.274	116	TDTS											TDTS	N
DWP	55	47 39.084	55 14.354	113	TDTS											TDTS	N
DWP	56	47 39.083	55 14.433	113	TDTS											TDTS	N
DWP	57	47 39.080	55 14.512	103	TDTS											TDTS	N
DWP	58	47 39.077	55 14.599	66	Hard					50%			50%			coralline algae (r), shells (f)	N
DWP	59	47 39.026	55 14.593	87	Hard					40%			60%			shells (f), algae (r)	Y
DWP	60	47 39.025	55 14.501	142	TDTS											TDTS	N
DWP	61	47 39.028	55 14.430	153	TDTS											TDTS	N
DWP	62	47 39.024	55 14.349	151	TDTS											TDTS	N
DWP	63	47 39.030	55 14.272	152	TDTS											TDTS	N
DWP	64	47 39.034	55 14.190	137	TDTS											TDTS	N
DWP	65	47 39.035	55 14.109	126	TDTS											TDTS	N
DWP	66	47 39.037	55 14.032	102	TDTS											TDTS	N
DWP	67	47 39.046	55 13.949	70	Hard				x	40%			60%			anemones (p), shells (f), kelp (r), coralline algae (s)	Y
DWP	68	47 38.980	55 14.191	134	TDTS											TDTS	N
DWP	69	47 38.978	55 14.265	144	TDTS											TDTS	N
DWP	70	47 38.977	55 14.346	155	TDTS											TDTS	N
DWP	71	47 38.976	55 14.425	155	TDTS											TDTS	N
DWP	72	47 38.973	55 14.504	150	TDTS											TDTS	N
DWP	73	47 38.972	55 14.586	105	TDTS											TDTS	N
DWP	74	47 39.979	55 14.642	58	Hard			x		80%	20%					shells (f)	N

Notes:

[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.

n/a-not available. TDTS- too deep to sample.

x = observed substrate.

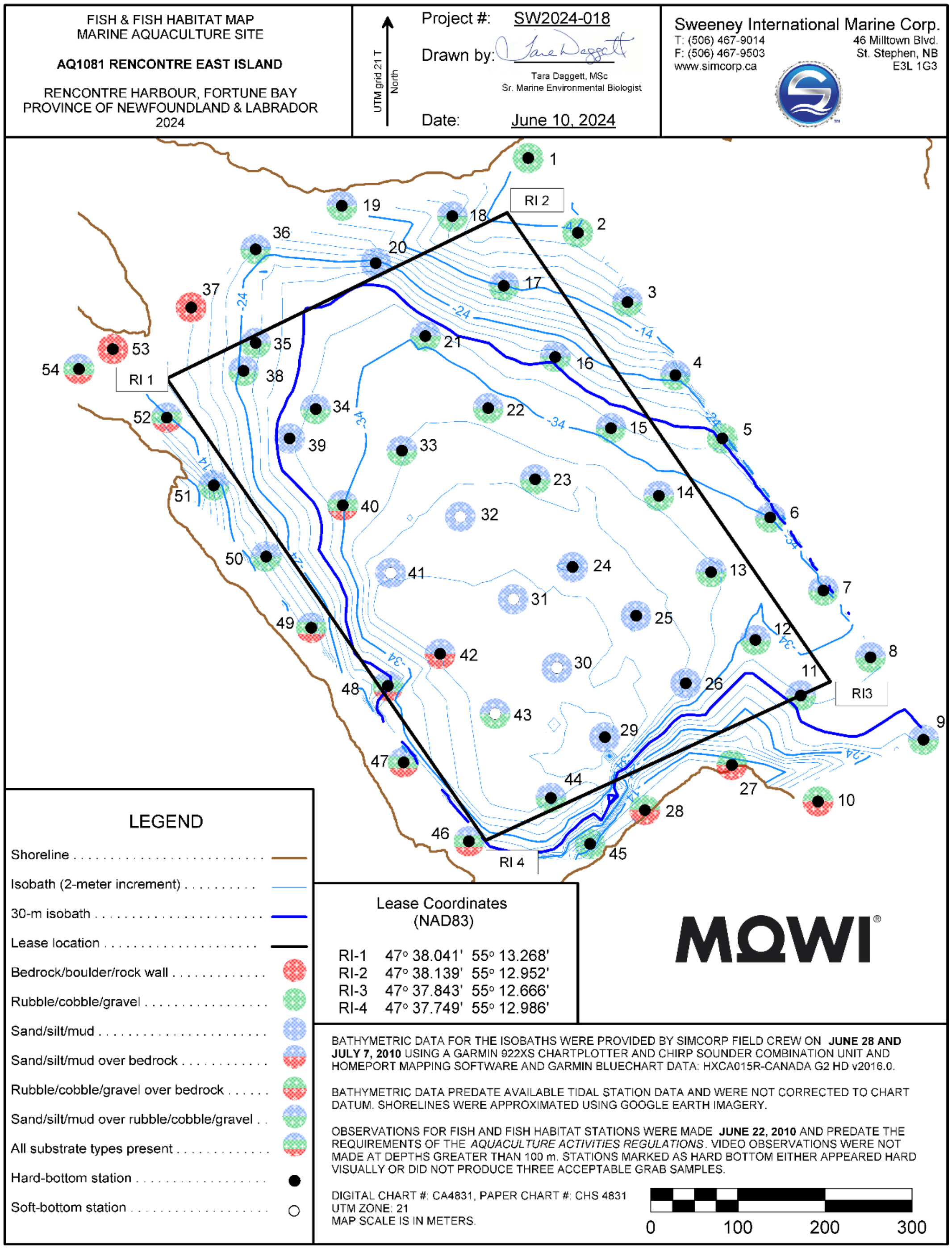


Figure 5.7. Habitat observations at sampling stations in the Rencontre East Island sea farm (June and July 2010).

Table 5.4. Summary of bottom type and observed flora and fauna at the Rencontre East Island sea farm (June–July 2010).

Rencontre East Island																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
RI	1	47 38.173	55 12.932	3	Hard					50%	80%					kelp (p), sea grass (p), shell debris (f)	N
RI	2	47 38.126	55 12.888	4	Hard					20%	80%					kelp (p), stringy seaweed (s), shell debris (f)	N
RI	3	47 38.082	55 12.844	9	Hard					10%	90%					kelp (p), stringy seaweed (p)	N
RI	4	47 38.036	55 12.802	25	Hard					30%	70%					kelp (p), scallops (f)	N
RI	5	47 37.996	55 12.760	31	Hard					20%	80%					seaweed (s), scallop (f)	N
RI	6	47 37.946	55 12.718	34	Hard					10%	70%		20%			seaweed (s), shell debris (f)	Y
RI	7	47 37.900	55 12.671	35	Hard					50%	50%					seaweed (s), shell debris (f), scallops (f)	N
RI	8	47 37.858	55 12.629	33	Hard					10%	90%					brittle star (r), kelp (p), shell debris (f)	N
RI	9	47 37.806	55 12.582	27	Hard						80%		20%			kelp (p), cod fish (f)	Y
RI	10	47 37.769	55 12.680	11	Hard			x		x						kelp (s), cunners, stringy seaweed (s)	N
RI	11	47 37.835	55 12.694	32	Hard					50%	50%					scallops (f), kelp (s)	N
RI	12	47 37.870	55 12.734	34	Hard					15%		50%	35%			seaweed (s), shell debris (f)	Y
RI	13	47 37.913	55 12.773	37	Hard					50%	50%					seaweed (f), shell debris (f), scallop (r)	N
RI	14	47 37.961	55 12.820	35	Hard					60%	40%					shell debris (f)	N
RI	15	47 38.004	55 12.862	34	Hard					40%	60%					seaweed (f), shell debris (f)	N
RI	16	47 38.049	55 12.912	29	Hard					20%		50%	30%			seaweed (s), shell debris (s), codfish	Y
RI	17	47 38.094	55 12.957	15	Hard					20%		40%	40%			seaweed (s), shell debris (f), cunners, scallops (f)	Y
RI	18	47 38.138	55 13.003	4	Hard					20%		80%				kelp (p), shell debris (f)	N
RI	19	47 38.146	55 13.104	3	Hard					20%		40%	40%			kelp (p), shell debris (f)	N
RI	20	47 38.110	55 13.074	24	Hard							50%	50%			scallops (s), shell debris (f), seaweed (s)	Y
RI	21	47 38.064	55 13.030	34	Hard					20%		50%	30%			seaweed (s), shell debris (s)	Y
RI	22	47 38.018	55 12.974	35	Hard					20%		40%	40%			shell debris (f)	Y
RI	23	47 37.973	55 12.933	37	Hard					25%	50%		25%			shell debris (f)	Y
RI	24	47 37.918	55 12.900	39	Hard							100%				shell debris (f), anemones (f), kelp (f)	Y
RI	25	47 37.887	55 12.843	38	Hard							100%				shell debris (f), anemones (r)	Y
RI	26	47 37.844	55 12.799	37	Hard							100%				shell debris (s)	Y
RI	27	47 37.793	55 12.758	7	Hard			x		x						kelp (p), stringy seaweed (p), cunners	N
RI	28	47 37.766	55 12.839	6	Hard			x		x						kelp (p), cunners, sea star	N
RI	29	47 37.812	55 12.874	42	Hard							100%				shell debris (f)	Y
RI	30	47 37.856	55 12.917	40	Soft							100%				shell debris (r), anemone (r)	Y
RI	31	47 37.899	55 12.955	40	Soft							100%				shell debris (r), seaweed (r)	Y

Rencontre East Island																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
RI	32	47 37.951	55 13.002	38	Soft							100%				seaweed (s), shell debris (f)	Y
RI	33	47 37.993	55 13.054	36	Hard					x		100%				shell debris (f), seaweed (f)	Y
RI	34	47 38.020	55 13.132	31	Hard					50%		50%				seaweed (s), scallop (f), shell debris (f)	N
RI	35	47 38.062	55 13.186	25	Hard					30%		70%				seaweed (f), kelp (p), scallops (r), shell debris (f)	N
RI	36	47 38.120	55 13.184	22	Hard					30%		40%	30%			seaweed (f), shell debris (f), scallop (r)	Y
RI	37	47 38.085	55 13.244	14	Hard		x	x								kelp (p), cunners	N
RI	38	47 38.045	55 13.198	24	Hard					30%		50%	20%			kelp (p), scallop (f)	Y
RI	39	47 38.002	55 13.157	31	Hard							100%				seaweed (f), shell debris (f), kelp (f)	Y
RI	40	47 37.960	55 13.110	34	Hard			x		60%		40%				shell debris (f), seaweed (f)	N
RI	41	47 37.917	55 13.067	38	Soft							100%				shell debris (f)	Y
RI	42	47 37.866	55 13.023	41	Hard		x	x				x				shell debris (f)	N
RI	43	47 37.828	55 12.974	41	Soft						40%	60%				shell debris (r)	Y
RI	44	47 37.775	55 12.925	40	Hard					x		100%				shell debris (f), seaweed (f)	Y
RI	45	47 37.746	55 12.890	6	Hard					50%	50%					kelp (p), cunners, shell debris (f)	N
RI	46	47 37.749	55 13.001	22	Hard		x			x		x				seaweed (p), shell debris (s)	N
RI	47	47 37.799	55 13.059	25	Hard			x		x		x				seaweed (p), shell debris (f)	N
RI	48	47 37.847	55 13.072	30	Hard			x		x		x				seaweed (s), shell debris (f), coralline algae (s), scallops (r)	N
RI	49	47 37.884	55 13.141	19	Hard			x		x		x				seaweed (s), coralline algae (s)	N
RI	50	47 37.929	55 13.181	22	Hard					70%		30%				kelp (s), seaweed (f), scallop (f), shell debris (f)	N
RI	51	47 37.974	55 13.227	11	Hard					60%		40%				kelp (p), shell debris (f), cunners	N
RI	52	47 38.017	55 13.269	11	Hard		x			30%		40%				kelp (p), shell debris (f), cunners	N
RI	53	47 38.060	55 13.317	7	Hard			x								kelp (p), cunners	N
RI	54	47 38.048	55 13.349	8	Hard			x		x		x				stringy seaweed (s), kelp (p), shell debris (s), scallops (r), cunners	N

Notes:
[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.
n/a-not available. TDTS- too deep to sample.
x = observed substrate.

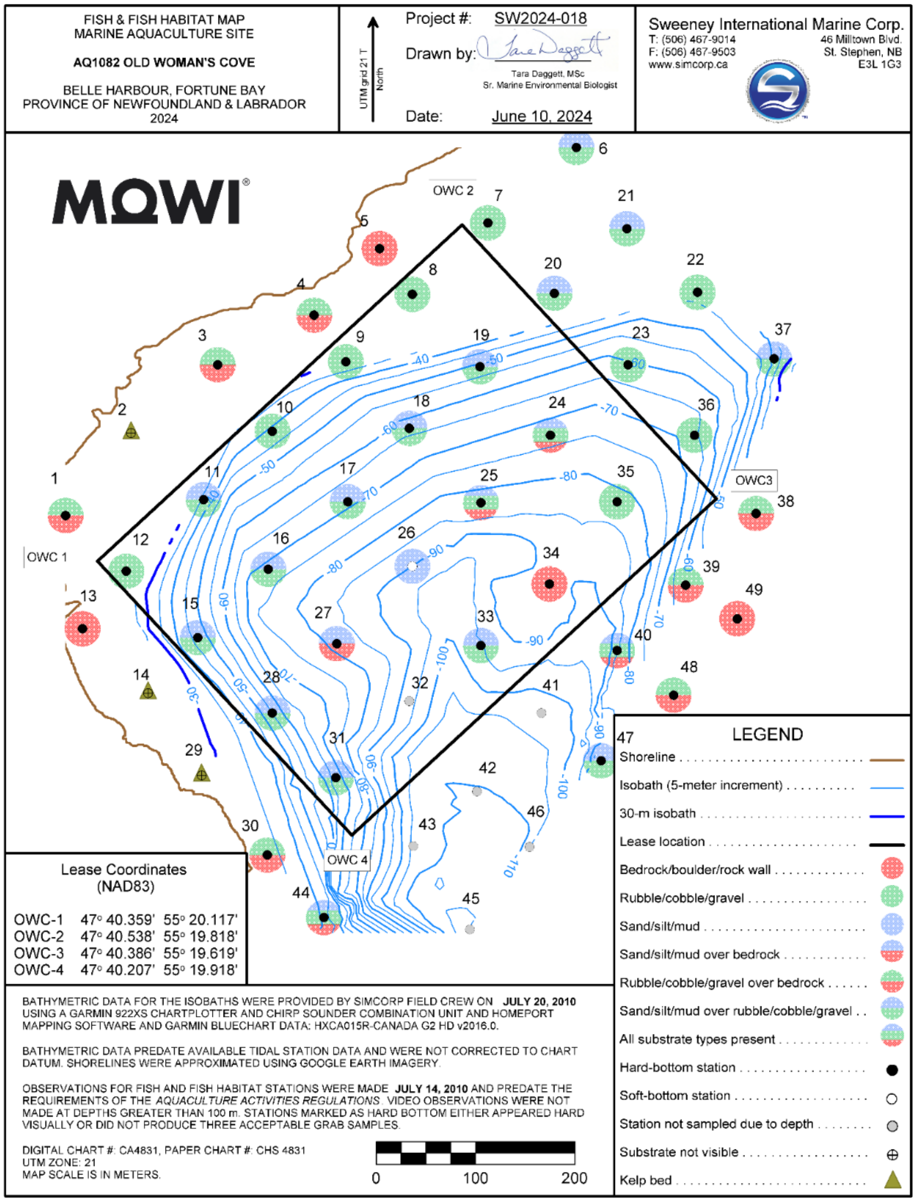


Figure 5.8. Habitat observations at sampling stations in the Old Woman's Cove sea farm (July 2010).

Table 5.5. Summary of bottom type and observed flora and fauna at the Old Woman's Cove sea farm (July 2010).

Old Woman's Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
OWC	1	47 40.385	55 20.142	6	Hard			60%		40%						seaweed (p), kelp (f), cunners, flounder	N
OWC	2	47 40.429	55 20.088	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	90% kelp coverage – difficult to see the bottom, kelp (p), seaweed (f), cunners	N
OWC	3	47 40.465	55 20.017	12	Hard		x			10%						kelp (p), seaweed (f), cunners	N
OWC	4	47 40.491	55 19.939	11	Hard		x	10%								kelp (p), seaweed (f), cunners	N
OWC	5	47 40.526	55 19.885	10	Hard		x									kelp (p), seaweed (f), cunners	N
OWC	6	47 40.579	55 19.725	13	Hard						x	x				kelp (p), seaweed (f), cunners	N
OWC	7	47 40.539	55 19.797	21	Hard				20%	60%	40%					kelp (p), cunners	N
OWC	8	47 40.501	55 19.859	36	Hard					50%	50%					kelp (s), scallop (f)	N
OWC	9	47 40.465	55 19.914	36	Hard					60%	40%	x				seaweed (r), kelp (r)	Y
OWC	10	47 40.428	55 19.974	45	Hard					50%	50%					kelp (drifting) (f), scallop (r), coralline algae (r)	N
OWC	11	47 40.392	55 20.031	50	Hard					40%		60%				scallop (r), kelp (drifting) (r), seaweed (r)	N
OWC	12	47 40.354	55 20.094	24	Hard		x		60%	40%						kelp (s), cunners	N
OWC	13	47 40.323	55 20.130	6	Hard		x									kelp (p), seaweed (r), cunners	N
OWC	14	47 40.287	55 20.079	14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	80% kelp coverage – difficult to see the bottom, kelp (p), seaweed (f), cunners	N
OWC	15	47 40.317	55 20.038	50	Hard					30%	30%	40%				kelp (drifting) (r)	Y
OWC	16	47 40.353	55 19.980	77	Medium					20%	20%		60%			anemone (f), cod (r), kelp (drifting) (r)	Y
OWC	17	47 40.389	55 19.915	75	Medium					40%			60%			anemone (f), kelp (drifting) (r)	Y
OWC	18	47 40.428	55 19.864	68	Hard					20%		80%				anemone (f)	Y
OWC	19	47 40.461	55 19.806	60	Hard					40%	30%		30%			anemone (f), kelp (drifting) (r)	Y
OWC	20	47 40.500	55 19.745	47	Hard					40%	40%		20%			shell debris (r), scallop (s), kelp (drifting) (r), coralline algae (f)	Y
OWC	21	47 40.534	55 19.686	32	Hard					10%	10%	80%				kelp (p), coralline algae (r)	Y
OWC	22	47 40.499	55 19.630	45	Hard					50%	50%					seaweed (r), kelp (r)	N
OWC	23	47 40.460	55 19.687	65	Hard					50%	50%					seaweed (r)	N
OWC	24	47 40.423	55 19.751	77	Hard			10%		40%		20%	30%			anemone (f), kelp (drifting) (f), seaweed (r), coralline algae (r)	Y
OWC	25	47 40.387	55 19.808	83	Medium			10%	20%	10%			60%			anemone (s)	Y
OWC	26	47 40.353	55 19.864	99	Medium							20%	80%			kelp (drifting) (f), holes in mud (f)	Y
OWC	27	47 40.312	55 19.926	99	Medium			10%					90%			holes in mud (f), seaweed (r)	Y

Old Woman's Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
OWC	28	47 40.275	55 19.979	57	Medium					30%	30%		40%			shell debris (r), seaweed (r), anemone (r)	Y
OWC	29	47 40.242	55 20.037	8	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	kelp coverage – difficult to see the bottom, kelp (p), cunners	N
OWC	30	47 40.198	55 19.986	15	Hard		80%			20%						kelp (p), seaweed (r), starfish (r), cunners	N
OWC	31	47 40.239	55 19.929	70	Hard					25%	25%	25%	25%			scallop (r), anemone (r), seaweed (r)	Y
OWC	32	47 40.280	55 19.869	105	TDTS											TDTS	N
OWC	33	47 40.309	55 19.810	95	Medium					20%		40%	40%			anemone (f), seaweed (r), soft coral (r), kelp (drifting) (r)	Y
OWC	34	47 40.311	55 19.814	86	Hard		90%	10%								anemone (f), soft coral (r), kelp (drifting) (r), seaweed (r)	N
OWC	35	47 40.386	55 19.698	82	Hard					60%	40%					scallop shell (f), starfish (r), anemone (r), kelp (drifting) (r)	N
OWC	36	47 40.421	55 19.635	68	Hard					60%	40%					scallop (r), seaweed (r)	N
OWC	37	47 40.462	55 19.570	39	Hard						50%	50%				seaweed (r), shell debris (r)	Y
OWC	38	47 40.378	55 19.587	22	Hard		x	20%		60%	20%					kelp (f), seaweed (f)	N
OWC	39	47 40.340	55 19.645	50	Hard		40%			30%	30%					shell debris (f), coralline algae (f), anemone (f)	N
OWC	40	47 40.305	55 19.701	88	Hard			10%		30%	30%		30%			anemone (f), shell debris (r), seaweed (r)	Y
OWC	41	47 40.272	55 19.763	101	TDTS											TDTS	N
OWC	42	47 40.230	55 19.816	110	TDTS											TDTS	N
OWC	43	47 40.201	55 19.868	104	TDTS											TDTS	N
OWC	44	47 40.163	55 19.941	39	Hard		x			40%	40%	10%				seaweed (r), coralline algae (r)	Y
OWC	45	47 40.155	55 19.824	115	TDTS											TDTS	N
OWC	46	47 40.199	55 19.775	112	TDTS											TDTS	N
OWC	47	47 40.245	55 19.716	82	Medium					25%	25%		50%			anemone (f), shell debris (f), scallop (r)	Y
OWC	48	47 40.280	55 19.656	36	Hard			20%		40%	40%					coralline algae (f), seaweed (r)	N
OWC	49	47 40.321	55 19.604	9	Hard		x	20%								seaweed (s), kelp (p), cunners	N

Notes:

[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.

n/a-not available. TDTS- too deep to sample.

x = observed substrate.

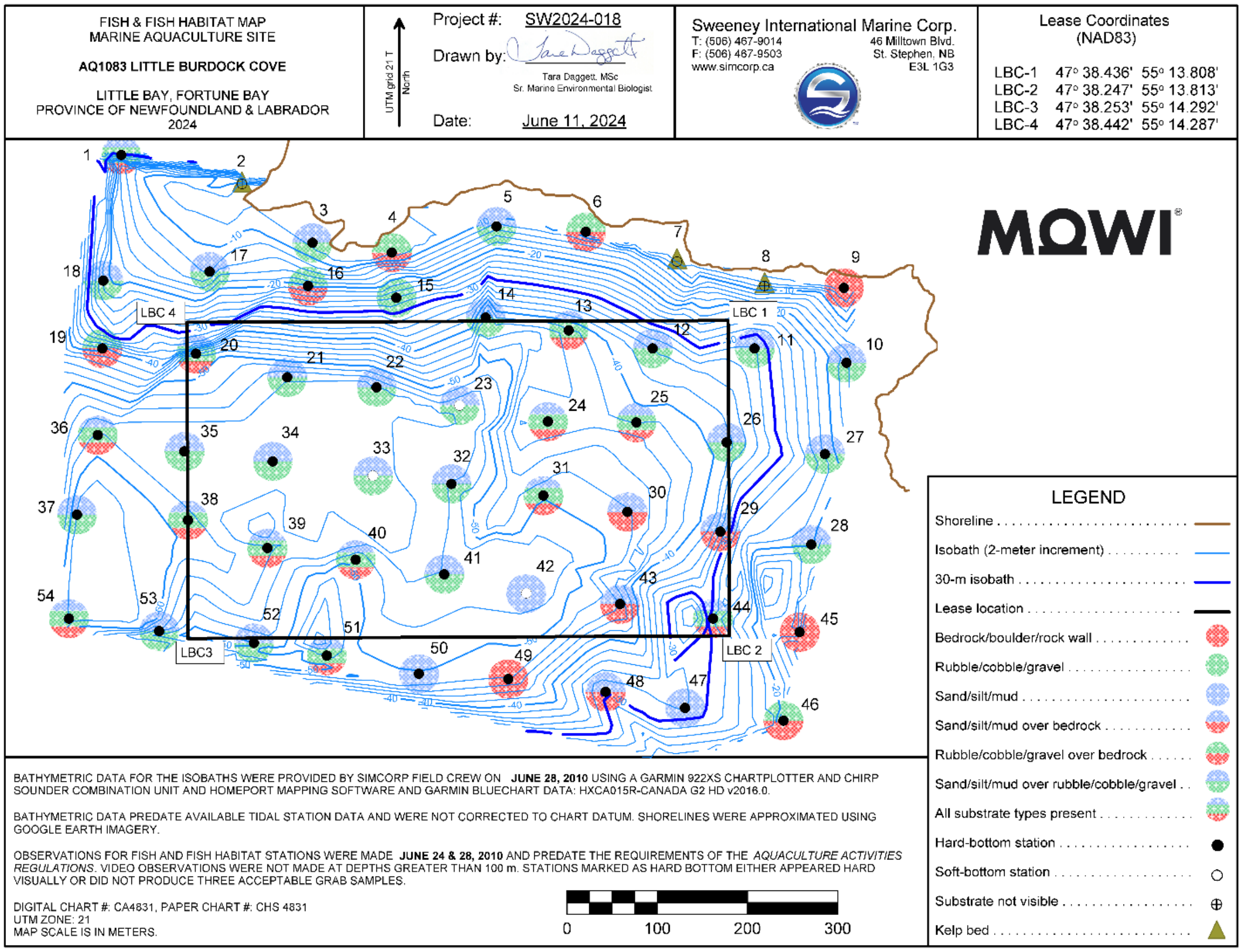


Figure 5.9. Habitat observations at sampling stations in the Little Burdock Cove sea farm (June 2010).

Table 5.6. Summary of bottom type and observed flora and fauna at the Little Burdock Cove sea farm (June 2010).

Little Burdock Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
LBC	1	47 38.543	55 14.342	17	Hard		x				x	x				kelp (p), moss (s)	N
LBC	2	47 38.524	55 14.235	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100 kelp coverage – difficult to see bottom, kelp (p), cunners	N
LBC	3	47 38.488	55 14.174	9	Hard					60	40					kelp (s), stringy seaweed (f), shell debris (f), cunners	N
LBC	4	47 38.481	55 14.104	12	Hard			x		x						kelp (s), stringy seaweed (f), cunners	N
LBC	5	47 38.495	55 14.011	12	Hard					50	50					stringy seaweed (f), kelp (s)	N
LBC	6	47 38.491	55 13.932	7	Hard			x		x						kelp (p), cunners, stringy seaweed (f)	N
LBC	7	47 38.472	55 13.852	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100 kelp coverage – difficult to see bottom, kelp (p), cunners	N
LBC	8	47 38.456	55 13.775	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100 kelp coverage – difficult to see bottom, kelp (p), stringy seaweed (s)	N
LBC	9	47 38.454	55 13.705	5	Hard		x	x								kelp (p), seaweed (s), cunners	N
LBC	10	47 38.409	55 13.704	17	Hard					50		50				seaweed (s)	N
LBC	11	47 38.419	55 13.785	32	Hard					50		50				seaweed (s), scallops (f), kelp (f)	N
LBC	12	47 38.420	55 13.875	35	Hard					60		40				seaweed (f), scallops (f)	N
LBC	13	47 38.432	55 13.949	42	Hard			10		50		40				seaweed (s), shell debris (f), scallops (f)	N
LBC	14	47 38.441	55 14.022	38	Hard					50		50				kelp (f), shell debris (f), seaweed (f)	N
LBC	15	47 38.454	55 14.101	23	Hard					70	30					kelp (f), shell debris (f), seaweed (f)	N
LBC	16	47 38.462	55 14.179	18	Hard		x			90						kelp (f), shell debris (f), seaweed (f)	N
LBC	17	47 38.472	55 14.266	12	Hard					50	50					kelp (p), shell debris (f), stringy seaweed (f), scallop (r)	N
LBC	18	47 38.468	55 14.360	20	Hard					60	40					kelp (p), shell debris (s), scallops (f)	N
LBC	19	47 38.428	55 14.362	36	Hard		x			80	20					scallops (f), seaweed (f), shell debris (f)	N
LBC	20	47 38.423	55 14.279	47	Hard			x		20		80				seaweed (f), shell debris (f)	N
LBC	21	47 38.408	55 14.199	56	Hard					x		100				sell debris (r), seaweed (r)	Y
LBC	22	47 38.401	55 14.120	57	Hard					x		100				seaweed (r)	Y
LBC	23	47 38.389	55 14.047	56	Soft					x		100				seaweed (r)	Y

<table>
<tr><th colspan="18">Little Burdock Cove</th></tr>
<tr><th colspan="2" rowspan="3">Station</th><th colspan="2">Coordinates (NAD83)</th><th rowspan="3">Depth (m)</th><th rowspan="3">Bottom Type</th><th colspan="10" rowspan="2">Bottom Type and Condition</th><th rowspan="3">Description, Comments and Observations [a]</th><th rowspan="3">Attempted Grab (Y/N)</th></tr>
<tr><th rowspan="2">Latitude</th><th rowspan="2">Longitude</th></tr>
<tr><th>Rockwall</th><th>Bedrock</th><th>Boulder</th><th>Rubble</th><th>Cobble</th><th>Gravel</th><th>Sand</th><th>Silt/Mud</th><th>Organic</th><th>Floc</th></tr>
<tr><td>LBC</td><td>24</td><td>47 38.378</td><td>55 13.969</td><td>44</td><td>Hard</td><td></td><td></td><td>X</td><td></td><td>x</td><td></td><td colspan="2">10</td><td></td><td></td><td>coralline algae (s)</td><td>N</td></tr>
<tr><td>LBC</td><td>25</td><td>47 38.376</td><td>55 13.891</td><td>44</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>seaweed (f), shell debris (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>26</td><td>47 38.363</td><td>55 13.812</td><td>39</td><td>Hard</td><td></td><td></td><td></td><td></td><td>x</td><td></td><td colspan="2">80</td><td></td><td></td><td>seaweed (f), shell debris (r), kelp (f), scallop (r)</td><td>N</td></tr>
<tr><td>LBC</td><td>27</td><td>47 38.355</td><td>55 13.725</td><td>22</td><td>Hard</td><td></td><td></td><td></td><td></td><td>20</td><td colspan="2">80</td><td></td><td></td><td></td><td>kelp (s), scallop (f), seaweed (f)</td><td>N</td></tr>
<tr><td>LBC</td><td>28</td><td>47 38.301</td><td>55 13.739</td><td>20</td><td>Hard</td><td></td><td></td><td></td><td></td><td>40</td><td colspan="2">60</td><td></td><td></td><td></td><td>kelp (p), cunners</td><td>N</td></tr>
<tr><td>LBC</td><td>29</td><td>47 38.310</td><td>55 13.819</td><td>30</td><td>Hard</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td colspan="2">40</td><td></td><td></td><td>seaweed (p)</td><td>N</td></tr>
<tr><td>LBC</td><td>30</td><td>47 38.323</td><td>55 13.901</td><td>48</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td colspan="2">100</td><td></td><td></td><td>kelp (f), shell debris (r), seaweed (f)</td><td>Y</td></tr>
<tr><td>LBC</td><td>31</td><td>47 38.334</td><td>55 13.975</td><td>50</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>seaweed (f), shell debris (r), scallop (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>32</td><td>47 38.342</td><td>55 14.056</td><td>54</td><td>Hard</td><td></td><td></td><td></td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>shell debris (r), anemone (r), seaweed (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>33</td><td>47 38.348</td><td>55 14.125</td><td>58</td><td>Soft</td><td></td><td></td><td></td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>shell debris (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>34</td><td>47 38.358</td><td>55 14.214</td><td>58</td><td>Hard</td><td></td><td></td><td></td><td></td><td>20</td><td></td><td colspan="2">80</td><td></td><td></td><td>seaweed (r), anemone (s)</td><td>Y</td></tr>
<tr><td>LBC</td><td>35</td><td>47 38.365</td><td>55 14.292</td><td>57</td><td>Hard</td><td></td><td></td><td></td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>anemones (s), shell debris (f)</td><td>Y</td></tr>
<tr><td>LBC</td><td>36</td><td>47 38.376</td><td>55 14.368</td><td>58</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td>20</td><td></td><td colspan="2">80</td><td></td><td></td><td>anemones (s), seaweed (f), shell debris (f)</td><td>Y</td></tr>
<tr><td>LBC</td><td>37</td><td>47 38.329</td><td>55 14.388</td><td>64</td><td>Hard</td><td></td><td></td><td></td><td></td><td>20</td><td></td><td colspan="2">80</td><td></td><td></td><td>anemones (p)</td><td>Y</td></tr>
<tr><td>LBC</td><td>38</td><td>47 38.324</td><td>55 14.290</td><td>57</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>anemones (s)</td><td>Y</td></tr>
<tr><td>LBC</td><td>39</td><td>47 38.306</td><td>55 14.220</td><td>57</td><td>Hard</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td colspan="2">100</td><td></td><td></td><td>anemones (s)</td><td>Y</td></tr>
<tr><td>LBC</td><td>40</td><td>47 38.298</td><td>55 14.142</td><td>53</td><td>Hard</td><td></td><td></td><td>70</td><td></td><td>x</td><td></td><td colspan="2">30</td><td></td><td></td><td>starfish (r), anemones (r)</td><td>N</td></tr>
<tr><td>LBC</td><td>41</td><td>47 38.288</td><td>55 14.064</td><td>54</td><td>Hard</td><td></td><td></td><td></td><td></td><td>20</td><td></td><td colspan="2">80</td><td></td><td></td><td>anemone (f)</td><td>Y</td></tr>
<tr><td>LBC</td><td>42</td><td>47 38.276</td><td>55 14.992</td><td>53</td><td>Soft</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">100</td><td></td><td></td><td>drifting kelp (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>43</td><td>47 38.268</td><td>55 14.909</td><td>43</td><td>Hard</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td colspan="2">100</td><td></td><td></td><td>seaweed (s), shell debris (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>44</td><td>47 38.258</td><td>55 14.827</td><td>27</td><td>Hard</td><td></td><td>10</td><td>10</td><td></td><td></td><td colspan="2">80</td><td></td><td></td><td></td><td>seaweed (s), kelp (s), shells (r)</td><td>Y</td></tr>
<tr><td>LBC</td><td>45</td><td>47 38.249</td><td>55 13.751</td><td>16</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>kelp (p), stringy seaweed (s), cunners</td><td>N</td></tr>
<tr><td>LBC</td><td>46</td><td>47 38.196</td><td>55 13.767</td><td>14</td><td>Hard</td><td></td><td>x</td><td>x</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td>kelp (p), lobster, cunners</td><td>N</td></tr>
<tr><td>LBC</td><td>47</td><td>47 38.205</td><td>55 13.854</td><td>32</td><td>Hard</td><td></td><td></td><td></td><td></td><td></td><td></td><td>50</td><td>50</td><td></td><td></td><td>seaweed (s), shells (f), anemone (r), kelp (f), scallop (r)</td><td>N</td></tr>
<tr><td>LBC</td><td>48</td><td>47 38.216</td><td>55 13.924</td><td>31</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td colspan="2">100</td><td></td><td></td><td>seaweed (s), coralline algae (f)</td><td>N</td></tr>
<tr><td>LBC</td><td>49</td><td>47 38.225</td><td>55 14.010</td><td>46</td><td>Hard</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>coralline algae (s), seaweed (s)</td><td>N</td></tr>
<tr><td>LBC</td><td>50</td><td>47 38.229</td><td>55 14.089</td><td>50</td><td>Hard</td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">100</td><td></td><td></td><td>seaweed (f)</td><td>Y</td></tr>
<tr><td>LBC</td><td>51</td><td>47 38.241</td><td>55 14.170</td><td>45</td><td>Hard</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td><td colspan="2">50</td><td></td><td></td><td>coralline algae (s)</td><td>N</td></tr>
</table>

Little Burdock Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
LBC	52	47 38.250	55 14.234	52	Hard					x		100				kelp (f), anemone (f), seaweed (f)	Y
LBC	53	47 38.258	55 14.318	54	Hard					x		100				seaweed (r)	Y
LBC	54	47 38.267	55 14.397	63	Hard			x		x		100				anemones (s)	Y

Notes:

[a] Benthic Fauna/ Flora Quantification Guide: (p)- prevalent; (s)- some; (f)- few; (r)- rare.

n/a-not available. TDTS- too deep to sample.

x = observed substrate.

5.3 Water Quality

The amount and temporal coverage of water quality data collected in the Rencontre East BMA are variable (Table 5.7). Seasonal water quality measurements at sea farms in the Rencontre East BMA are summarized in Tables 5.8, 5.9, and 5.10, for water temperature, dissolved oxygen, and salinity, respectively. Available data for Old Woman's Cove were limited to dissolved oxygen data during summer (Table 5.9).

Table 5.7. Available water quality data for the Rencontre East BMA (2019–2024).

Available Data			
Year	**Measurement**	**Depth(s) (m)**	**Month(s)**
Deep Water Point			
2019	Temperature (°C)	0.5	14 Jun–7 Sep
		1	n/a
		5	14 Jun–7 Sep
		10	n/a
		15	14 Jun–7 Sep
		20	n/a
		30	n/a
	Dissolved Oxygen (mg/L)	0.5	12 Aug–7 Sep
		1	n/a
		5	12 Aug–7 Sep
		10	n/a
		15	12 Aug–7 Sep
		20	n/a
		30	n/a
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2021	Temperature (°C)	all	27 May–31 Dec
	Oxygen (mg/L)	all	27 May–31 Dec
	Salinity (‰)	all	27 May–31 Dec
2022	Temperature (°C)	all	2 Jan–24 May
	Oxygen (mg/L)	all	2 Jan–24 May
	Salinity (‰)	all	2 Jan–24 May
2023–2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
Little Burdock Cove			
2019	Temperature (°C)	0.5	14 Jun–7 Sep
		1	n/a
		5	14 Jun–7 Sep
		10	n/a
		15	14 Jun–7 Sep
		20	n/a
		30	n/a
	Oxygen (mg/L)	0.5	12 Aug–7 Sep
		1	n/a
		5	12 Aug–7 Sep
		10	n/a
		15	12 Aug–7 Sep
		20	n/a
		30	n/a
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a

Available Data			
Year	Measurement	Depth(s) (m)	Month(s)
2021	Temperature (°C)	all	23 Jun–31 Dec
	Oxygen (mg/L)	all	23 Jun–31 Dec
	Salinity (‰)	all	23 Jun–31 Dec
2022	Temperature (°C)	all	23 Jun–31 Dec
	Oxygen (mg/L)	all	23 Jun–31 Dec
	Salinity (‰)	all	23 Jun–31 Dec
2023	Temperature (°C)	all	2 Jan–28 Mar
	Oxygen (mg/L)	all	2 Jan–28 Mar
	Salinity (‰)	all	2 Jan–28 Mar
2024	Temperature (°C)	all	11 May–8 Jul
	Oxygen (mg/L)	all	11 May–8 Jul
	Salinity (‰)	all	11 May–8 Jul
Rencontre Island			
2019	Temperature (°C)	0.5	14 Jun–31 Dec
		1	3 Sep–31 Dec
		5	14 Jun–31 Dec
		10	3 Sep–31 Dec
		15	14 Jun–31 Dec
		20	3 Sep–31 Dec
		30	n/a
	Oxygen (mg/L)	0.5	12 Aug–31 Dec
		1	3 Sep–31 Dec
		5	12 Aug–31 Dec
		10	3 Sep–31 Dec
		15	12 Aug–31 Dec
		20	3 Sep–31 Dec
		30	n/a
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	0.5,1,5,10,15,20	2 Jan–20 Dec
		30	4 May–20 Dec
	Oxygen (mg/L)	0.5,1,5,10,15,20	2 Jan–20 Dec
		30	4 May–20 Dec
	Salinity (‰)	all	4 May–20 Dec
2021–2024	Temperature (°C)	n/a	n/a
	Oxygen(mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
Old Woman's Cove			
2019	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	0.5	12 Aug–7 Sep
		1	Sep 3–7
		5	14 Jun–7 Sep
		10	Sep 3–7
		15	12 Aug–7 Sep
		20	12 Aug–7 Sep
		30	Sep 3–7
	Salinity (‰)	n/a	n/a
2020–2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a

Notes:
"all" is inclusive of depths: 0.5,1,5,10,15,20 and 30 m.

5.3.1 Water Temperature

Seasonal water temperatures were generally consistent across sea farms with available data, though the Rencontre East Island sea farm had slightly lower water temperatures compared to the other sea farms in the BMA (Table 5.8). Temperature trends are typical of those observed by MCE in coastal Newfoundland waters. A thermocline develops in spring as surface waters warm. This thermocline becomes more pronounced and deeper in summer until it breaks down in the fall as air temperature decreases. During winter, temperatures throughout the water column tend to be more uniform until spring, when the seasonal water temperature pattern repeats. At depths 10 m and below, water temperatures were slightly warmer in winter but cooler during other seasons. In contrast, at depths above 10 m, water temperatures were higher in spring, summer, and fall.

Table 5.8. Average, maximum, and minimum water temperatures (°C) at the sea farms in the Rencontre East BMA (2019–2023).

Water Depth	Sampling Period	Water Temperature Parameter	Winter	Spring	Summer	Fall
			Temperature (°C)			
Deep Water Point						
0.5 m	27 May 2021–24 May 2022	Average	2.4	7.7	16.6	10.3
		Maximum	5.5	16.2	20.5	15.7
		Minimum	0.4	2.6	12.5	4.9
1 m	27 May 2021–24 May 2022	Average	2.5	7.5	16.4	10.4
		Maximum	5.4	16.2	19.6	15.6
		Minimum	1.3	2.5	12.1	5.5
5 m	27 May 2021–24 May 2022	Average	2.6	6.6	15.7	10.4
		Maximum	5.4	15.8	18.4	15.2
		Minimum	1.3	2.4	9.5	5.5
10 m	27 May 2021–24 May 2022	Average	2.8	5.9	14.8	10.4
		Maximum	5.3	15.0	17.9	15.0
		Minimum	1.5	2.3	6.7	5.5
15 m	27 May 2021–24 May 2022	Average	2.9	5.3	13.7	10.4
		Maximum	5.3	15.0	17.5	14.9
		Minimum	1.5	2.2	4.3	5.6
20 m	27 May 2021–24 May 2022	Average	3.1	4.7	11.9	10.4
		Maximum	5.5	14.8	17.1	14.8
		Minimum	1.5	2.2	3.1	5.7
30 m	27 May 2021–24 May 2022	Average	3.2	3.6	9.8	10.3
		Maximum	5.5	8.3	17.0	14.8
		Minimum	1.5	2.1	2.6	5.7
Rencontre East Island						
0.5 m	14 Jun 2019–20 Dec 2020	Average	1.1	6.0	15.5	7.7
		Maximum	3.3	15.7	20.0	14.8
		Minimum	-0.1	1.2	10.1	2.2
1 m	3 Sep 2019–20 Dec 2020	Average	1.1	5.8	15.3	7.8
		Maximum	3.3	15.6	19.4	14.6
		Minimum	-0.1	1.3	9.8	2.2
5 m	14 Jun 2019–20 Dec 2020	Average	1.2	5.0	14.4	7.8
		Maximum	3.4	13.5	19.2	13.9
		Minimum	0.2	1.2	3.4	2.6
10 m	3 Sep 2019–20 Dec 2020	Average	1.3	3.9	12.9	7.7
		Maximum	3.6	9.6	17.8	13.4
		Minimum	0.2	1.1	4.6	2.7
15 m	14 Jun 2019–20 Dec 2020	Average	1.3	3.7	10.8	7.7
		Maximum	3.6	8.3	18.5	13.1
		Minimum	0.2	1.0	1.7	2.7
20 m	3 Sep 2019–20 Dec 2020	Average	1.3	2.5	9.1	7.5
		Maximum	3.7	6.6	16.1	12.6
		Minimum	0.2	0.9	2.0	3.3
30 m	4 May 2020–20 Dec 2020	Average	n/a	2.1	5.4	6.5
		Maximum	n/a	4.1	15.0	11.9
		Minimum	n/a	0.9	1.6	2.9

Water Depth	Sampling Period	Water Temperature Parameter	Winter	Spring	Summer	Fall
			Temperature (°C)			
Little Burdock Cove						
0.5 m	2 Jan 2022–28 Feb 2023	Average	2.1	7.4	17.2	9.1
		Maximum	4.9	16.6	20.5	14.8
		Minimum	0	2.4	4.9	2.4
1 m	2 Jan 2022–28 Feb 2023	Average	2.2	7.2	16.9	9.1
		Maximum	4.9	16.6	20.5	14.8
		Minimum	0.1	2.4	4.7	2.4
5 m	2 Jan 2022–28 Feb 2023	Average	2.3	6.3	16.1	9.1
		Maximum	4.9	14.1	19.3	14.6
		Minimum	0.7	2.3	4.4	2.5
10 m	2 Jan 2022–28 Feb 2023	Average	2.4	5.7	14.5	9.1
		Maximum	5.2	11.3	18.8	14.4
		Minimum	1.0	2.3	3.8	2.6
15 m	2 Jan 2022–28 Feb 2023	Average	2.6	5.0	12.7	9.0
		Maximum	5.3	10.7	18.6	14.0
		Minimum	1.3	2.2	3.2	2.7
20 m	2 Jan 2022–28 Feb 2023	Average	2.6	4.4	9.9	8.9
		Maximum	5.4	9.9	16.8	13.9
		Minimum	1.3	2.2	2.9	2.9
30 m	2 Jan 2022–28 Feb 2023	Average	2.7	3.4	6.6	8.4
		Maximum	5.5	8.6	14.6	13.8
		Minimum	1.4	2.1	2.6	3.1

Notes:
n/a = not available

Mean water temperatures ranged from 1.1°C in winter at the Rencontre East Island sea farm (0.5 and 1 m depths) to 17.2°C in summer at the Little Burdock Cove sea farm (0.5 m depth). Maximum water temperatures at the Deep Water Point, Rencontre East Island, and Little Burdock Cove sea farms were recorded at a depth of 0.5 m in summer, reaching 20.5°C, 20.0°C, and 20.5°C, respectively. Minimum temperatures occurred in winter at the same depth, measuring 0.4°C, -0.1°C and 0.0°C, respectively.

Historical water temperature data for the Rencontre East BMA (Figure 5.10) are provided for measurements collected at a depth of 15 m. During 2019–2022, data collected at the Deep Water Point sea farm showed a general water temperature increase from April–September, with average temperatures peaking in September and declining thereafter (Figure 5.10A). During 2019–2020, data collected at the Rencontre East Island sea farm indicated an increase in average and maximum temperatures from April–August, while minimum temperatures increased from August–October (Figure 5.10B). Similarly, average temperatures were highest in September, with steady increases from April–September, followed by decreasing water temperatures from October onwards in the Little Burdock Cove sea farm (Figure 5.10C). Lowest water temperatures were observed in March in all sea farms.

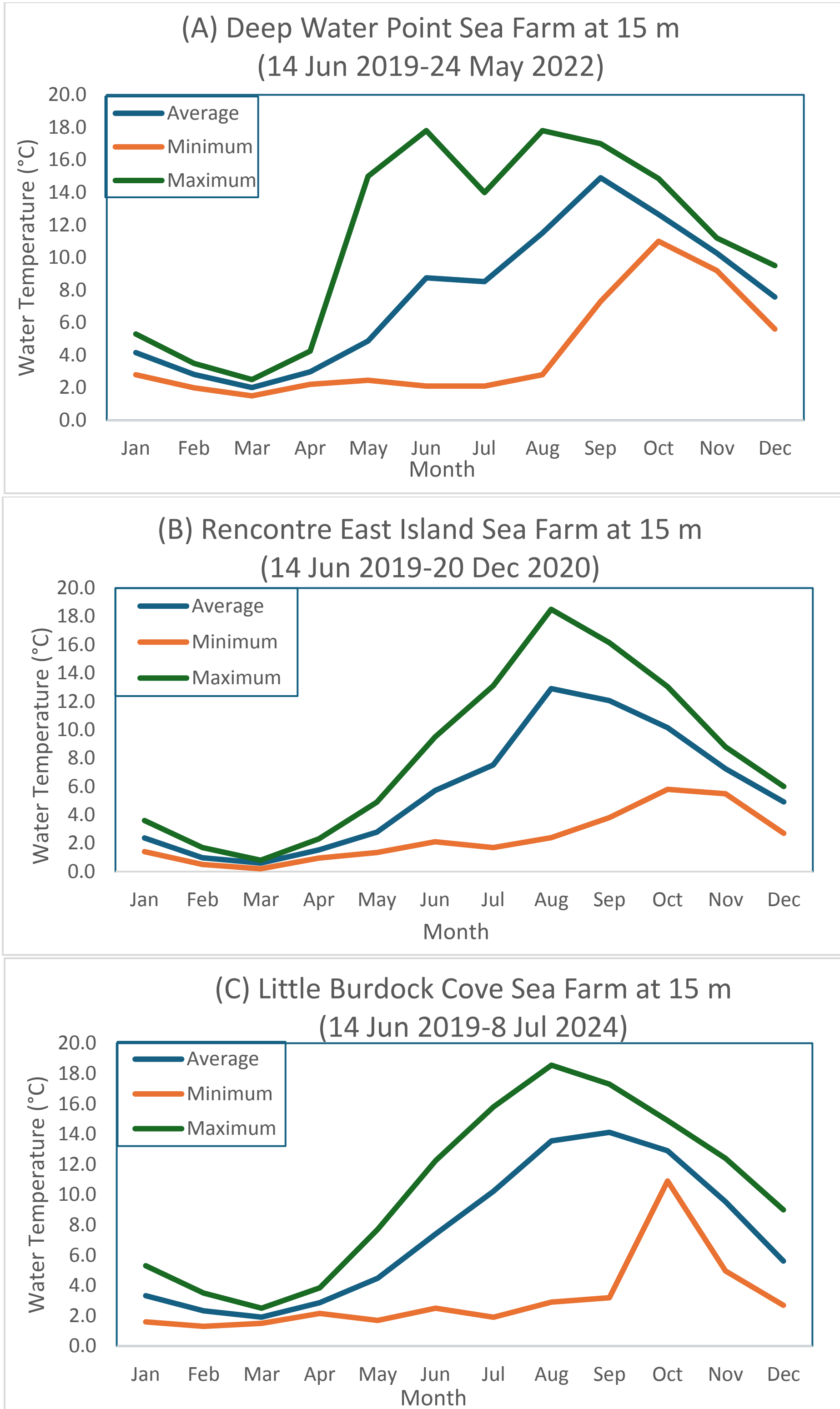


Figure 5.10. Historical water temperature (°C) data at the (A) Deep Water Point, (B) Rencontre East Island and (C) Little Burdock Cove sea farms in the Rencontre East BMA at 15 m depth.

5.3.2 Dissolved Oxygen

Dissolved oxygen levels were consistently lower in summer and fall compared to winter and spring with the Rencontre East Island sea farm generally having the highest average dissolved oxygen levels relative to the other sea farms within the BMA, except in winter (Table 5.9). Mean dissolved oxygen ranged from 7.7 mg/L in summer to 12.8 mg/L in winter at 0.5 m depth. Maximum observed dissolved oxygen was 16.0 mg/L, recorded at a depth of 0.5 m at the Little Burdock Cove sea farm in spring; minimum dissolved oxygen was 5.2 mg/L, measured at a depth of 1 m in fall at the Rencontre East Island sea farm.

Table 5.9. Average, maximum, and minimum dissolved oxygen (mg/L) at the sea farms in the Rencontre East BMA (2019–2024).

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
Deep Water Point						
0.5 m	27 May 2021–24 May 2022	Average	11.3	10.4	8.1	8.8
		Maximum	14.5	11.8	9.1	10.2
		Minimum	9.9	8.3	6.7	6.1
1 m	27 May 2021–24 May 2022	Average	11.2	10.4	8.0	8.8
		Maximum	12.6	11.8	9.0	10.1
		Minimum	9.9	8.2	6.8	6.0
5 m	27 May 2021–24 May 2022	Average	11.1	10.6	8.1	8.7
		Maximum	11.9	11.9	9.9	10.1
		Minimum	9.9	8.8	6.8	6.9
10 m	27 May 2021–24 May 2022	Average	11.0	10.8	8.3	8.8
		Maximum	11.8	12.0	10.2	10.0
		Minimum	9.9	9.0	6.1	7.3
15 m	27 May 2021–24 May 2022	Average	10.9	10.9	8.5	8.8
		Maximum	11.6	12.2	10.4	10.0
		Minimum	8.6	9.0	6.7	7.3
20 m	27 May 2021–24 May 2022	Average	10.8	10.9	8.7	8.7
		Maximum	11.6	12.4	10.4	10.0
		Minimum	9.7	9.0	6.8	7.5
30 m	27 May 2021–24 May 2022	Average	10.7	10.8	9.1	8.8
		Maximum	11.6	12.5	10.4	10.0
		Minimum	9.5	9.5	7.1	7.6
Rencontre East Island						
0.5 m	12 Aug 2019–20 Dec 2020	Average	12.8	10.8	7.7	9.5
		Maximum	15.7	14.4	9.3	12.9
		Minimum	10.1	6.6	5.8	6.6
1 m	3 Sep 2019–20 Dec 2020	Average	12.7	10.7	7.8	9.4
		Maximum	15.6	14.5	9.4	12.9
		Minimum	8.6	6.4	5.8	5.2
5 m	12 Aug 2019–20 Dec 2020	Average	12.6	11.2	7.8	9.3
		Maximum	15.6	14.8	9.5	12.9
		Minimum	10.0	6.5	6.4	6.9
10 m	3 Sep 2019–20 Dec 2020	Average	12.5	11.5	8.1	9.3
		Maximum	15.3	14.8	10.4	12.7
		Minimum	9.8	8.1	6.1	6.0
15 m	12 Aug 2019–20 Dec 2020	Average	12.4	11.6	8.3	9.3
		Maximum	15.2	14.7	11.8	12.6
		Minimum	9.8	9.4	6.2	6.2
20 m	3 Sep 2019–20 Dec 2020	Average	12.3	11.6	9.0	9.3
		Maximum	15.2	14.4	10.7	12.4
		Minimum	9.7	10.2	6.9	7.0
30 m	4 May 2020–20 Dec 2020	Average	n/a	10.8	9.7	9.3
		Maximum	n/a	11.4	10.7	10.4

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
		Minimum	n/a	10.0	7.6	8.3
Old Woman's Cove						
5 m	1 Jul–7 Sep 2019	Average	n/a	n/a	10.1	n/a
		Maximum	n/a	n/a	11.1	n/a
		Minimum	n/a	n/a	8.4	n/a
Little Burdock Cove[a]						
0.5	2 Jan 2022–28 Feb 2023	Average	11.1	10.3	8.1	9.4
		Maximum	16.0	11.7	9.7	11.6
		Minimum	7.8	8.1	7.1	8.0
1 m	2 Jan 2022–30 Jun 2024	Average	11.1	10.2	8.1	9.4
		Maximum	13.2	11.6	9.7	11.4
		Minimum	9.8	8.1	7.1	8.0
5 m	2 Jan 2022–30 Jun 2024	Average	11.0	10.5	8.1	9.4
		Maximum	12.6	11.7	9.5	11.3
		Minimum	9.7	8.6	7.1	8.0
10 m	2 Jan 2022–30 Jun 2024	Average	10.9	10.7	8.1	9.3
		Maximum	12.2	12.0	9.5	11.0
		Minimum	9.5	9.3	6.8	7.8
15 m	2 Jan 2022–30 Jun 2024	Average	10.8	10.8	8.2	9.2
		Maximum	11.9	12.2	9.8	10.9
		Minimum	9.4	9.5	6.7	7.9
20 m	2 Jan 2022–30 Jun 2024	Average	10.7	10.8	8.7	9.2
		Maximum	11.9	12.4	9.9	10.9
		Minimum	9.5	9.7	7.0	7.9
30 m	2 Jan 2022–30 Jun 2024	Average	10.6	10.8	9.2	9.2
		Maximum	11.8	12.6	10.0	10.8
		Minimum	9.6	9.9	8.0	8.0

Notes:
[a] missing April 2023 data.
n/a = not available.

During 2019–2022, a general decline in dissolved oxygen levels was recorded from June–September, followed by an increase in winter and early spring at the Deep Water Point sea farm (Figure 5.11A). Average oxygen levels peaked in May, while the lowest levels were recorded in September at the Deep Water Point sea farm. At the Rencontre East Island sea farm, dissolved oxygen increased from November–March; both average and maximum oxygen levels peaked in March whereas the lowest oxygen levels were observed in August (Figure 5.11B). For the Little Burdock Cove sea farm, highest dissolved oxygen levels were recorded in May and the lowest were recorded in August; dissolved oxygen levels began increasing in November–December (Figure 5.11C).

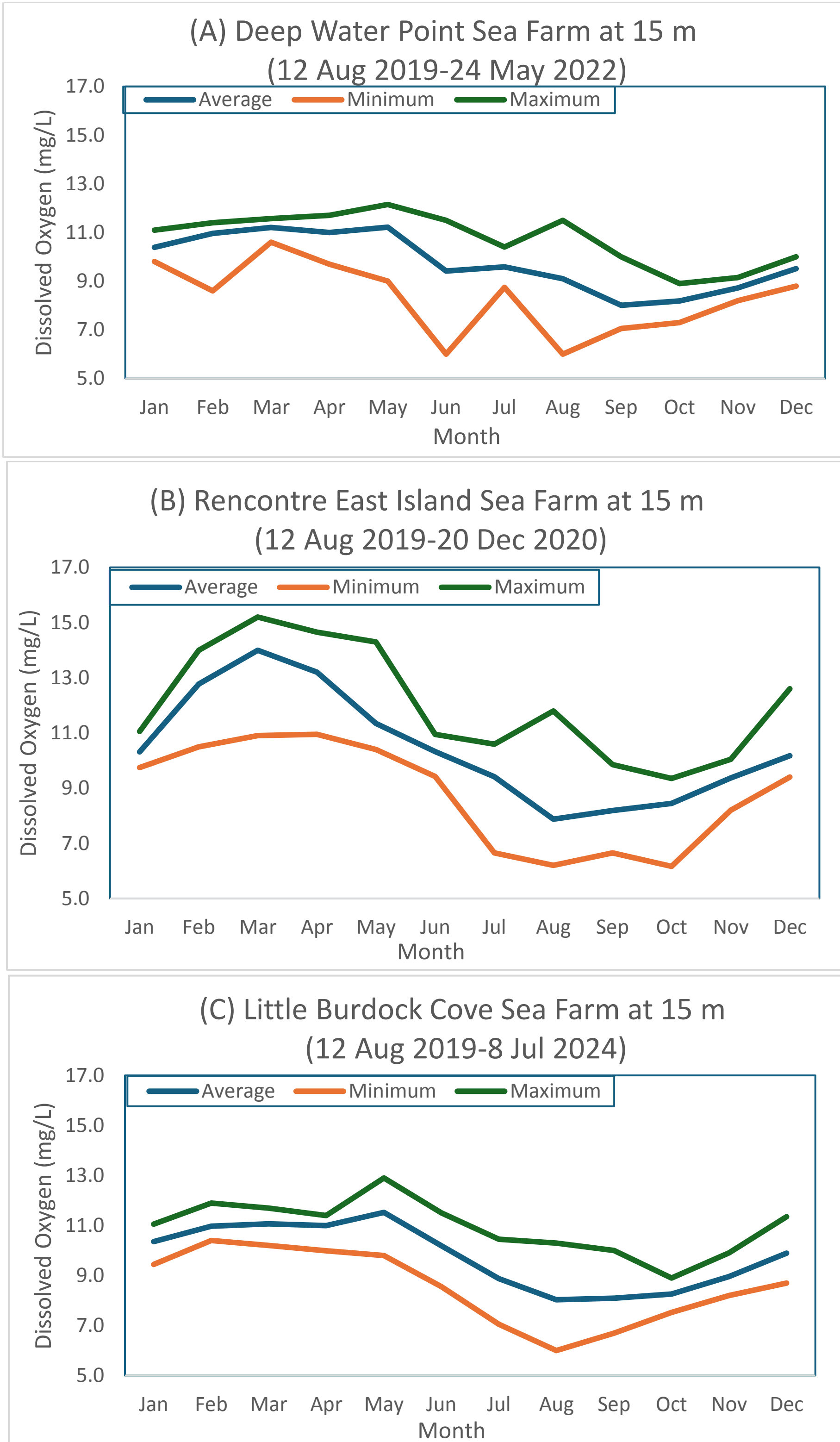


Figure 5.11. Historical dissolved oxygen (mg/L) data at the (A) Deep Water Point, (B) Rencontre East Island and (C) Little Burdock Cove sea farms in the Rencontre East BMA at 15 m depth.

5.3.3 Salinity

Salinity was fairly consistent across sea farms and seasons with averages ranging from 28.0–31.6 ppt (Table 5.10). Results indicate a moderate freshwater influence near the surface that was more pronounced at Rencontre East Island.

Table 5.10. Average salinity (‰) at the sea farms in the Rencontre East BMA (2019–2024).

Water Depth	Sampling Period	Winter	Spring	Summer	Fall
		Salinity (‰)			
Deep Water Point					
0.5 m	27 May 2021–24 May 2022	27.9	29.0	29.5	28.5
1 m	27 May 2021–24 May 2022	28.9	29.4	29.7	29.1
5 m	27 May 2021–24 May 2022	29.2	29.7	29.9	29.3
10 m	27 May 2021–24 May 2022	29.6	29.9	30.0	29.9
15 m	27 May 2021–24 May 2022	29.8	30.1	30.2	30.0
20 m	27 May 2021–24 May 2022	30.0	30.2	30.3	30.1
30 m	27 May 2021–24 May 2022	30.2	30.4	30.4	30.1
Rencontre East Island					
0.5 m	4 May–20 Dec 2020	n/a	26.3	27.9	27.6
1 m	4 May–20 Dec 2020	n/a	27.4	29.9	28.7
5 m	4 May–20 Dec 2020	n/a	29.7	29.3	30.0
10 m	4 May–20 Dec 2020	n/a	30.6	29.9	30.3
15 m	4 May–20 Dec 2020	n/a	32.3	30.0	30.5
20 m	4 May–20 Dec 2020	n/a	31.3	30.4	30.7
30 m	4 May–20 Dec 2020	n/a	31.6	30.7	30.9
Little Burdock Cove					
Surface	1 Jul 2022–8 Jul 2024	29.0	28.2	28.6	29.8
1 m	1 Jul 2022–8 Jul 2024	29.6	28.7	28.9	29.9
5 m	1 Jul 2022–8 Jul 2024	30.0	29.3	29.4	30.1
10 m	1 Jul 2022–8 Jul 2024	30.1	29.5	29.7	30.2
15 m	1 Jul 2022–8 Jul 2024	30.3	29.7	29.9	30.3
20 m	1 Jul 2022–8 Jul 2024	30.3	29.9	30.1	30.3
30 m	1 Jul 2022–8 Jul 2024	30.4	30.0	30.4	30.4

Notes:
n/a = not available.

5.4 Oceanographic and Meteorological Data

Bathymetric, current, wind and wave data are available for all four sea farms in the Rencontre East BMA.

5.4.1 Bathymetry

Water depths below the leases and sea cage arrays range from 4–155 m and 34–111 m, respectively (Table 5.11). The shallowest sea farm is Rencontre East Island where depths range from 34–42 m below the sea cage array. Water depth profiles (3-D) acquired in 2010 are available for three leases (Figure 5.12–5.14) and a bathymetric profile for the fourth lease (Figure 5.15).

Table 5.11. Water depth range at sea farm in the Rencontre East BMA.

Site No.	Sea Farm	Lease Depth Range (m)	Sea Cage Array Depth Range (m)
AQ 1080	Deep Water Point	4–155	43–111
AQ 1081	Rencontre East Island	3–42	34–42
AQ 1082	Old Woman's Cove	6–115	58–96
AQ 1083	Little Burdock Cove	5–61	37–57

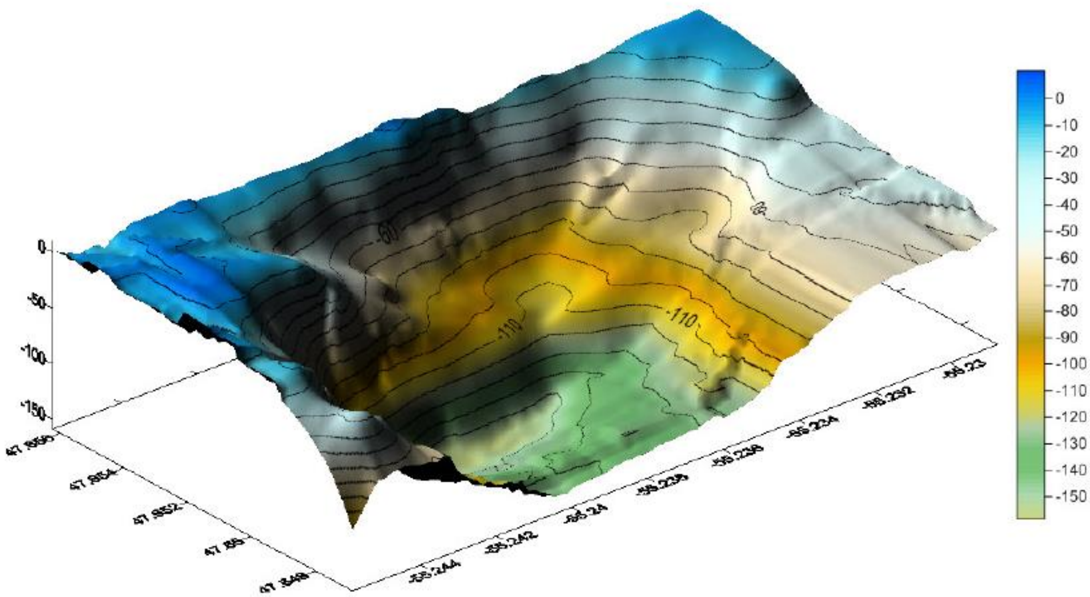


Figure 5.12. 3-D water depth profile of the Deep Water Point sea farm lease area (acquired in June and July 2010).

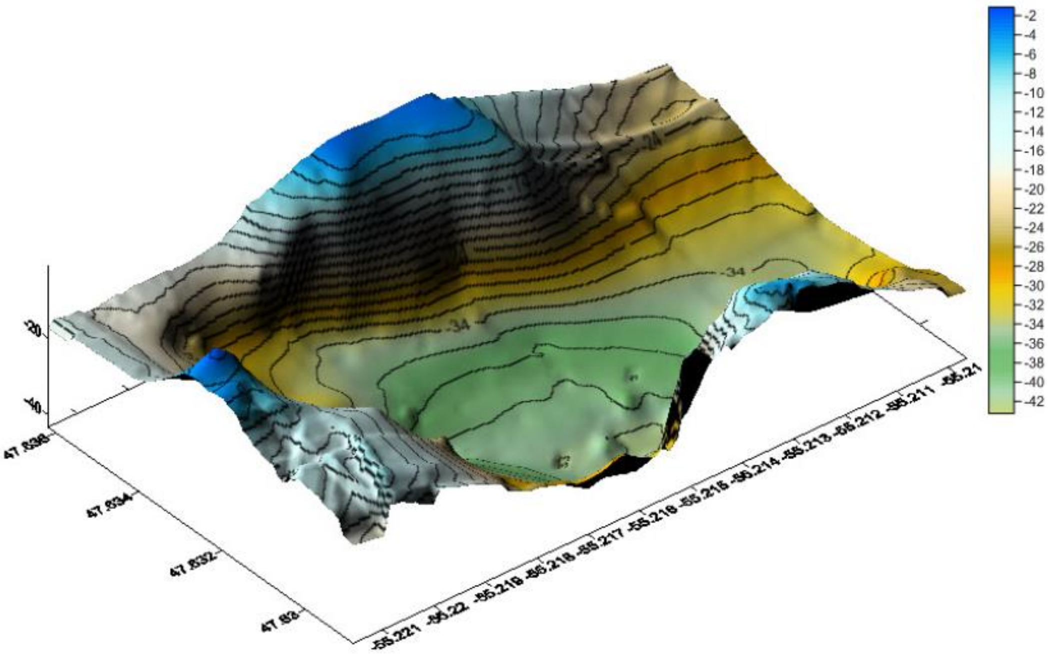


Figure 5.13. 3-D water depth profile of the Rencontre East Island sea farm lease area (acquired in June and July 2010).

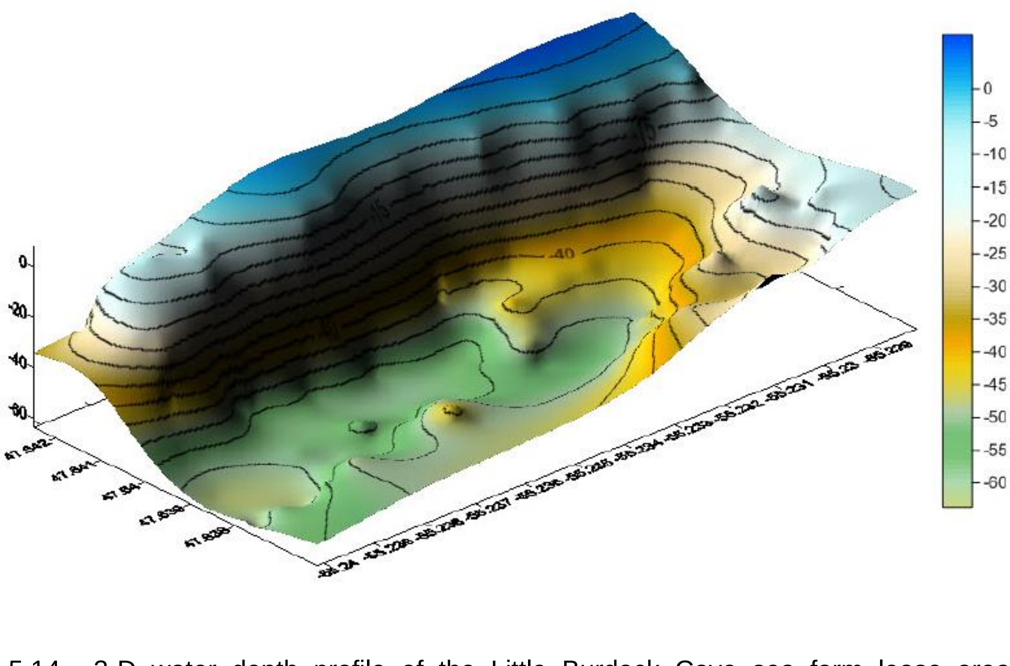


Figure 5.14. 3-D water depth profile of the Little Burdock Cove sea farm lease area (acquired in June 2010).

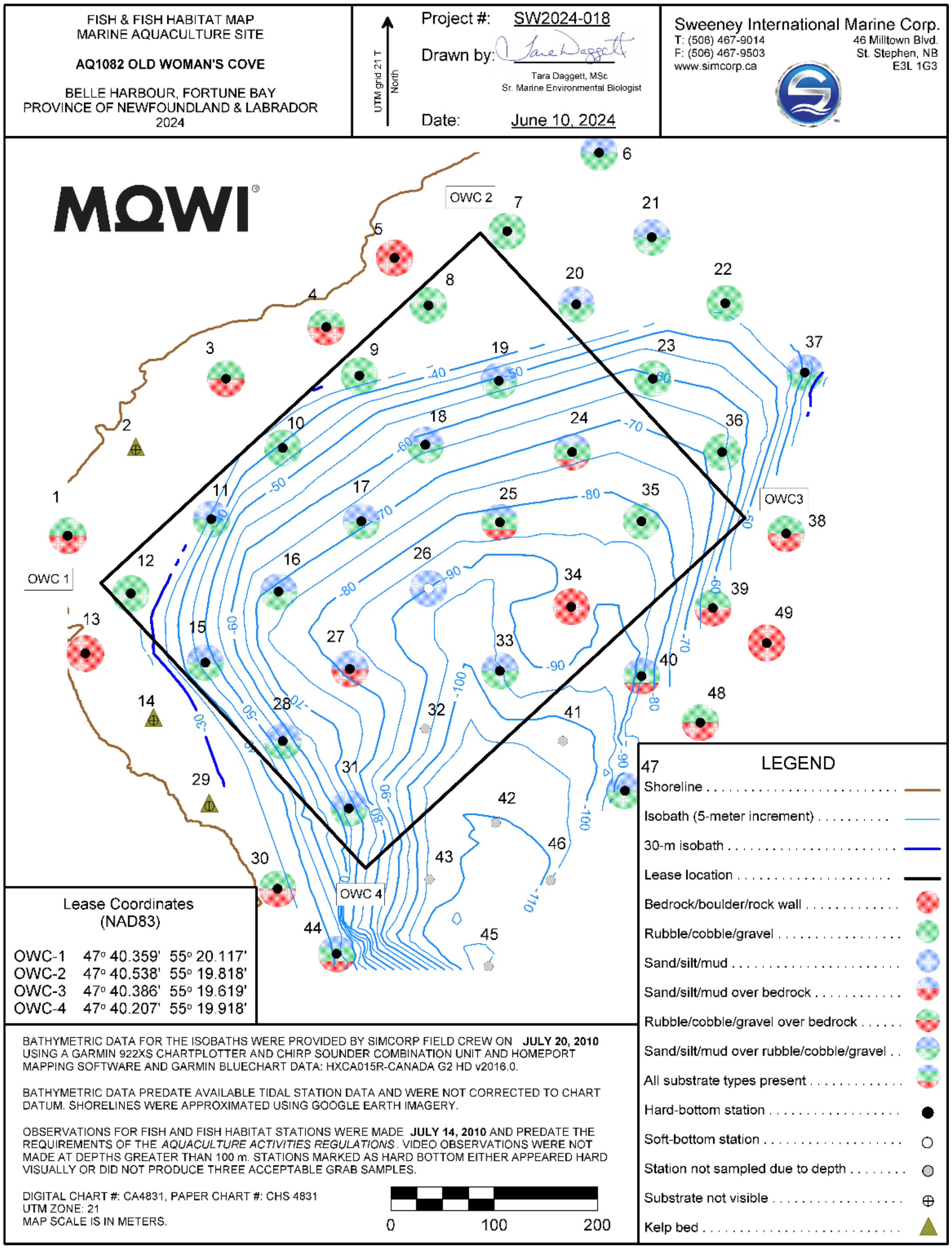


Figure 5.15. Bathymetric map for the Old Woman's Cove sea farm (July 2010).

5.4.2 Currents

Current data were acquired at the Deep Water Point, Rencontre East Island, and Old Woman's Cove sea farms in June and July 2024 whereas current data from April–August (2023) are available for the Little Burdock Cove sea farm.

5.4.2.1 Deep Water Point

During June–July 2024, current measurements were collected at six water depths in the Deep Water Point sea farm (Table 5.12). During this period, mean current speeds ranged from 1.37 cm/s (at 20 m depth), to 1.96 cm/s (at 5 m water depth). Maximum current speeds were recorded within 10 m of the water surface. In the upper 20 m, the currents were bi-directional, west-southwest to east-northeast. The strongest currents tended to be toward the west-southwest at these depths. Below 20 m depth, the currents were generally omnidirectional with a tendency for currents from the southwest (Figure 5.16). In June and July, the vector-averaged current speed, an indication of the net long-term drift at the measurement site, varied between 0.1 and 0.6 cm/s (Table 5.12). In the upper 20 m, the vector average direction was between the northwest and east-northeast. At 39 m water depth, the vector average direction was toward the west-southwest, and near bottom it was toward the south.

Table 5.12. Current speeds (mean and maximum values) and vector-averages at the Deep Water Point sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	1.96	11.56	0.6 @ 334 °
10	1.69	15.54	0.4 @ 340 °
15	1.51	7.84	0.2 @ 350 °
20	1.37	6.70	0.1 @ 19 °
39	1.49	7.69	0.2 @ 258 °
72 (7 m above bottom)	1.51	5.63	0.1 @ 192 °

Notes:
MWL = mean water level.

5.4.2.2 Rencontre East Island

During June–July 2024, current measurements were collected at five depths in the Rencontre East Island sea farm (Table 5.13). During this period, mean current speeds were relatively consistent across water depths ranging from 1.88 cm/s to 2.26 cm/s. Maximum current speeds were quite variable ranging from 9.05 cm/s near-bottom to 16.06 cm/s at 20 m depth. Currents were generally aligned east-west with the orientation of the inlet (Figure 5.17). However, at 20 m depth and near-bottom the currents were largely towards the southwest quadrant. The vector average currents, an indication of the net long-term drift at the site, ranged from 0.5–0.8 cm/s towards southwest or west-southwest.

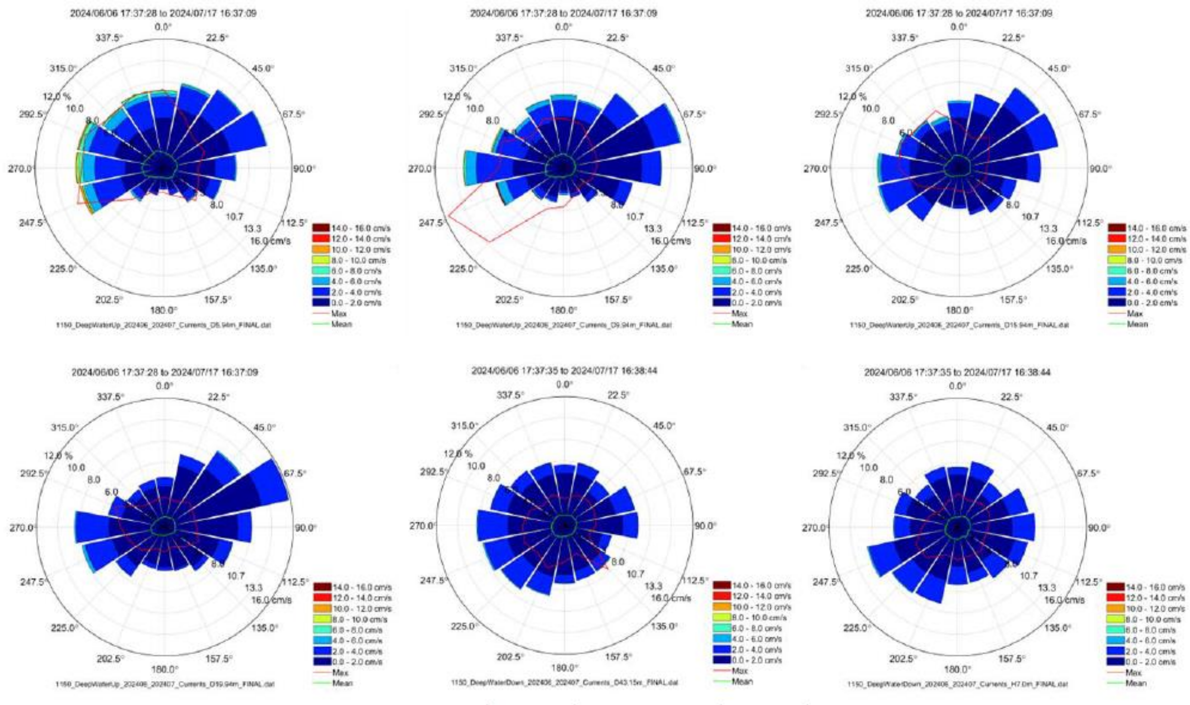


Figure 5.16. Compass rose plots of current speeds at the Deep Water Point sea farm (June–July 2024). Current speeds and directions at 5 m,10 m, 15 m, 20 m, 43 m (mid-depth), and near bottom (7 m height) are shown from left to right, top to bottom in the figure.

Table 5.13. Current speeds (mean and maximum values) and vector-averages at the Rencontre East Island sea farm (June–July 2024).

Speed (cm/s)			
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
6	2.12	9.31	0.7 @ 233 °
10	2.10	12.23	0.5 @ 253 °
15	2.17	12.79	0.6 @ 255 °
20	2.26	16.06	0.8 @ 233 °
34 (5 m above bottom)	1.88	9.05	0.7 @ 233 °

Notes:
MWL = mean water level.

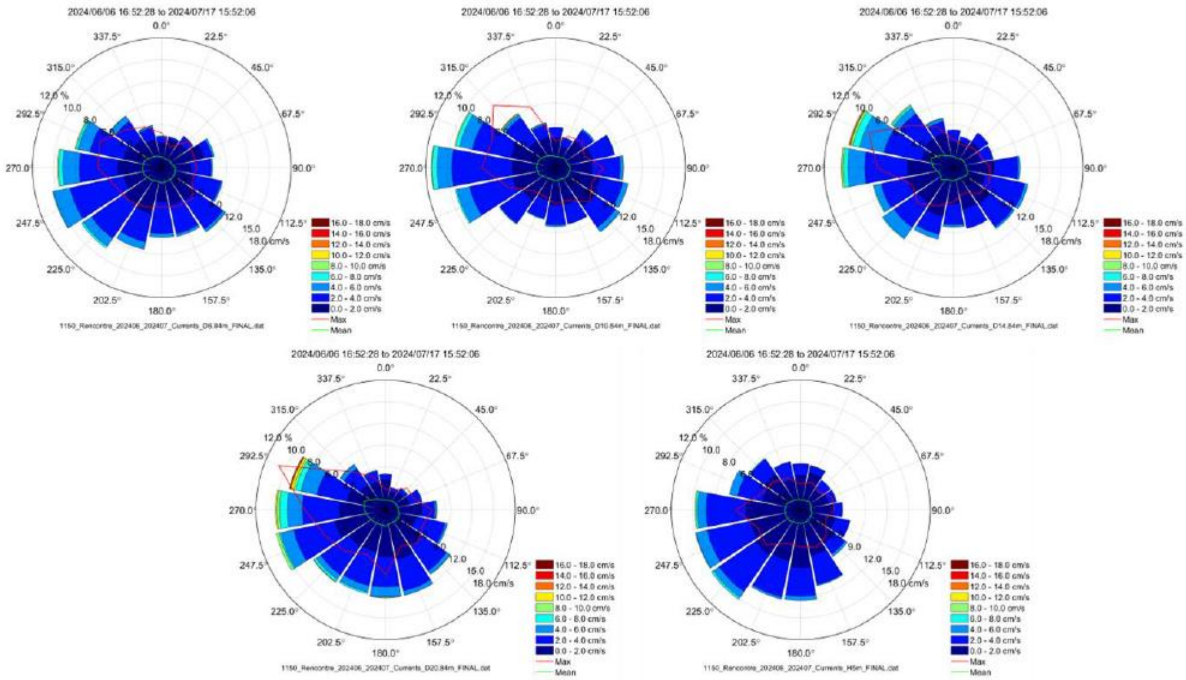


Figure 5.17. Compass rose plots of current speeds at the Rencontre East Island sea farm (June–July 2024). Current speeds and directions at 6 m,10 m, 15 m, 20 m, and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

5.4.2.3 Old Woman's Cove

During June–July 2024, current measurements were collected at six depths in the Old Woman's Cove sea farm (Table 5.14). During this period, mean current speeds ranged from 1.42 cm/s near-bottom to 2.79 cm/s near-surface. Maximum current speeds were variable ranging from to 6.44 cm/s near-bottom to 16.35 cm/s near-surface. Current directions were aligned southwest-northeast with the dominant current direction from the southwest, except at mid-depth where the flow was predominantly from the east-northeast (Figure 5.18). Near-bottom currents were more omnidirectional. The vector average currents, an indication of the net long-term drift at the measurement site, in the upper 20 m were toward the west to northwest and ranging from 0.4–1.0 cm/s. At mid-depth, the vector-averaged current was 0.7 cm/s towards the northeast. Near-bottom the vector-averaged current was 0.2 cm/s towards the south-southwest (Table 5.14).

Table 5.14. Current speeds (mean and maximum values) and vector-averages at the current speed and vector-averages at Old Woman's Cove (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	2.79	16.35	1.0 @ 301 °
10	2.20	12.68	0.7 @ 285 °
15	1.89	7.75	0.5 @ 274 °
20	1.95	9.23	0.4 @ 286 °
34	2.17	9.47	0.7 @ 46 °
56 (5 m above bottom)	1.42	6.44	0.2 @ 193 °

Notes:
MWL = mean water level.

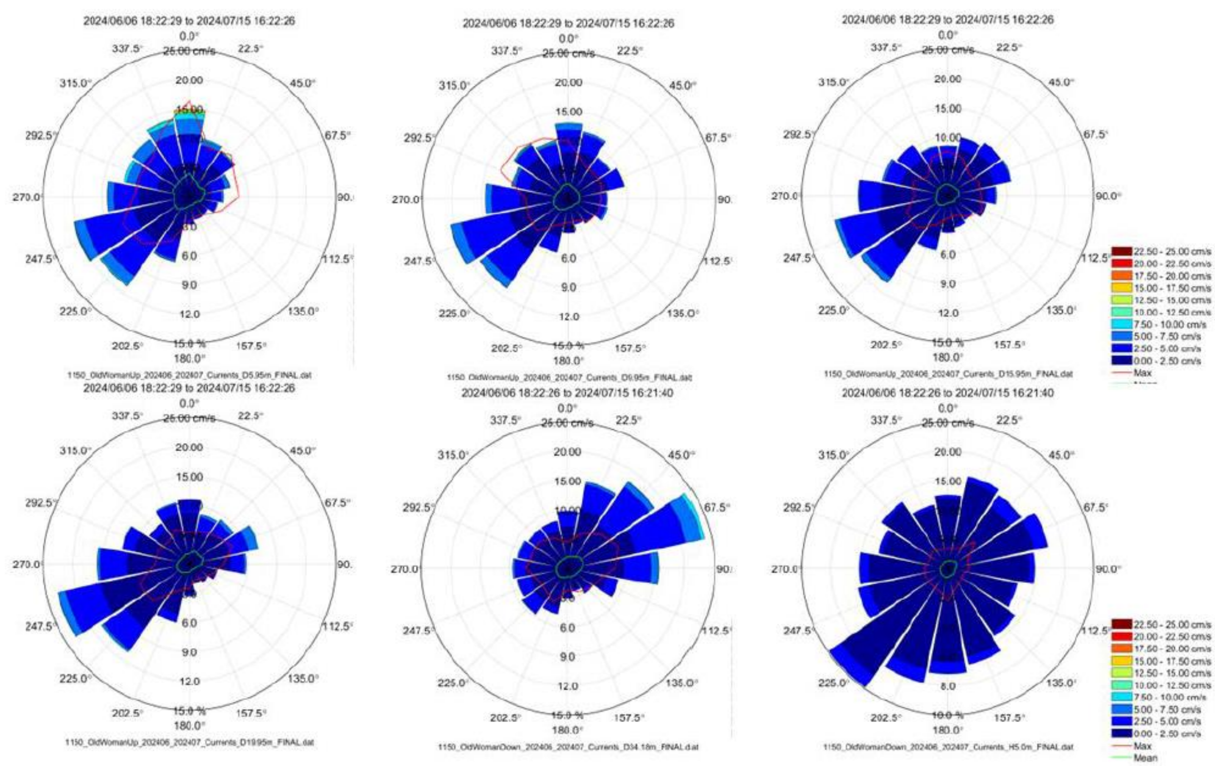


Figure 5.18. Compass rose plots of current speeds at the Old Woman's Cove sea farm (June–July 2024). Current speeds and directions at 5 m, 10 m, 15 m, 20 m, 34 m (mid-depth), and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

5.4.2.4 *Little Burdock Cove*

During April–August 2023, current measurements at three depths were collected in the Little Burdock Cove sea farm (Table 5.15). During this period, mean current speeds ranged from 2.2 cm/s to 3.0 cm/s at 15 m and 5 m below the surface, respectively. Maximum current speeds ranged from 12.1 cm/s to 23.2 cm/s. Current directions were largely east-west, with the orientation of the bathymetric contours (Figure 5.19). The vector average currents were towards the east at 0.6–1.1 cm/s (Table 5.15).

Table 5.15. Current speeds (mean and maximum values) and vector-averages at the Little Burdock Cove sea farm (April–August 2023).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	3.0	23.2	1.1 @ 94 °
10	2.4	12.1	0.7 @ 84 °
15	2.2	18.6	0.6 @ 81 °

Notes:
MWL = mean water level.

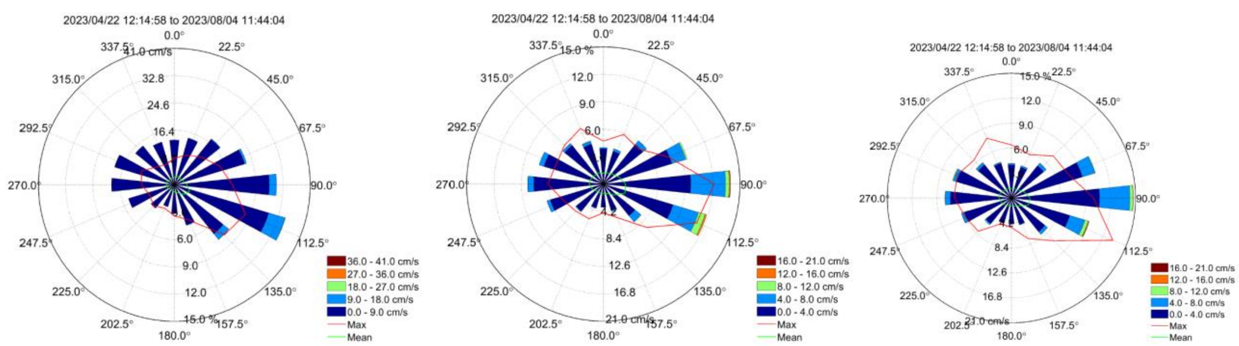


Figure 5.19. Compass rose plots of current speeds at Little Burdock Cove sea farm (April–August 2023). Current speeds and directions are shown at 5 m, 10.7 m, and 14.7 m from left to right in the figure.

5.4.3 Wind and Waves

5.4.3.1 Modelling (MSC50 Hindcast Approach) for Atlantic Canada

Mean wind speeds and mean wave heights near the Rencontre East BMA were highest in December, January, and February and lowest in June, July, and August based on 10 years of historical data (Tables 5.16 and 5.17). Maximum monthly wind speeds of ~20–21 m/s (~72 -76 km/h) occurred in December, February, and March. Similarly, maximum monthly wave heights of wind direction were predominantly from the west, southwest (Figure 5.20) with wind speeds most frequently ranging from ~6–12 m/s (Figure 5.20).

Table 5.16. Monthly wind speeds (mean and maximum) near the Rencontre East BMA (at MSC50 grid points M6012719 and M6012720 during 2009–2018).

Month	M6012719		M6012720	
	Wind Speed Mean (m/s)	Wind Speed Max (m/s)	Wind Speed Mean (m/s)	Wind Speed Max (m/s)
January	10.80	18.71	10.80	19.65
February	10.41	21.43	10.41	21.36
March	9.49	20.49	9.49	20.44
April	7.98	18.09	7.99	18.08
May	6.52	13.79	6.53	13.77
June	5.84	12.68	5.85	12.65
July	5.48	11.81	5.50	11.83
August	6.00	13.79	6.01	13.83
September	7.69	16.81	7.70	16.86
October	8.84	18.31	8.84	18.31
November	9.68	19.19	9.69	19.17
December	10.60	20.19	10.60	20.18

Notes:
Grid point M6012720 is ~4 km from the Rencontre Island East sea farm.

Table 5.17. Monthly wave heights (m) (mean and maximum) recorded near the Rencontre East BMA (at MSC50 grid points M6012719 and M6012720 during 2009–2018).

Month	M6012719		M6012720	
	Wave Height Mean (m)	Wave Height Max (m)	Wave Height Mean (m)	Wave Height Max (m)
January	0.73	1.82	0.85	1.83
February	0.71	1.85	0.79	1.97
March	0.63	1.76	0.68	1.68
April	0.50	1.39	0.56	1.61
May	0.37	1.09	0.40	1.27
June	0.30	1.05	0.32	1.20
July	0.27	0.95	0.33	1.15
August	0.32	1.14	0.36	1.22
September	0.47	1.30	0.54	1.48
October	0.57	1.44	0.64	1.73
November	0.65	1.61	0.74	1.78
December	0.73	1.69	0.80	1.87

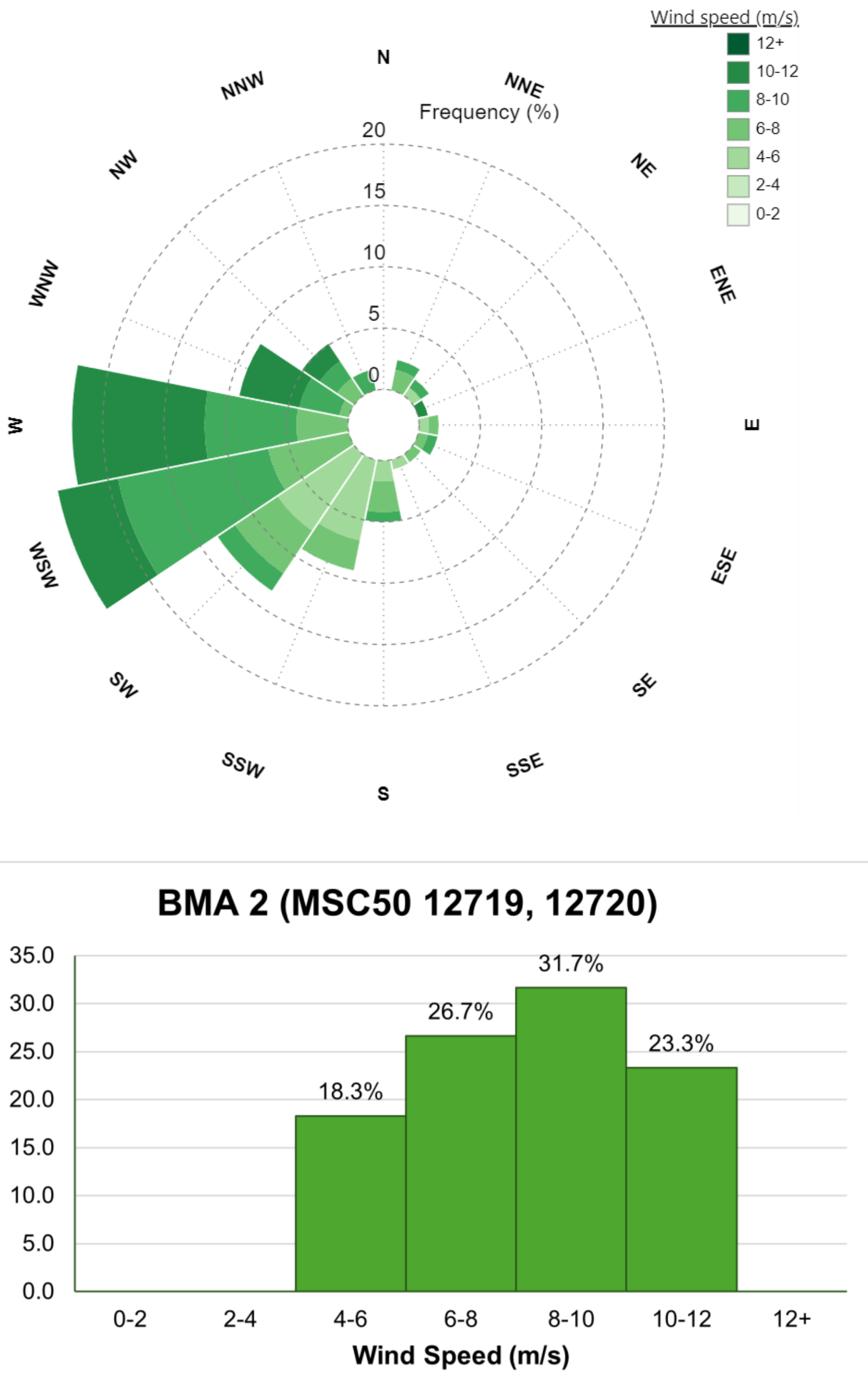


Figure 5.20. Wind rose and wind speed frequency histogram for MSC50 grid points M6012719 and M6012720 near the Rencontre East BMA (2009–2018).

5.5 Ice Conditions

Ice conditions for the Study Area including Rencontre East (BMA 2) are detailed in Section 4.5.

5.6 Storms

Storm conditions for the Study Area including Rencontre East (BMA 2) are detailed in Section 4.6.

5.7 Tides and Floods

Tide and flood conditions for the Study Area including Rencontre East (BMA 2) are detailed in Section 4.7.

5.8 Performance of Sea Farms with a Previous Production Cycle

The Rencontre East BMA has been previously stocked with one sea farm (Little Burdock Cove) currently in production. The summaries below detail the monitoring, reporting, and performance of the four sea farms in the Rencontre East BMA during the period that public reporting has been a requirement (2016–present).

5.8.1 Fallowing Periods

Table 5.18 summarizes the fallow periods for MCE sea farms in the Rencontre East BMA since the enactment of the AAR. Old Woman's Cove, Rencontre East Island, and Deep Water Point sea farms have been fallow since September 2019, November 2020, and June 2022, respectively. The Little Burdock Cove sea farm was most recently stocked in June 2024 following a fallow period that commenced in January 2023.

Table 5.18. Summary of fallow schedule for Rencontre East BMA sea farms since 2016. Green indicates production (month stocked), red indicates harvesting/depopulation (month sea cages were empty), and blue is fallow (not stocked).

Sea Farm	2016	2017	2018	2019	2020	2021	2022	2023	2024
Deep Water Point		Apr	Jun	Sep		Jun	Jun		
Rencontre East Island			Feb Oct		Nov				
Old Woman's Cove	Aug		May	Sep					
Little Burdock Cove		Jul	Jun	Sep		Jun		Jan	Jun

5.8.2 Benthic Monitoring

For Rencontre East BMA, regulatory modelling of deposition (i.e., DEPOMOD) has not been required and not completed to date.

As per the AAR, benthic monitoring of an active sea farm is required during a period of peak salmon feeding. Depending on bottom type (hard or soft), either video monitoring or bottom grabs are collected to determine the amount of BOD matter. During years with active farming, required benthic monitoring at sampling stations in the Rencontre East BMA was conducted. All sea farms were within the allowable regulatory threshold based on the BOD indicators (Table 5.19). Benthic monitoring was performed at the Little Burdock Cove sea farm in 2024 as per the AAR, but at the time of this writing, the report is unavailable.

Table 5.19. AAR benthic monitoring results for sea farms in the Rencontre East BMA (2016–2023). [Green = within allowable regulatory threshold[a]]

AAR Monitoring Year	BOD Indicator	Sea Farm			
		Deep Water Point	Rencontre East Island	Old Woman's Cove	Little Burdock Cove
2015	Date				
	%Stations				
2016	Date	20 Sep 16	03 Oct 16	24 Jun 16	04 Oct 16
	%Stations	44 (21/48)	39 (17/44)	41 (19/46)	48 (23/48)
2017	Date				
	%Stations				
2018	Date				
	%Stations				
2019	Date	18 Sep 19		19 Sep 19	17 Sep 19
	%Stations	31 (15/48)		43 (18/42)	38 (18/48)
2020	Date		6 Oct 20		
	%Stations		65 (30/46)		
2021	Date				
	%Stations				
2022	Date	24 Jul 22			19 Oct 22
	%Stations	2 (1/48)			17 (8/48)
2023	Date				
	%Stations				

Source: MCE (2024).

Notes:

[a] If >70% of monitoring stations had the presence of *Beggiatoa* species or similar bacteria, marine worms, or barren substrate (as determined by visual monitoring) and/or if the mean concentration of free sulfide in surficial sediment was >3000 μM (as determined by sediment sampling) this is considered an exceedance (fail) of the allowable threshold.

n/a = not available

5.8.3 Publicly Reported Performance

As detailed in Section 3.8.3, sea farm performance reports which include mass mortality, disease, and escape information and sea lice count data are available for recent years. Drugs and pesticide use information at sea farms are available for 2016–2022.

5.8.3.1 Mortality Events

In 2019, prior to the requirement for public reporting, a mass mortality event occurred in the Rencontre East BMA. The event resulted in the depopulation of the Deep Water Point, Old Woman's Cove, and Little Burdock Cove sea farms in September 2019. In late 2021 (November and December) and early 2022, an abnormal mortality event occurred which was attributed to environmental challenges including pressure from sea lice, treatment, and rough weather. These fish mortalities (~755,000) were removed from the sea cages using approved procedures and were sent to a local rendering facility (Table 5.20).

Table 5.20. Summary of reportable incident events at sea farms in the Rencontre East BMA.

Date	Sea Farm	Incident				No. Cages Impacted	No. Fish Affected	Cause	Response Measures
		Abnormal Mortality	Fish Health Suspect	Fish Health Confirmed	Escape				
2021-11-30	Deepwater Point	Atlantic Salmon					570,238	Environmental challenges	Removed for rendering
2022-01-14									
2021-12-03	Little Burdock Cove	Atlantic Salmon					184,598	Environmental challenges	Removed for rendering
2022-01-14									
2022-07-30	Little Burdock Cove		ISAv			1	22,891	ISA virus	Quarantine
2022-08-31				ISAv		2	46,003		Quarantine and harvest

Source: NAIA website (naia.ca).

5.8.3.2 *Disease*

In July 2022, during a routine passive screening of fish on the Little Burdock Cove sea farm, a Federally Reportable Disease, ISAv was detected (see Table 5.20). As per standard protocol, replicate samples were sent to other labs for confirmation. During this time, the sea farm was placed in quarantine pending a confirmation of the results. In late August 2022, it was confirmed that ISAv was present and the affected cages were harvested with oversight by FFA.

5.8.3.3 *Escapes*

No fish escapes were reported at sea farms in the Rencontre East BMA for the years publicly reported on NAIA website and the Aquaculture Portal 2019–2024 (see Table 5.20).

5.8.3.4 *Sea Lice*

Sea lice are reported on the NAIA website as an average number per fish. These results are not reported for each sea farm or each BMA but as an average for all active sea farms. Table 4.22 (see Section 4.8.3.4) summarizes the average sea lice/fish for all active sea farms for 2021–2024.

5.8.3.5 *Deposits of Drugs and Pesticides*

Between 2016–2020, MCE has used pest management products at its sea farms in BMA 2 including bath treatments (Azamethiphos and Hydrogen Peroxide), and in-feed treatments (Emamectin Benzoate and Ivermectin). In addition, the antibiotic Florfenicol was used in 2016, 2018 and 2021 (Table 5.21). These products have all been approved for use in Canada and four are registered with Health Canada (Azamethiphos, Hydrogen Peroxide, Emamectin Benzoate, and Florfenicol) while Ivermectin is available through Health Canada's EDR program. All applications are under the control of the DAV and only applied by individuals that have received training and licensing for the application.

Table 5.21. Summary of deposits of pesticides and drugs at sea farms in the Rencontre East BMA (2016–2022).

BMA	Sea Farm	Year	Bath Treatment		In-Feed Treatment		
			Azamethiphos (Salmosan) (kg)	Hydrogen Peroxide (kg)	Emamectin Benzoate (Slice) (kg)	Florfenicol (Aquaflor) (kg)	Ivermectin (Ivomec)(kg)
2	Deep Water Point	2016	15		6.064		
2	Deep Water Point	2018	5.229		0.9555		
2	Deep Water Point	2019	3.24		0.6		
2	Deep Water Point	2021	72.45	4726.5	0.48	63.38	
2	Deep Water Point	2022	11.55		0.1		
2	Little Burdock Cove	2016	12.75		5.736		
2	Little Burdock Cove	2017	1.5				
2	Little Burdock Cove	2018			0.8235		
2	Little Burdock Cove	2019	17.55	3600	0.712		
2	Little Burdock Cove	2021	37.8		0.33		
2	Little Burdock Cove	2022	68.05		0.75		
2	Old Woman's Cove	2016	4.5				
2	Old Woman's Cove	2018	8.684	3660	0.2611	5.515	0.022
2	Old Woman's Cove	2019	13.65		0.441		
2	Rencontre East Island	2016	7.5		0.9	9	0.7909
2	Rencontre East Island	2017	33.74		6.87519		
2	Rencontre East Island	2019	6.575	32,446.8	1.0832		
2	Rencontre East Island	2020	62.75				

Source: National Aquaculture Public Reporting Data Website (2024).
Notes:
At the time of writing, 2023 and 2024 data not available.

During 2016–2022, fish at all four sea farms received treatment from pesticide (bath) and drugs (in-feed) for sea lice. As per the AAR, the total amounts (kg) of each treatment were reported to DFO (see Table 5.21).

5.9 Exposure Zone Modelling

5.9.1 PEZ Modelling

DFO has not conducted PEZ modelling for BMA 2 sea farms.

5.9.2 Dispersion Modelling

Dispersion modelling by BMT was undertaken to model exposure zones of Azamethiphos (bath treatment) in a worst-case scenario approach (see Appendix B). The modelling study estimated an exposure profile for the entire BMA assuming sea farms were treated in sequence and concentrations were modelled from the first treatment at Old Woman's Cove sea cages (4 May 2023 for spring tide; 16 June 2023 for neap tide) through final treatment at Rencontre East sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 5.22).

Table 5.22. Treatment schedule (assumed dates) for sea farms in BMA 2 during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
Old Woman's Cove	1	4 May 2023	-315	16 Jun 2023	-315
	2	4 May 2023	-312	16 Jun 2023	-312
	3	5 May 2023	-291	17 Jun 2023	-291
	4	5 May 2023	-288	17 Jun 2023	-288
	5	6 May 2023	-267	18 Jun 2023	-267
	6	6 May 2023	-264	18 Jun 2023	-264
	7	7 May 2023	-243	19 Jun 2023	-243
Deep Water Point	1	7 May 2023	-240	19 Jun 2023	-240
	2	8 May 2023	-219	20 Jun 2023	-219
	3	8 May 2023	-216	20 Jun 2023	-216
	4	9 May 2023	-195	21 Jun 2023	-195
	5	9 May 2023	-192	21 Jun 2023	-192
	6	10 May 2023	-171	22 Jun 2023	-171
	7	10 May 2023	-168	22 Jun 2023	-168
Little Burdock Cove	1	11 May 2023	-147	23 Jun 2023	-147
	2	11 May 2023	-144	23 Jun 2023	-144
	3	12 May 2023	-123	24 Jun 2023	-123
	4	12 May 2023	-120	24 Jun 2023	-120
	5	13 May 2023	-99	25 Jun 2023	-99
	6	13 May 2023	-96	25 Jun 2023	-96
	7	14 May 2023	-75	26 Jun 2023	-75
Rencontre East Island	1	14 May 2023	-72	26 Jun 2023	-72
	2	15 May 2023	-51	27 Jun 2023	-51
	3	15 May 2023	-48	27 Jun 2023	-48
	4	16 May 2023	-27	28 Jun 2023	-27
	5	16 May 2023	-24	28 Jun 2023	-24
	6	17 May 2023	-3	29 Jun 2023	-3
	7	17 May 2023	0	29 Jun 2023	0

Exposure zone modelling of a worst-case scenario for Azamethiphos use in the Rencontre East BMA predicted maximum areas of 3.83 km^2 and 5.02 km^2 during neap and spring tides, respectively, where Azamethiphos concentrations exceeded 100 ng/L (0.1 µg/L) during the treatment duration. The maximum Azamethiphos concentration for the Rencontre East BMA was 2000 ng/L during the simulated neap tide and 2200 ng/L during the spring tide. The peak concentration occurred during the treatments of the third sea farm, Little Burdock Cove, and decreased shortly after treatments were completed; concentration levels 72 hrs after final treatment were below 100 ng/L (Figures 5.21 and 5.22). The maximum area within BMA 2 where Azamethiphos concentrations were predicted to exceed 100 ng/L was larger during the spring tide scenario (5.02 km^2) than during the neap tide scenario (3.83 km^2).

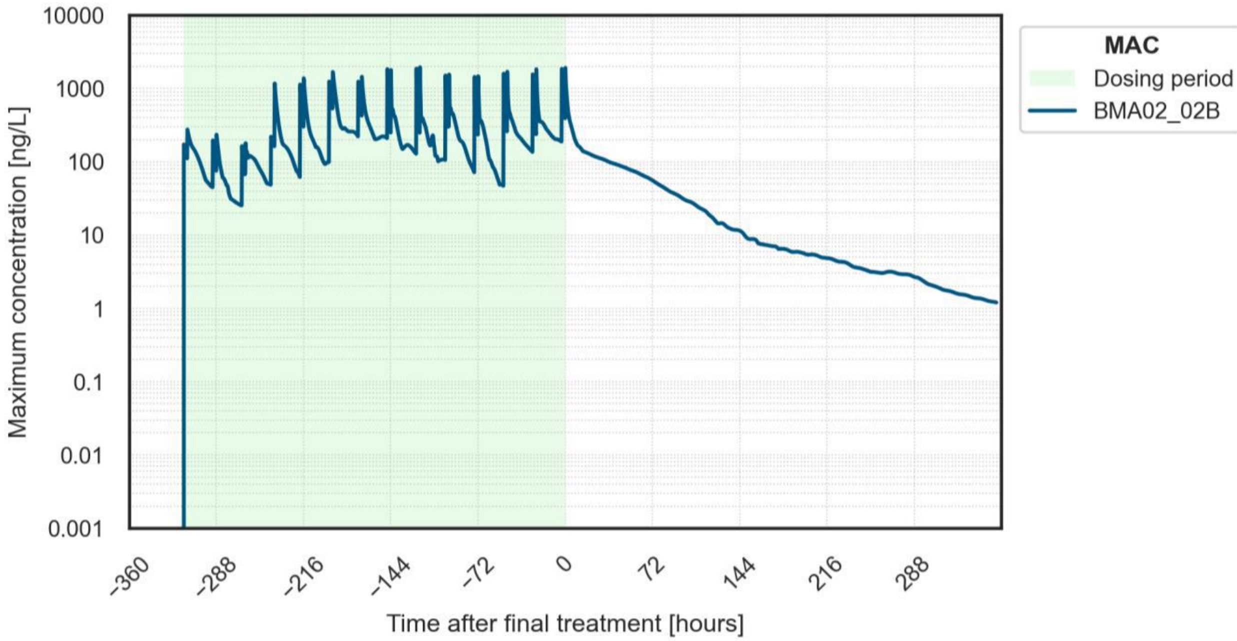


Figure 5.21. Maximum concentrations for Rencontre East BMA during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at Old Woman's Cove (assumed 16 June 2023) and final treatment was at Rencontre East Island (time=0; assumed 29 June 2023).

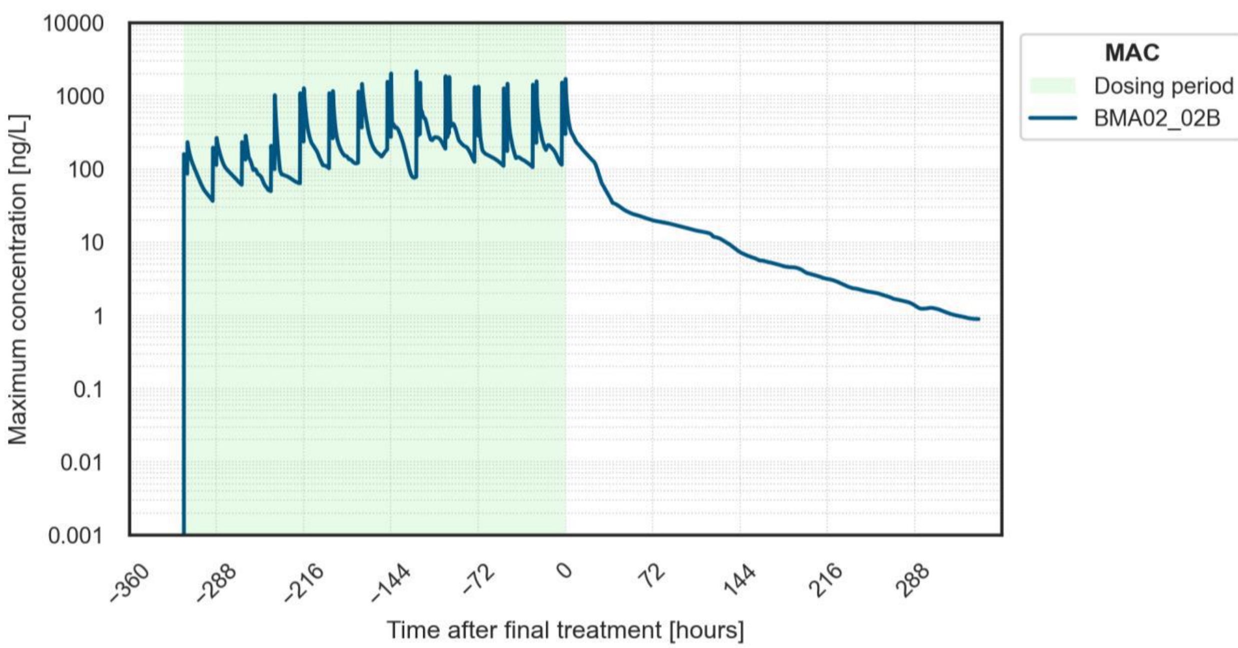


Figure 5.22. Maximum concentrations for Rencontre East BMA during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at Old Woman's Cove (assumed 4 May 2023) and final treatment was at Rencontre East Island (time=0; assumed 17 May 2023).

6.0 Fortune Bay West (BMA 3)

The Fortune Bay West BMA (BMA 3) is located in the Bays East Area and includes eleven licensed sea farms: Ironskull Point, Spyglass Cove, Spoon Cove, Cinq Island Cove, McGrath Cove South, McGrath Cove North, Belle Island, Tilt Point, Hickman's Point, Steamers Head and South East Bight (Table 6.1; Figure 6.1). The closest community to these sea farms is Pool's Cove. Most sea farms are located in relatively close proximity within the north portion of the BMA whereas Ironskull Point is further south. The majority of sea farms in BMA 3 have been previously stocked, with the exception of Belle Island and South East Bight which have never been in production.

Table 6.1. Fortune Bay West (BMA 3) sea farm locations and construction status in 2024.

BMA Name	BMA No.	Sea Farm Name	AQ Licence No.	Site Coordinates		Construction Status
				Latitude (N)	Longitude (W)	
Fortune Bay West	3	Ironskull Point	865	47.56811	-55.40319	Existing
		Spyglass Cove	881	47.62661	-55.47111	Existing
		Spoon Cove	882	47.70131	-55.43819	Existing
		Cinq Island Cove	883	47.63490	-55.46380	Existing
		McGrath Cove South	885	47.65939	-55.36989	Existing
		McGrath Cove North	886	47.66389	-55.37942	Existing
		Belle Island	888	47.63350	-55.35389	TBD
		Tilt Point	976	47.64311	-55.45150	Existing
		Hickman's Point	1002	47.71539	-55.39611	Existing
		Steamers Head	1050	47.69150	-55.43150	Existing
		South East Bight	1046	47.70950	-55.36119	TBD

The sea farms in Fortune Bay West were originally designed with either a 2x5, 2x6, 2x7, or 2x8 sea cage array with a net circumference of 90–100 m and a depth of 15 m. Beyond 2025, sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The maximum number of fish per site ranges from 600,000–700,000 with a maximum stocking density of 15 kg/m^3.

For sea farms with available information, the water depths below the leases range from 0–230 m (Table 6.2). The shallowest sea farm is Spyglass Cove where sea cage array depths range from 28–43 m. Sea farms have bottom sediments consisting of mixed substrates. All sites were classified with the majority having hard substrates with some mixed substrates including silt, sand or mud for an overall site classification of hard bottom.

Currents were reported at near surface, upper, mid-water, and near bottom depths. At 15 m water depth, the maximum water current speed at each site was between ~four to ~eleven times the mean speed (Table 6.2). There is much vertical variation in the maximum current speed and this variation is larger than the mean current speeds.

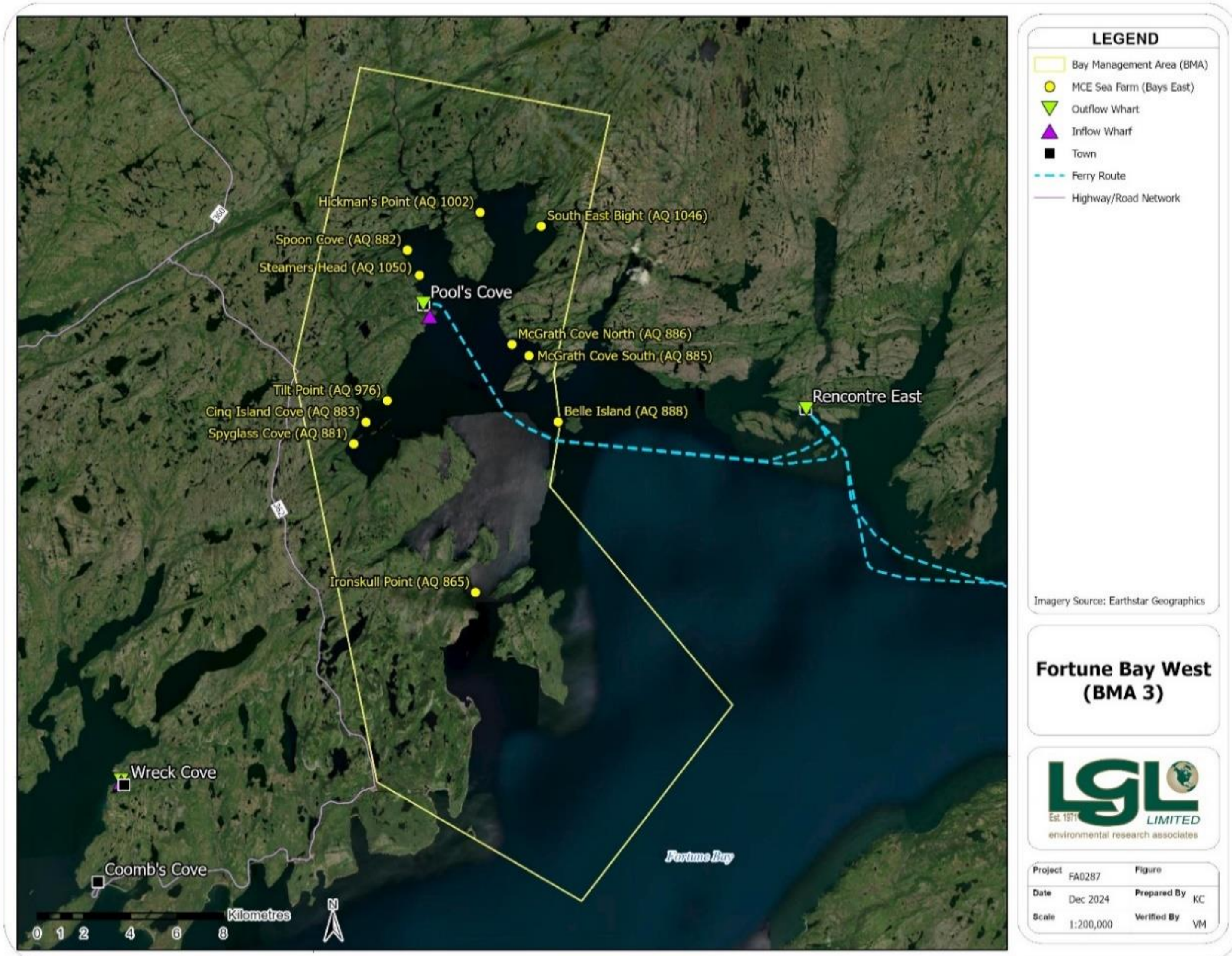


Figure 6.1. Locations of sea farms in the Fortune Bay West BMA.

Table 6.2. Summary of historic site-specific sea farm characteristics in Fortune Bay West (BMA 3)

Characteristic	Sea Farm										
	Ironskull Point	Spyglass Cove	Spoon Cove	Cinq Island Cove	McGrath Cove South	McGrath Cove North	Belle Island [a]	Tilt Point	Hickman's Point	Steamers Head	South East Bight [a]
Lease Area (ha)	31	20	20	20	20	20	20	20	20	20	20
Water depth under lease (m)	0–87	0–63	6–82	12–58	11–76	5–130	10–230	9–111	10–62	20–106	13–78
Water depth under sea cages (m)	53–71	28–43	34–74	48–58	31–60	71–82	n/a	27–63	35–58	35–67	n/a
Predominant Bottom Type	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard
Water Temperature (Mean °C at 15 m)											
Winter [b]	1.9	n/a	n/a	1.7	n/a	2.1	n/a	n/a	n/a	3.1	n/a
Spring [b]	4.3	n/a	n/a	4.1	n/a	3.9	n/a	n/a	n/a	4.4	n/a
Summer [b]	12.1	n/a	n/a	12.1	n/a	11.7	n/a	n/a	n/a	10.8	n/a
Fall [b]	8.8	n/a	n/a	8.6	n/a	8.9	n/a	n/a	n/a	7.9	n/a
Dissolved Oxygen (Mean mg/L at 15 m)											
Winter [b]	11.0	n/a	n/a	11.6	n/a	10.8	n/a	n/a	n/a	10.4	n/a
Spring [b]	11.1	n/a	n/a	10.3	n/a	11.2	n/a	n/a	n/a	10.9	n/a
Summer [b]	8.9	n/a	n/a	8.2	n/a	8.9	n/a	n/a	n/a	9.1	n/a
Fall [b]	9.2	n/a	n/a	9.4	n/a	9.1	n/a	n/a	n/a	9.2	n/a
Currents (cm/s at 15 m)											
Mean	10.2	1.95	2.21	2.2	2.10	3.4	4.7	5.24	1.64	3.60	1.98
Maximum	39.6	7.57	9.56	23.7	13.76	25.3	32.3	33.69	6.62	18.84	13.71

Notes:

[a] Belle Island and South East Bight sea farms have never been in production. Characteristics described as original design.

[b] Winter refers to January, February and March, Spring refers to April, May June, Summer is July, August, September and Fall is October, November and December. Water depth values may vary by approximately ±2 m depending on tidal influence.

Benthic habitat surveys revealed that the predominate flora and fauna at sea farms are anemones, coralline algae and ctenophores. Soft corals, kelp beds and vase tunicates were observed. Seasonal water temperatures at 15 m water depth were relatively similar across sea farms (see Table 6.2). Mean water temperatures ranged from 1.7°C in winter to 12.1°C in the summer. Dissolved oxygen levels were consistently lower in the summer and fall than winter and spring.

During 2009–2018, average monthly wind speeds ranged from 5.48 m/s in July to 10.8 m/s in January. The maximum wind speed during this period was 21.64 m/s in February. Wind direction in the Fortune Bay West BMA was predominately westerly. Mean wave height from 2009–2018 ranged from 0.24 m in July to 0.87 m in January. The maximum wave height was 1.91 m in February.

6.1 Sea Farm Site Maps

The past designs for sea farms in the Fortune Bay West BMA include 2x5, 2x6, 2x7, or 2x8 sea cage array with a net circumference of 90–100 m and a depth of 15 m. Beyond 2025, all sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The sea farms in the Fortune Bay West BMA are currently third-party certified or will be prior to future stocking [as per FFA policy (FFA 2019)].

6.1.1 Ironskull Point

As originally designed, the Ironskull Point sea farm has a 2x7 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.2). The sea farm design has been updated to a 1x6 cage array with a net circumference of 140 m and a depth of 35 m.

6.1.2 Spyglass Cove

As originally designed, the Spyglass Cove sea farm has a 2x5 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.3).

6.1.3 Spoon Cove

As originally designed, the Spoon Cove sea farm has a 2x6 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.4).

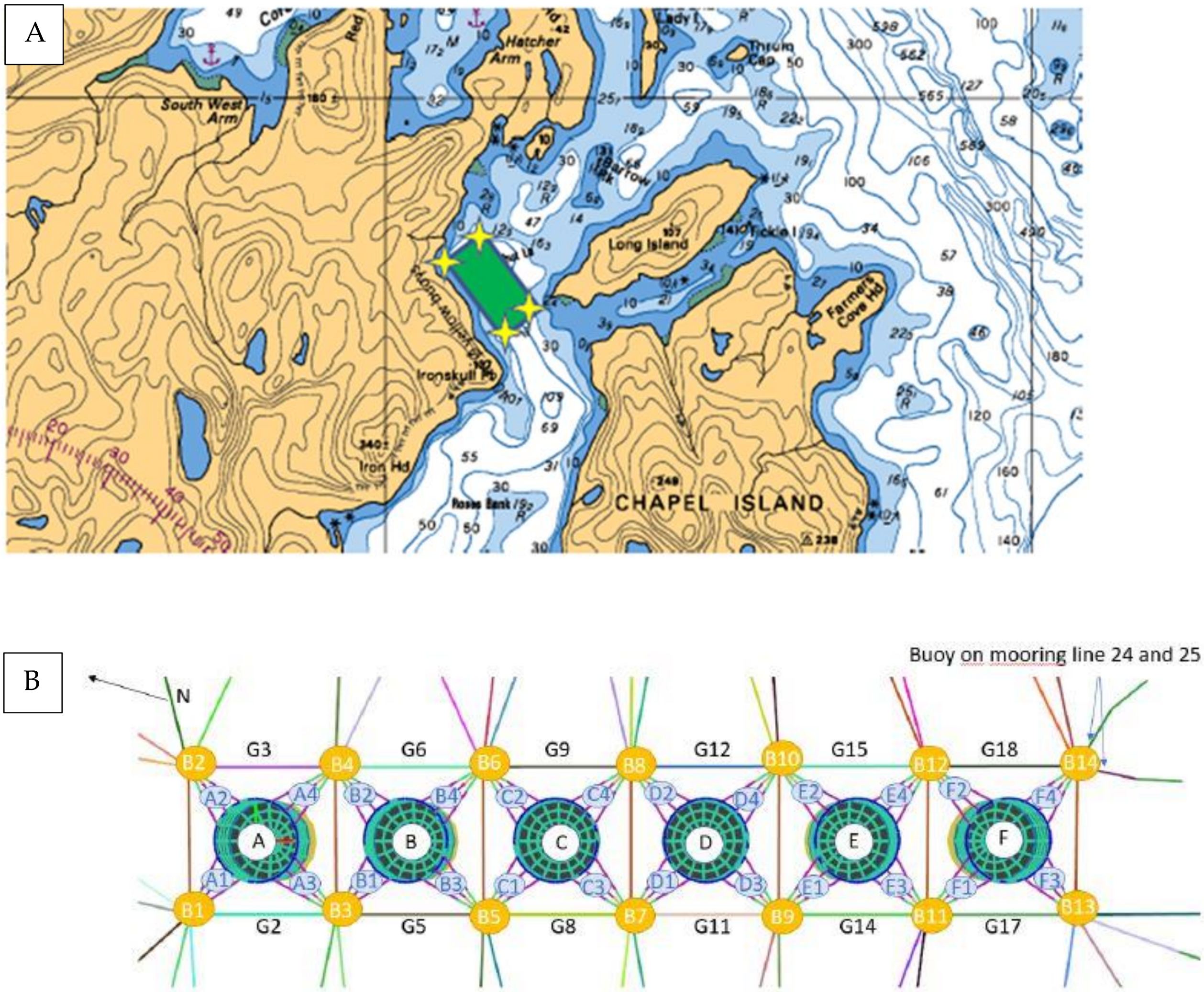


Figure 6.2. Ironskull Point (A) sea farm map and (B) sea cage layout.

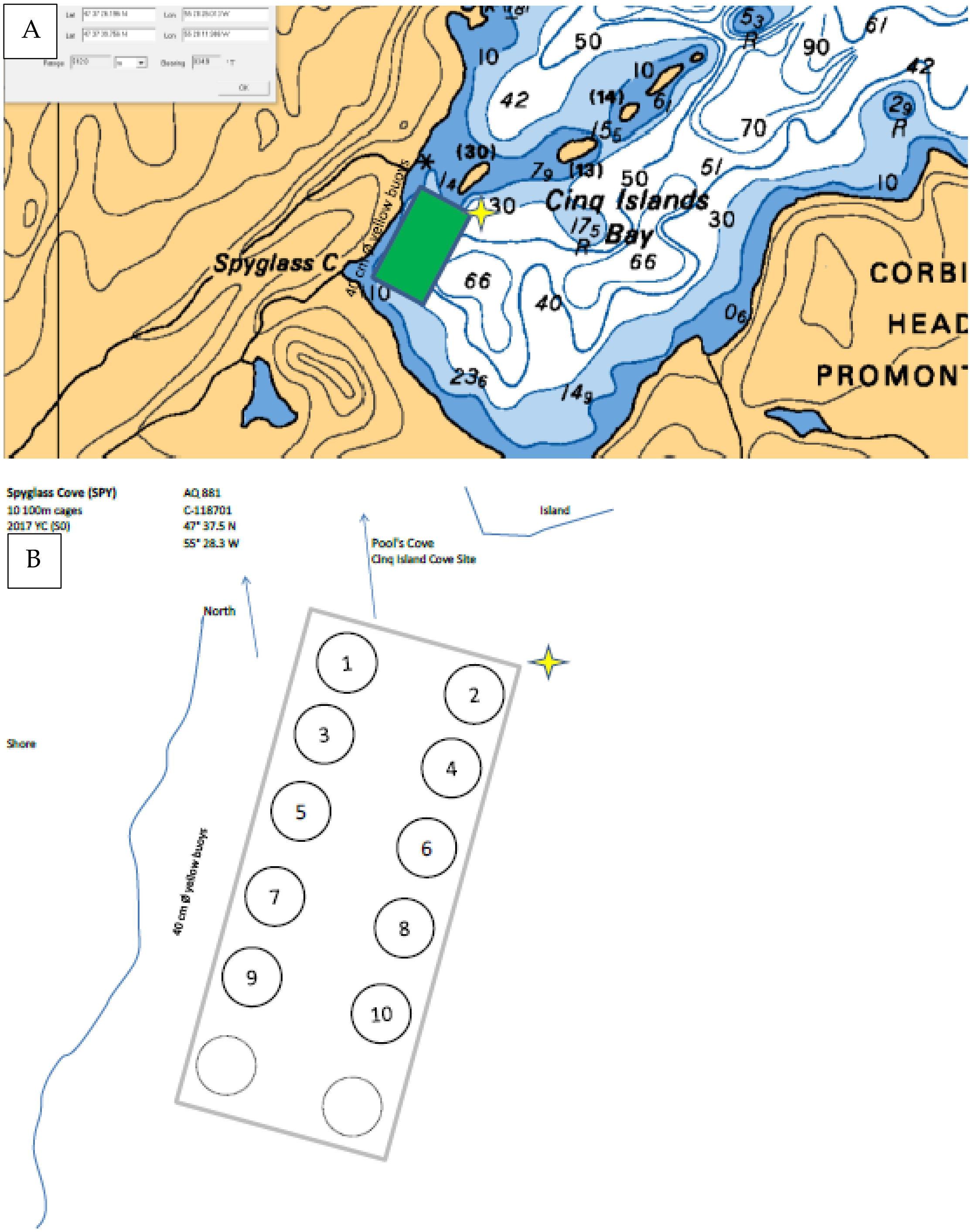


Figure 6.3. Spyglass Cove (A) sea farm map and (B) sea cage layout.

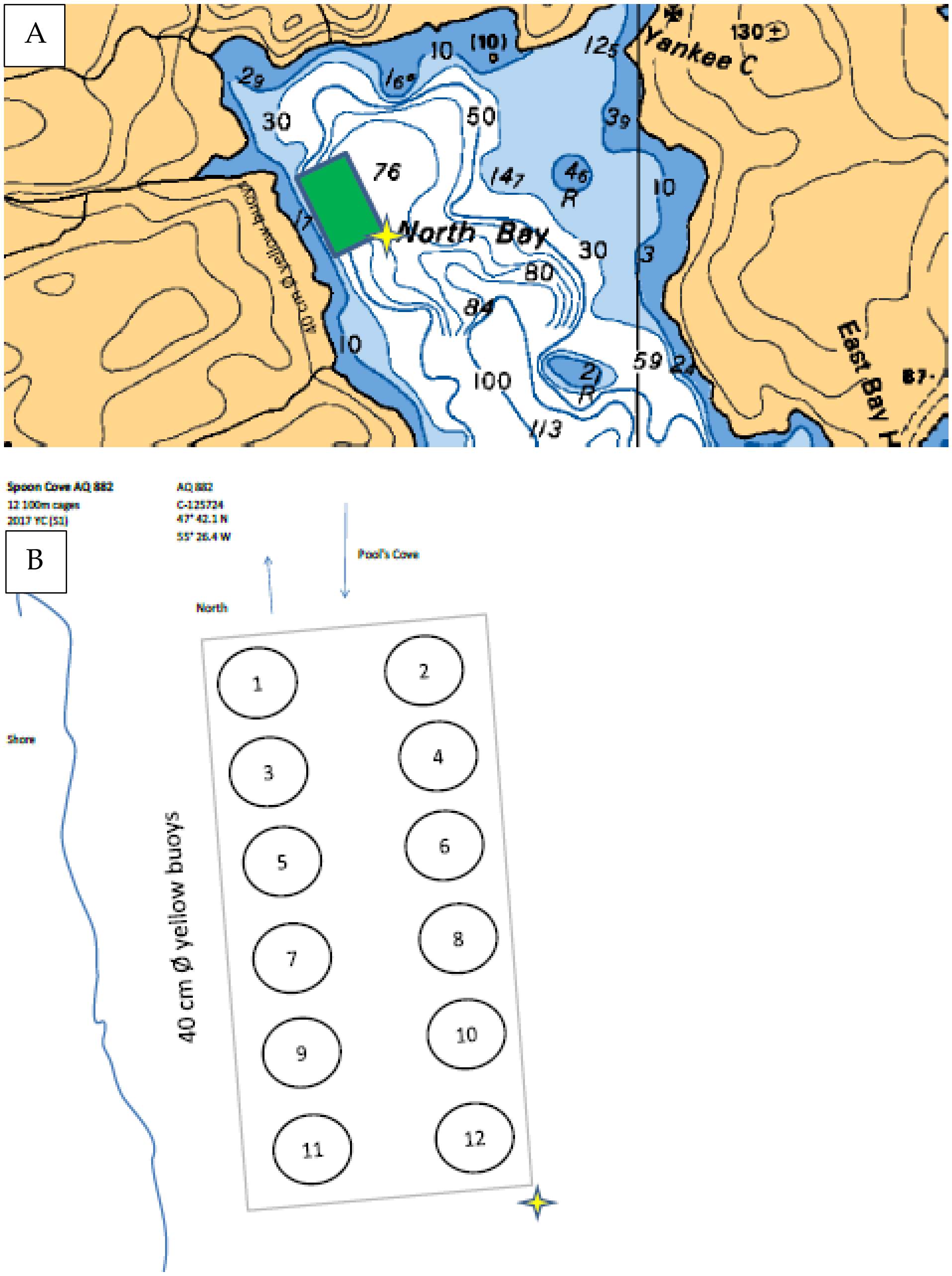


Figure 6.4. Spoon Cove (A) sea farm map and (B) sea cage layout.

6.1.4 Cinq Island Cove

As originally designed, the Cinq Island Cove sea farm has a 2x8 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.5). The sea farm design has been updated to a 1x6 cage array with a net circumference of 140 m and a depth of 35 m.

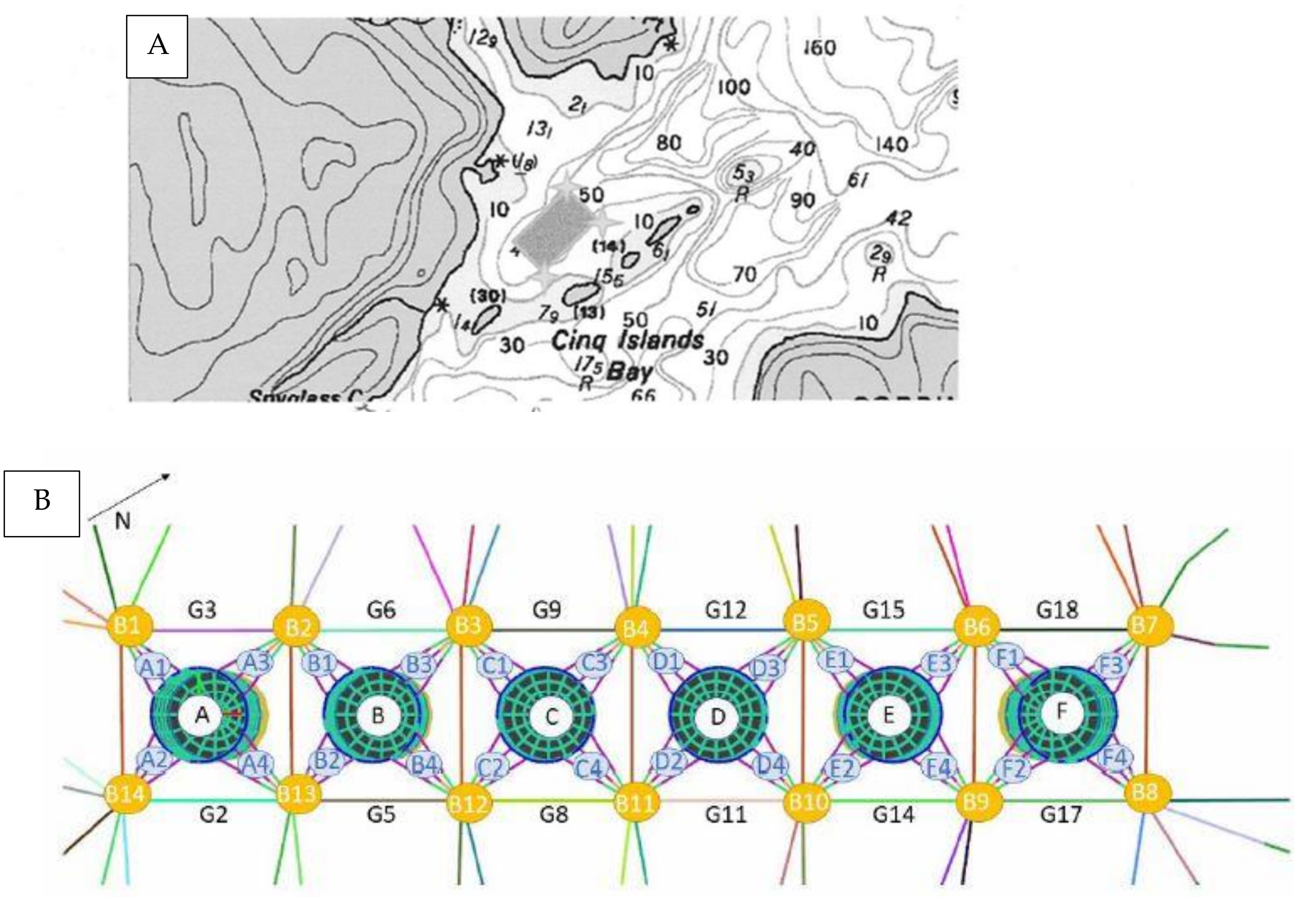


Figure 6.5. Cinq Island Cove (A) sea farm map and (B) sea cage layout.

6.1.5 McGrath Cove South

As originally designed, the McGrath Cove South sea farm has a 2x6 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.6).

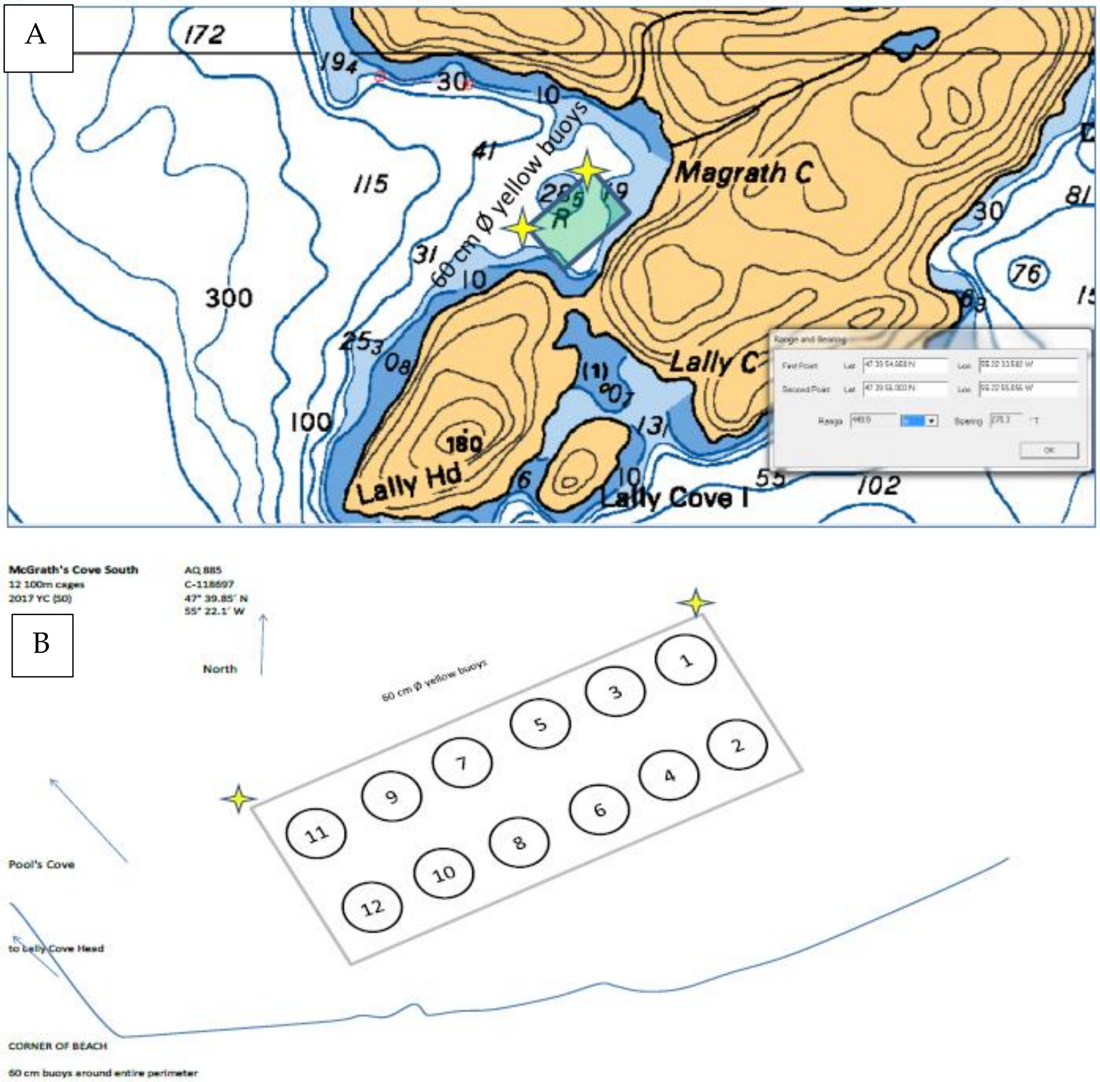


Figure 6.6. McGrath Cove South (A) sea farm map and (B) sea cage layout.

6.1.6 McGrath Cove North

As originally designed, the McGrath Cove North sea farm has a 2x8 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.7). The sea farm design has been updated to a 1x6 cage array with a net circumference of 140 m and a depth of 35 m.

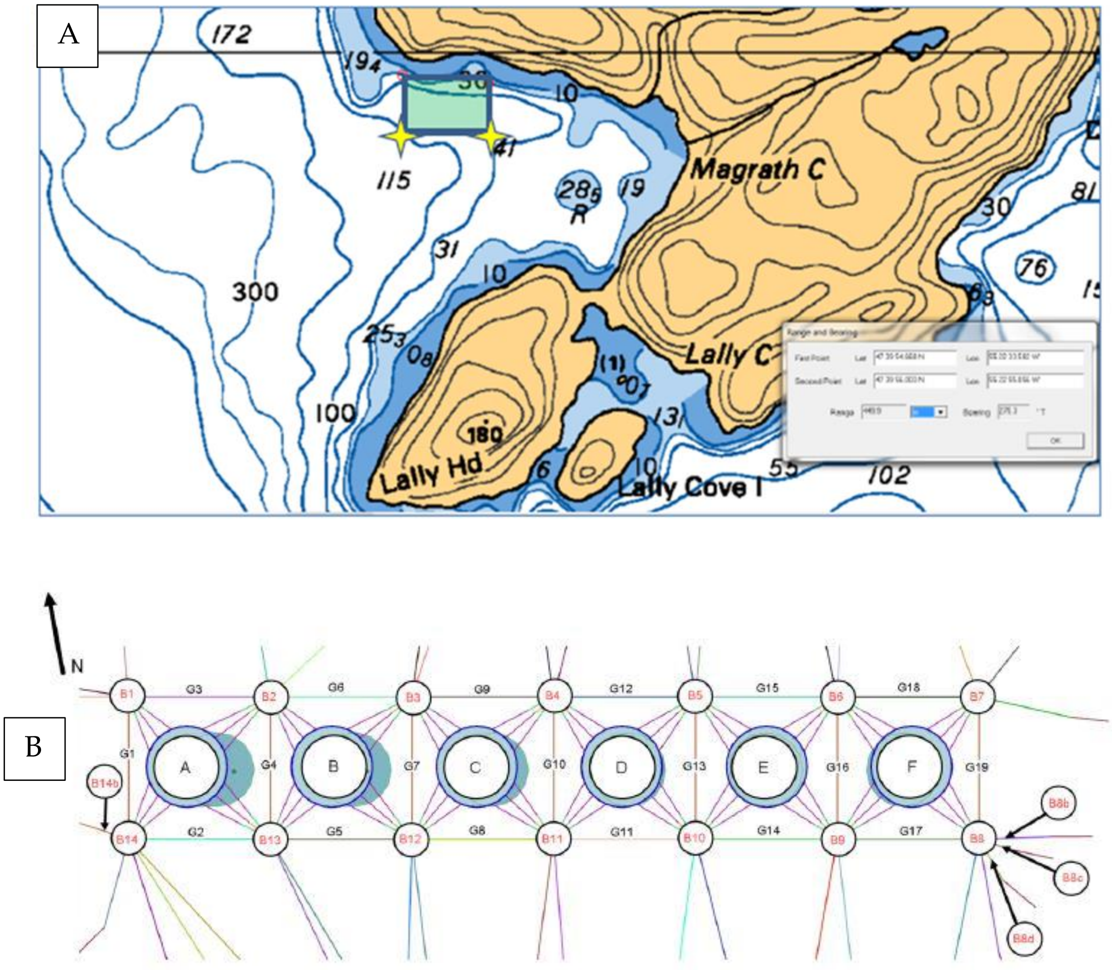


Figure 6.7. McGrath Cove North (A) sea farm map and (B) sea cage layout.

6.1.7 Belle Island

Belle Island has never been in production. Prior to MCE acquisition of Belle Island license, a farm design and sea cage layout was provided to regulators (Figure 6.8). The sea farm design has a 2x6 sea cage array with a net circumference of 100 m and a depth of 15 m. A production schedule has not been determined for Belle Island and thus the 2008 (Figure 6.8) design does not reflect MCE plans for the sea farm. Once a production schedule has been defined, a sea farm map and third-party certified sea cage layout will be developed.

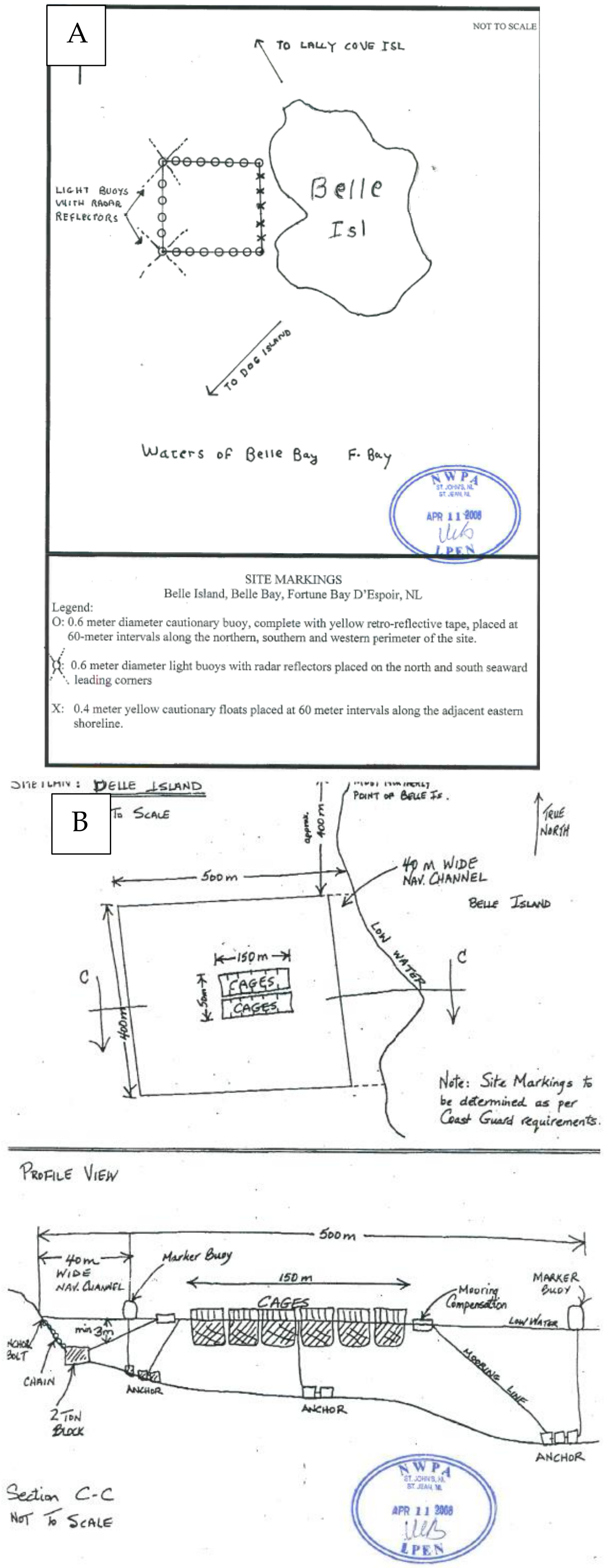


Figure 6.8. Belle Island (A) sea farm map and (B) sea cage layout.

6.1.8 Tilt Point

As originally designed, the Tilt Point sea farm has a 2x7 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.9).

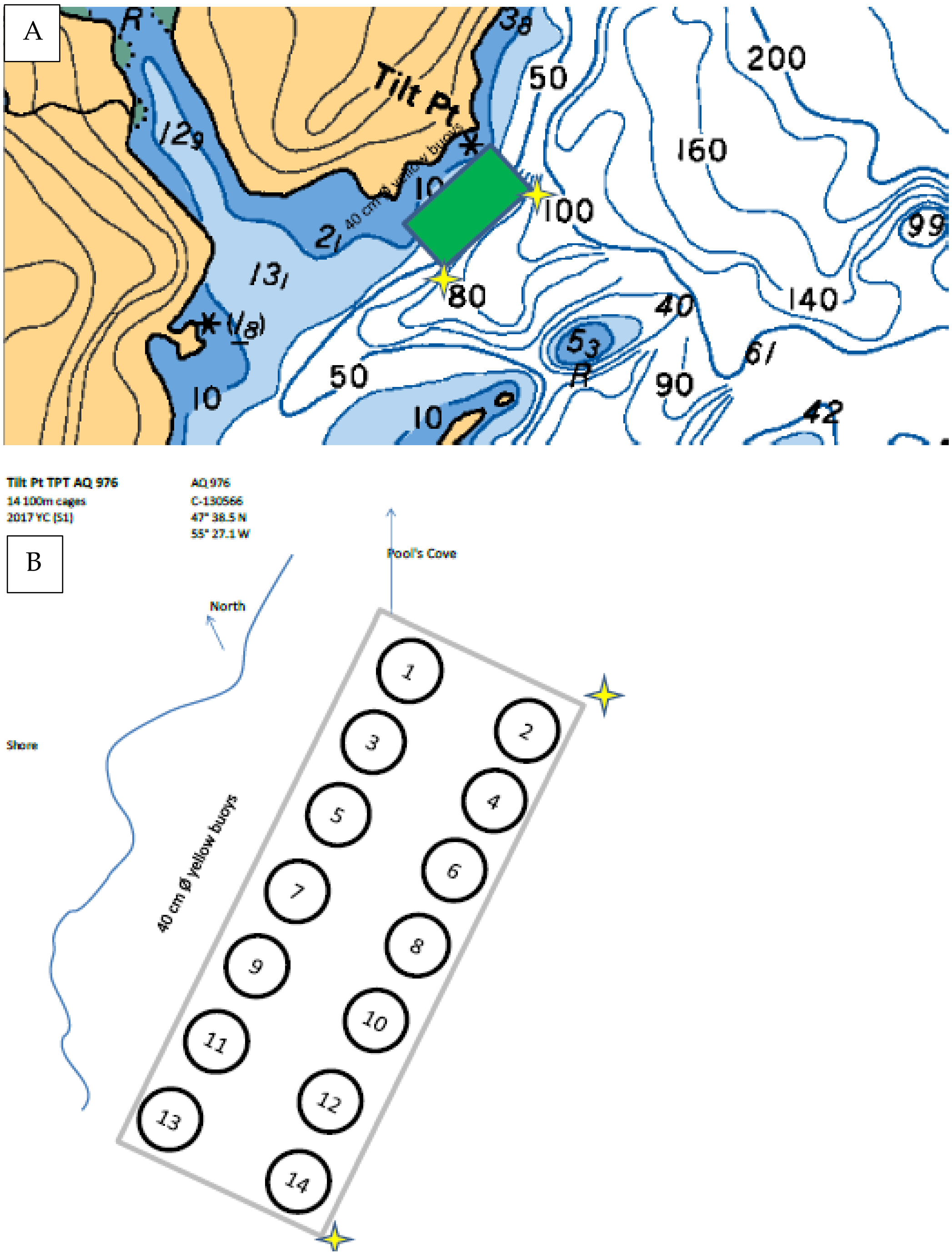


Figure 6.9. Tilt Point (A) sea farm map and (B) sea cage layout.

6.1.9 Hickman's Point

As originally designed, the Hickman's Point sea farm has a 2x6 sea cage array with a net circumference of 90–100 m and a depth of 15 m (Figure 6.10).

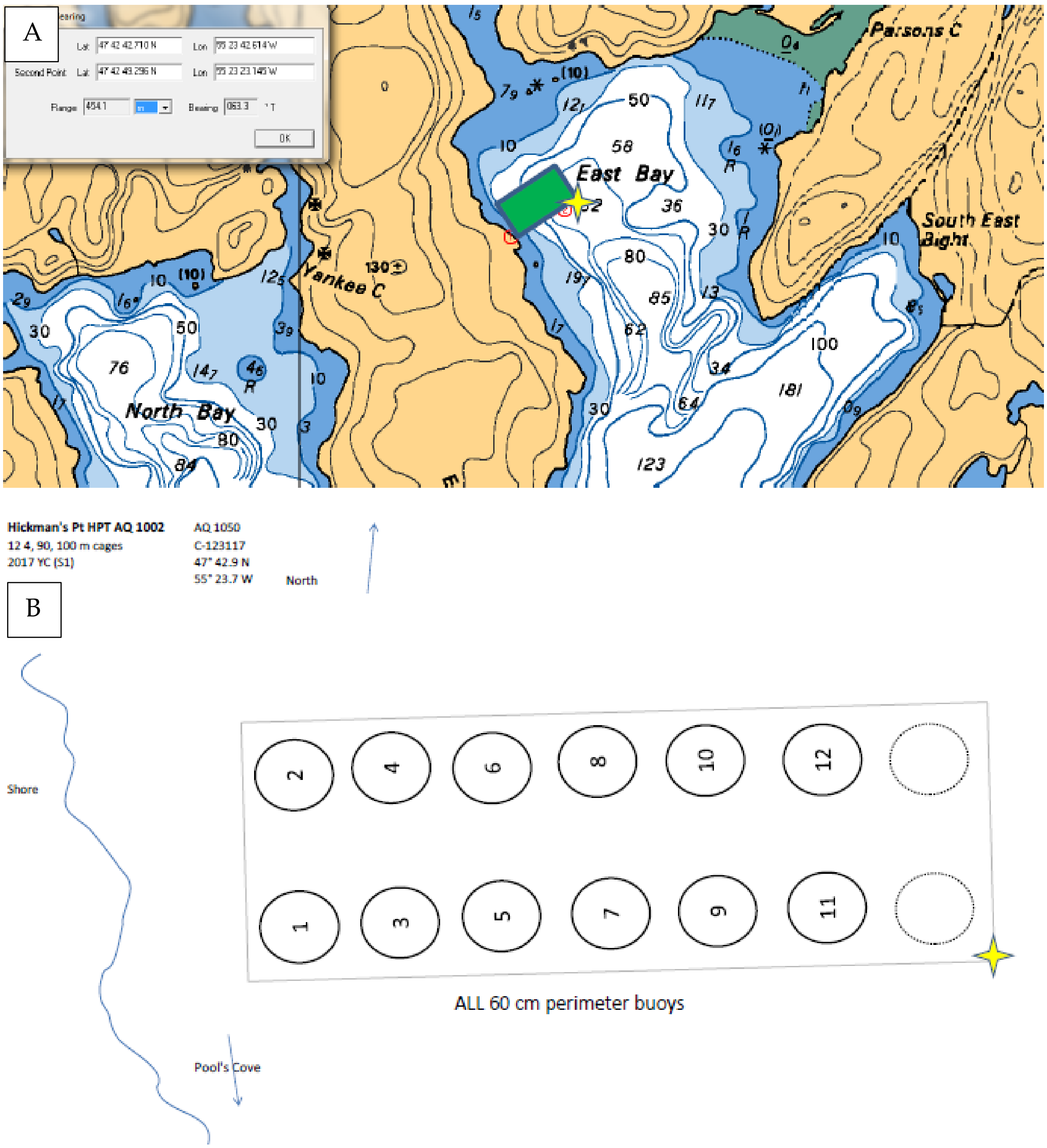


Figure 6.10. Hickman's Point (A) sea farm map and (B) sea cage layout.

6.1.10 Steamer's Head

As originally designed, the Steamer's Head sea farm has a 2x8 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 6.11).

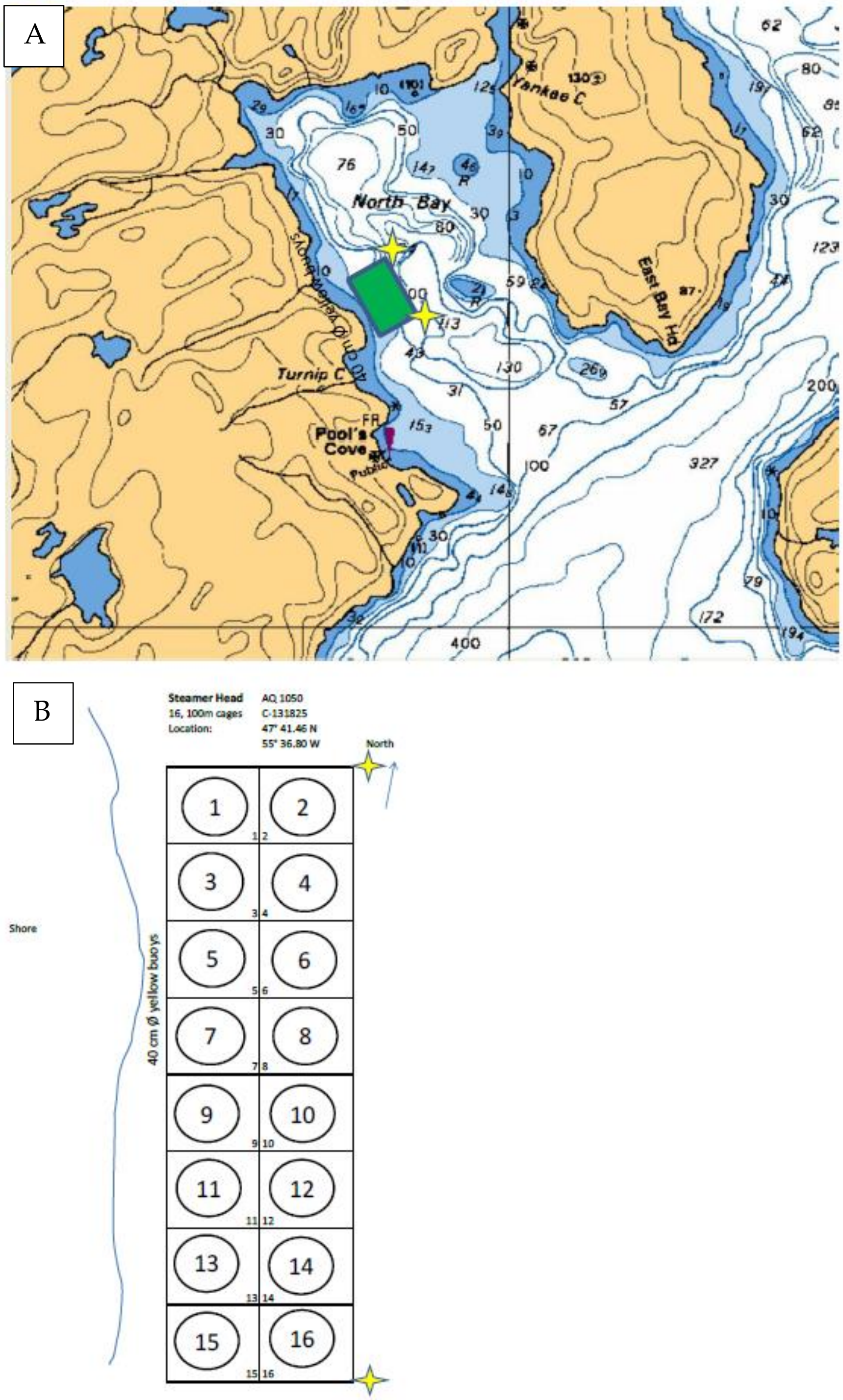


Figure 6.11. Steamers Head (A) sea farm map and (B) sea cage layout.

6.1.11 South East Bight

South East Bight has never been in production. Prior to MCE acquisition of South East Bight license, a sea farm design and sea cage layout was provided to regulators (Figure 6.12). The original sea farm design has a 2x5 sea cage array with a net circumference of 100 m and a depth of 15 m. A production schedule has not been determined for South East Bight and thus the 2009 (Figure 6.12) design does not reflect MCE plans for the sea farm. Once a production schedule has been defined, a sea farm map and third-party certified sea cage layout will be developed.

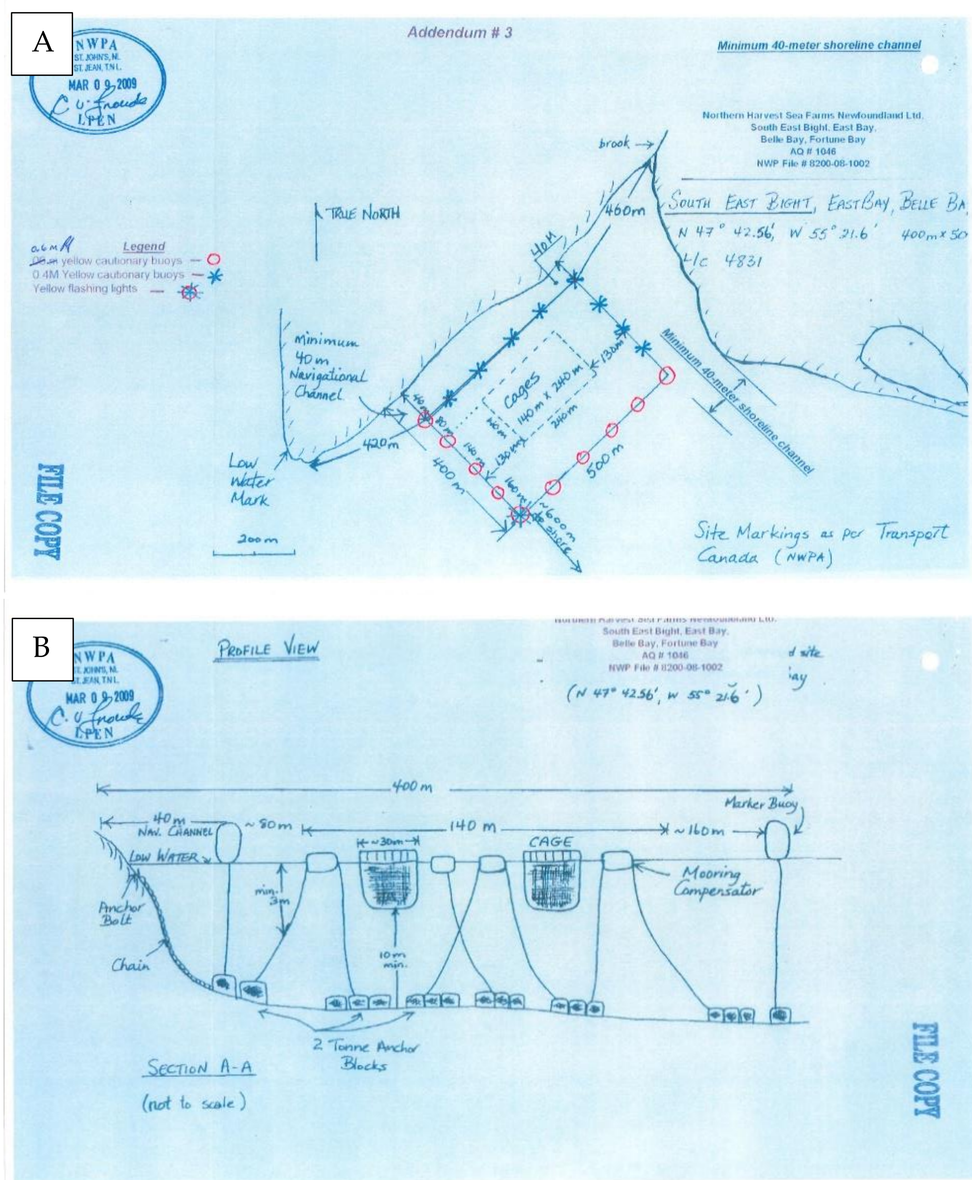


Figure 6.12. South East Bight (A) sea farm map and (B) sea cage profile.

6.2 Benthic Surveys

Benthic surveys at sea farms in the Fortune Bay West BMA were conducted in May and June of 2024, except for the Belle Island sea farm which was surveyed in December 2022. Stations categorized as hard bottom appeared hard visually or did not produce acceptable grab samples.

6.2.1 Ironskull Point

Based on surveys at 62 of the 64 sampling stations (~3% (n=2) were too shallow to sample or the cage was obstructed), the composition of the seafloor in the Ironskull Point sea farm is primarily mixed substrate with silt/mud characterizing the middle portion of the site and a mixture of grain sizes ranging from bedrock to silt characterizing the remaining site (Figure 6.13, Table 6.3). The majority of stations (43 of 62 with data) were considered hard bottom. The predominant species observed included coralline algae, anemones, cunners and scallops. Soft corals were noted across five stations. Eight kelp beds were present near the shoreline. One cluster of invasive vase tunicate was observed.

6.2.2 Spyglass Cove

Based on surveys at 46 of the 48 sampling stations (~4% (n=2) were not accessible due to the proximity to land), the composition of the seafloor in the Spyglass Cove sea farm is primarily cobble, gravel, sand, and silt (Figure 6.14, Table 6.4). The majority of stations (41 of 46 stations with data) were considered hard bottom. The predominant species observed included anemones, worms, cunners and ctenophores (Table 6.4). Soft corals were observed across six stations. Six kelp beds were present near the shoreline.

6.2.3 Spoon Cove

Based on surveys at 49 sampling stations, the composition of the seafloor in the Spoon Cove sea farm is primarily sand, silt, and gravel (Figure 6.15; Table 6.5). More than half of stations (28 of 49) were considered hard bottom. The predominant species observed included ctenophores, anemones, encrusting algae, kelp and scallops. Soft corals were observed across 10 stations. Two kelp beds were present near the shoreline.

6.2.4 Cinq Island Cove

Based on the surveys at 52 of 56 sampling stations (~7%(n=4) were on land or obstructed by the cage), the composition of the seafloor in the Cinq Island Cove sea farm is primarily cobble, gravel, sand, and silt (Figure 6.16; Table 6.6). The majority of stations (48 of 52 with data) were considered hard bottom. The predominant species observed included coralline algae, welks, worms, anemones, cunners and kelp (Table 6.6). Six kelp beds were present near the shoreline.

6.2.5 McGrath Cove South

Based on surveys at 55 sampling stations, the composition of the seafloor in the McGrath Cove South sea farm is primarily cobble, gravel and sand (Figure 6.17; Table 6.7). The majority of stations (53 of 55) were considered hard bottom. The predominant species observed included anemones, cunners and sponges (Table 6.7). Soft corals were observed across 11 stations. Three kelp beds were present near the shoreline.

6.2.6 McGrath Cove North

Based on surveys at 46 of the 49 stations (~6% (n=3) were obstructed by cage), the composition of the seafloor in the McGrath Cove North sea farm is primarily cobble, gravel, and sand (Figure 6.18; Table 6.8). The majority of stations (45 of 46 with data) were considered harm bottom. The predominant species observed included anemones, encrusting algae, sponges and cunners. Six kelp beds were present near the shoreline. Soft corals were observed across eight stations.

6.2.7 Belle Island

The Belle Island sea farm has never been active. Based on surveys at 47 sampling stations, the composition of the seafloor in the Belle Island sea farm is primarily silt/mud over bedrock or other hard substrate (Figure 6.19, Table 6.9). The majority of stations (46 of 47) were considered hard bottom. The predominant species observed included anemones, sponges, coralline algae, and scallops (Table 6.9). Soft coral was observed at one station.

6.2.8 Tilt Point

Based on surveys at 46 of 49 sampling stations (6%(n=3) were not visible due to kelp), the composition of the seafloor at Tilt Point is primarily cobble, gravel, and silt, often with larger grains such as boulders (Figure 6.20, Table 6.10). The majority of sampling stations (48 of 49) were considered hard bottom. The predominant species observed included anemones, worms and Ctenophores. Soft corals were observed across 15 stations. Other Nephthied corals were present at one station. Eight kelp beds were present near the shoreline.

6.2.9 Hickman's Point

Based on surveys at 47 of 48 sampling stations (~2%(n=1) were not visible due to kelp canopy), the composition of the seafloor in the Hickman's Point sea farm is primarily hard packed sand and silt (Figure 6.21, Table 6.11). The majority of stations (33 of 48) were considered hard bottom. The predominant species observed included Ctenophores, kelp (restricted to the photic zone), encrusting coralline algae, worms, and cunners. Soft corals were observed at three stations.

6.2.10 Steamers Head

Based on surveys at 56 sampling stations the composition of the seafloor in the Steamers Head sea farm is primarily sand, silt, and gravel (Figure 6.22; Table 6.12). The majority of stations (46 of the 56) were considered harm bottom. The predominant species observed included anemones, *Lithothamnion* sp and sponges. Soft corals were observed across 13 stations. Four kelp beds were present near the shoreline.

6.2.11 South East Bight

Based on surveys at 49 of the 50 sampling stations (2% (n=1) were not visible due to kelp coverage), the composition of the seafloor in the South East Bight is primarily cobble, gravel, sand, and silt (Figure 6.23; Table 6.13). All stations were considered hard bottom. The predominant species observed included sponges, Ctenophores, anemones, kelp (restricted to the photic zone) and scallops. Soft coral was observed across 20 stations. Two kelp beds were present near the shoreline.

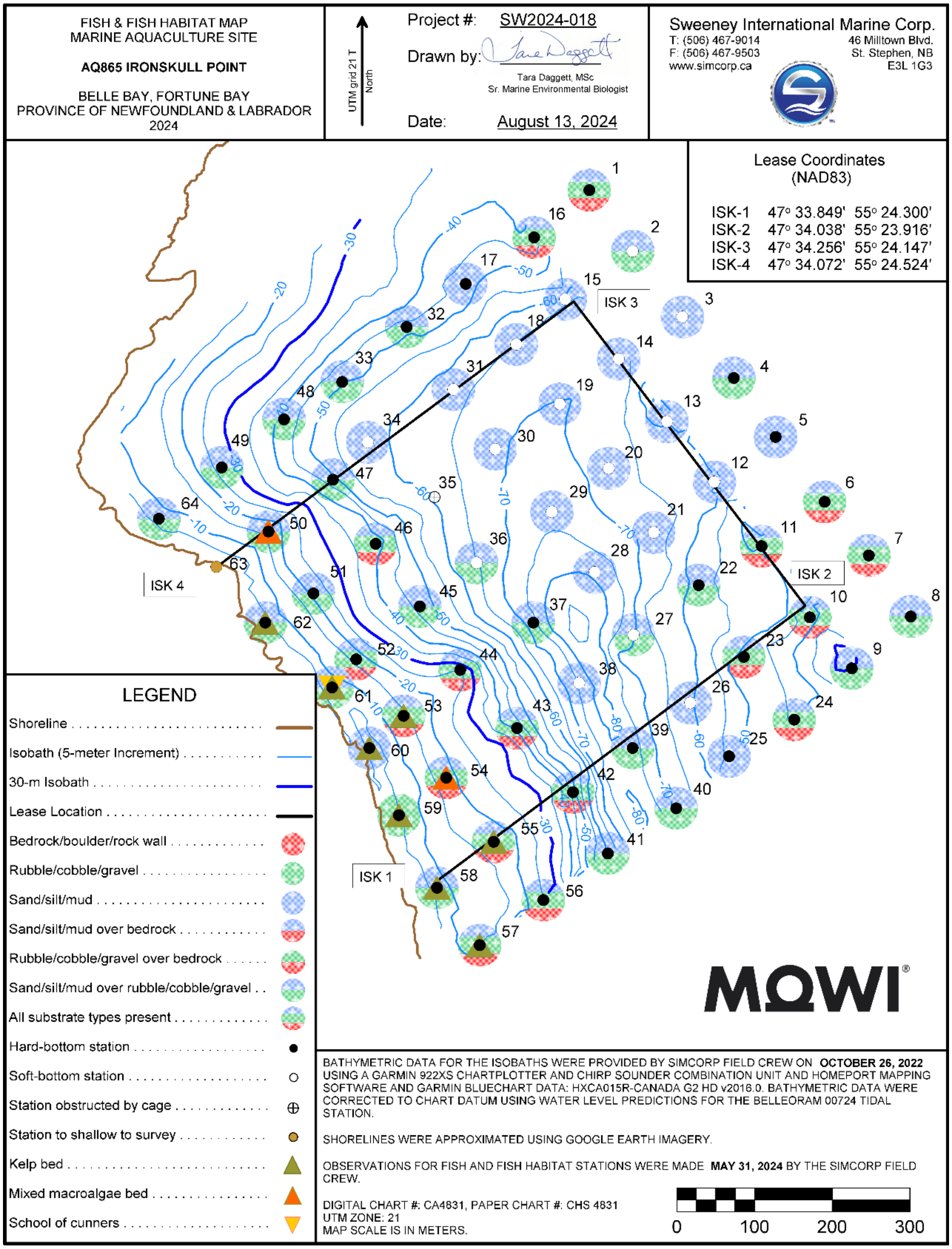


Figure 6.13. Habitat observations at sampling stations in the Ironskull Point sea farm (May 2024).

Table 6.3. Summary of bottom type and observed flora and fauna at the Ironskull Point sea farm (May 2024).

Ironskull Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
ISK	1	47 34.335	55 24.129	38	Hard		10%	5%	25%	10%	5%	15%	30%			ctenophore (1), *Lithothamnion* (20%), *Hildenbrandia* (5%), dulse (5%)
ISK	2	47 34.291	55 24.086	58	Soft					5%	15%	30%	50%			ctenophore (3), arrow worm (3), *Hormathia* anemone (3), Geodiidae sponge (1), *Serpula* (1), infaunal burrow (8), *Lithothamnion* (<5%)
ISK	3	47 34.244	55 24.036	61	Soft						<5%	5%	95%			arrow worm (3), *Hormathia* anemone (4), *Crangon* shrimp (5), infaunal burrow (12)
ISK	4	47 34.200	55 23.985	45	Hard					5%	25%	35%	35%	<5%		ctenophore (4), *Hormathia* anemone (3), Atlantic scallop (1), infaunal burrow (7), *Lithothamnion* (<5%)
ISK	5	47 34.158	55 23.943	55	Hard		<5%				<5%	45%	55%	<5%		*Hormathia* anemone (2), unidentified tube worm (2), infaunal burrow (18)
ISK	6	47 34.111	55 23.894	43	Hard			5%	20%	20%	5%	20%	30%	<5%		yellow encrusting sponge (<5%), American lobster (2), *Hormathia* anemone (9), *Stomphia* anemone (7), *Gersemia* soft coral (1), *Asterias* sea star (2), unidentified tube worm (3), *Lithothamnion* (20%), *Hildenbrandia* (5%), dulse (<5%)
ISK	7	47 34.073	55 23.850	35	Hard			10%	5%	25%	15%	20%	25%			*Hormathia* anemone (1), Icelandic scallop (4), Atlantic scallop (7), *Serpula* (1), *Lithothamnion* (5%) dulse (15%)
ISK	8	47 34.029	55 23.808	34	Hard					20%	55%	15%	10%			*Crangon* shrimp (1), *Hormathia* anemone (1), *Lithothamnion* (5%), *Hildenbrandia* (5%), *Saccharina* (<5%), dulse (5%)
ISK	9	47 33.993	55 23.870	31	Hard				5%	25%	30%	25%	15%			Atlantic scallop (8), dulse (10%), *Lithothamnion* (20%), *Hildenbrandia* (<5%), sea colander (<5%), *Saccharina* (<5%)
ISK	10	47 34.030	55 23.912	38	Hard		15%	5%	25%	30%	5%	10%	10%			Atlantic scallop (8), unidentified tube worm (1), *Lithothamnion* (20%), *Hildenbrandia* (5%), dulse (5%)
ISK	11	47 34.081	55 23.960	50	Hard	15%		10%	5%	15%	5%	15%	35%	<5%		*Hormathia* anemone (>20), *Melonanchora* sponge (9), Geodiidae sponge (6), *Lithothamnion* (5%)
ISK	12	47 34.127	55 24.007	61	Soft								95%	5%		infaunal burrow (7)
ISK	13	47 34.170	55 24.054	59	Soft								100%	<5%		*Hormathia* anemone (11), *Stomphia* anemone (3), Geodiidae sponge (9),

Ironskull Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																unidentified tube worm (1), infaunal burrow (>20)
ISK	14	47 34.215	55 24.102	69	Soft								100%			*Asterias* sea star (2), infaunal burrow (10)
ISK	15	47 34.258	55 24.156	66	Soft								100%	<5%		infaunal burrow (13)
ISK	16	47 34.302	55 24.187	43	Hard			5%	10%	25%	15%	20%	25%			*Hormathia* anemone (11), *Metridium* anemone (4), Atlantic scallop (1), *Lithothamnion* (5%), *Hildenbrandia* (5%), dulse (<5%)
ISK	17	47 34.270	55 24.258	48	Hard					<5%	<5%	15%	85%			*Hormathia* anemone (1), *Serpula* (2), *Geodiidae* sponge (1)
ISK	18	47 34.227	55 24.207	66	Soft								100%	<5%		American plaice (1), unidentified flatfish (1), infaunal burrow (>20)
ISK	19	47 34.184	55 24.164	71	Soft								100%	<5%		infaunal burrow (3)
ISK	20	47 34.138	55 24.115	68	Soft							<5%	100%			*Metridium* anemone (1), infaunal burrow (>20)
ISK	21	47 34.092	55 24.070	68	Soft							<5%	100%			infaunal burrow (8)
ISK	22	47 34.054	55 24.025	57	Hard				<5%	<5%	5%	15%	80%			*Hormathia* anemone (>20),Geodiidae sponge (2), *Melonanchora* sponge (9), *Gersemia* soft coral (1), brittle star (2), unidentified tube worm (1), infaunal burrow (7)
ISK	23	47 34.003	55 23.980	50	Hard			5%	10%	15%	30%	15%	25%			*Hormathia* anemone (>20), Geodiidae sponge (7), *Melonanchora* sponge (6), yellow encrusting sponge (<5%), *Gersemia* soft coral (1), unidentified tube worm (3), *Lithothamnion* (5%)
ISK	24	47 33.958	55 23.930	45	Hard			5%	5%	35%	15%	30%	10%			*Asterias* sea star (1), spiny sun star (1), *Melonanchora* sponge (4), Geodiidae sponge (4), encrusting sponge (<5%), *Hormathia* anemone (6), unidentified tube worm (1), *Lithothamnion* (15%), *Hildenbrandia* (<5%), dulse (<5%)
ISK	25	47 33.933	55 23.998	57	Hard							15%	85%			*Hormathia* anemone (>20), *Melonanchora* sponge (11), Geodiidae sponge (2), *Serpula* (1)
ISK	26	47 33.974	55 24.039	61	Soft							10%	90%			*Hormathia* anemone (>20), *Melonanchora* sponge (4), infaunal burrow (13)
ISK	27	47 34.020	55 24.093	70	Soft				<5%		5%	15%	80%			*Hormathia* anemone (>20), *Melonanchora* sponge (5), Geodiidae sponge (2), *Serpula* (4), infaunal burrow (4)
ISK	28	47 34.065	55 24.132	79	Soft								100%	<5%		infaunal burrow (5)
ISK	29	47 34.108	55 24.174	75	Soft							5%	95%	<5%		American plaice (1), infaunal burrow (>20)

Ironskull Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
ISK	30	47 34.153	55 24.231	70	Soft								100%	<5%		American plaice (1), infaunal burrow (14)
ISK	31	47 34.196	55 24.273	65	Soft								100%	<5%		infaunal burrow (9)
ISK	32	47 34.241	55 24.319	45	Hard			<5%	5%	10%	15%	45%	25%			*Stomphia* anemone (2), *Hormathia* anemone (1), Geodiidae sponge (>20), American lobster (1), *Lithothamnion* (5%), *Hildenbrandia* (<5%)
ISK	33	47 34.203	55 24.387	49	Hard					20%	35%	20%	25%			*Stomphia* anemone (2), brittle star (1)
ISK	34	47 34.160	55 24.362	60	Soft								80%	10%	10%	vase tunicate (>20)
ISK	35	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cage obstruction
ISK	36	47 34.073	55 24.253	67	Soft					5%		15%	65%	15%	<5%	arrow worm (7), krill (12)
ISK	37	47 34.030	55 24.196	76	Hard					10%	<5%	5%	85%			arrow worm (4), krill (2)
ISK	38	47 33.985	55 24.150	78	Soft					<5%		15%	85%			arrow worm (1), *Hormathia* anemone (>20), infaunal burrow (>20)
ISK	39	47 33.940	55 24.096	80	Hard					<5%	10%	20%	70%			arrow worm (3), *Hormathia* anemone (>20), *Melonanchora* sponge (2), ctenophore (3), infaunal burrow (>20)
ISK	40	47 33.897	55 24.053	71	Hard				<5%		15%	20%	65%			*Gersemia* soft coral (2), *Hormathia* anemone (>20), *Melonanchora* sponge (4), Geodiidae sponge (4), unidentified tube worm (1),unidentified fish (1), infaunal burrow (8), *Pandalus* shrimp (1), branching bryozoan (1)
ISK	41	47 33.866	55 24.124	66	Hard					<5%	10%	25%	65%			*Hormathia* anemone (>20), *Gersemia* soft coral (1), arrow worm (2)
ISK	42	47 33.910	55 24.159	48	Hard			5%	10%	35%	10%	30%	10%			ctenophore (4), *Hormathia* anemone (5), Atlantic scallop (1), *Lithothamnion* (<5%), dulse (<5%)
ISK	43	47 33.956	55 24.215	47	Hard			10%	15%	10%	5%	45%	15%			*Melonanchora* sponge (5), brittle star (1), ctenophore (2), *Hormathia* anemone (1), *Asterias* sea star (1), *Serpula* (4), *Lithothamnion* (5%), *Hildenbrandia* (5%), dulse (<5%)
ISK	44	47 33.998	55 24.272	29	Hard		45%	10%	10%	5%	5%	15%	10%			*Asterias* sea star (3), yellow encrusting sponge (<5%), Atlantic scallop (1), American lobster (1), *Lithothamnion* (20%), *Hildenbrandia* (5%), *Saccharina* (5%), sea colander (25%), dulse (5%)
ISK	45	47 34.043	55 24.312	50	Hard						15%	45%	40%			American plaice (2), brittle star (4), dulse (<5%)
ISK	46	47 34.088	55 24.356	42	Hard		25%	<5%	<5%	15%	10%	40%	10%			*Melonanchora* sponge (14), ctenophore (1), *Hormathia*

Ironskull Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																anemone (3), *Lithothamnion* (15%), *Hildenbrandia* (5%), dulse (<5%)
ISK	47	47 34.134	55 24.398	54	Hard					15%	15%	40%	30%	<5%		ctenophore (1), Atlantic scallop (1)
ISK	48	47 34.177	55 24.447	45	Hard					20%	15%	35%	30%	<5%		infaunal burrow (12), ctenophore (1), worm tube (>20)
ISK	49	47 34.144	55 24.512	30	Hard					15%	35%	35%	15%			Atlantic scallop (8), ctenophore (2), *Lithothamnion* (<5%), dulse (<5%), *Desmarestia* (<5%)
ISK	50	47 34.098	55 24.466	18	Hard				15%	35%	10%	25%	15%			*Asterias* sea star (1), cunner (2), unidentified flatfish (2), *Lithothamnion* (30%), *Hildenbrandia* (<5%), sea colander (25%), *Saccharina* (20%), dulse (5%)
ISK	51	47 34.054	55 24.421	24	Hard					5%	45%	30%	20%			Atlantic scallop (2), *Lithothamnion* (<5%), sea colander (5%)
ISK	52	47 34.007	55 24.378	22	Hard		25%			20%	15%	30%	10%			blood star (8), Atlantic scallop (1), cunner (3), *Lithothamnion* (35%), *Hildenbrandia* (5%), dulse (5%), sea colander (30%), *Saccharina* (5%), *Ascophyllum* (<%5), unidentified Rhodophyta (<5%)
ISK	53	47 33.966	55 24.331	15	Hard		30%			10%	35%	10%	10%			blood star (2), cunner (1), *Lithothamnion* (15%), *Hildenbrandia* (<5%), *Saccharina* (40%), sea colander (15%)
ISK	54	47 33.922	55 24.288	18	Hard		15%	10%		25%	15%	25%	10%			American lobster (1), Atlantic scallop (3), cunner (3), *Lithothamnion* (30%), *Saccharina* (25%), sea colander (25%), dulse (10%), unidentified Rhodophyta (<5%)
ISK	55	47 33.876	55 24.241	18	Hard		45%			15%	30%	5%	5%			cunner (2), blood star (5), American lobster (1), *Lithothamnion* (25%), *Saccharina* (35%), sea colander (20%), dulse (<5%)
ISK	56	47 33.834	55 24.191	27	Hard		25%			15%	10%	25%	25%			*Hormathia* anemone (2), Atlantic scallop (2), American plaice (1), ctenophore (1), unidentified tube worm (1), *Lithothamnion* (20%), *Hildenbrandia* (5%), dulse (5%)
ISK	57	47 33.803	55 24.258	15	Hard		15%			15%	45%	15%	10%			Atlantic scallop (1), *Asterias* sea star (2), blood star (2), *Lithothamnion* (10%), *Saccharina* (45%), sea colander (5%), dulse (<5%)
ISK	58	47 33.844	55 24.300	8	Hard				25%	25%	25%	15%	10%			cunner (8), blood star (1), *Saccharina* (65%), sea colander (<5%),

Ironskull Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Lithothamnion (5%)
ISK	59	47 33.896	55 24.338	6	Hard				50%		50%					cunner (14), *Saccharina* (90%), *Desmarestia* (<5%), *Lithothamnion* (5%)
ISK	60	47 33.944	55 24.367	3	Hard							95%	5%			cunner (1), *Saccharina* (95%), *Desmarestia* (<5%)
ISK	61	47 33.987	55 24.404	8	Hard						65%	30%	5%			cunner (>20), *Saccharina* (90%), *Desmarestia* (<5%)
ISK	62	47 34.034	55 24.471	6	Hard						60%	35%	5%			cunner (12), *Saccharina* (95%)
ISK	63	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station too shallow to sample
ISK	64	47 34.109	55 24.578	10	Hard					45%	25%	30%				cunner (5), *Lithothamnion* (15%), *Saccharina* (35%), *Desmarestia* (<5%)

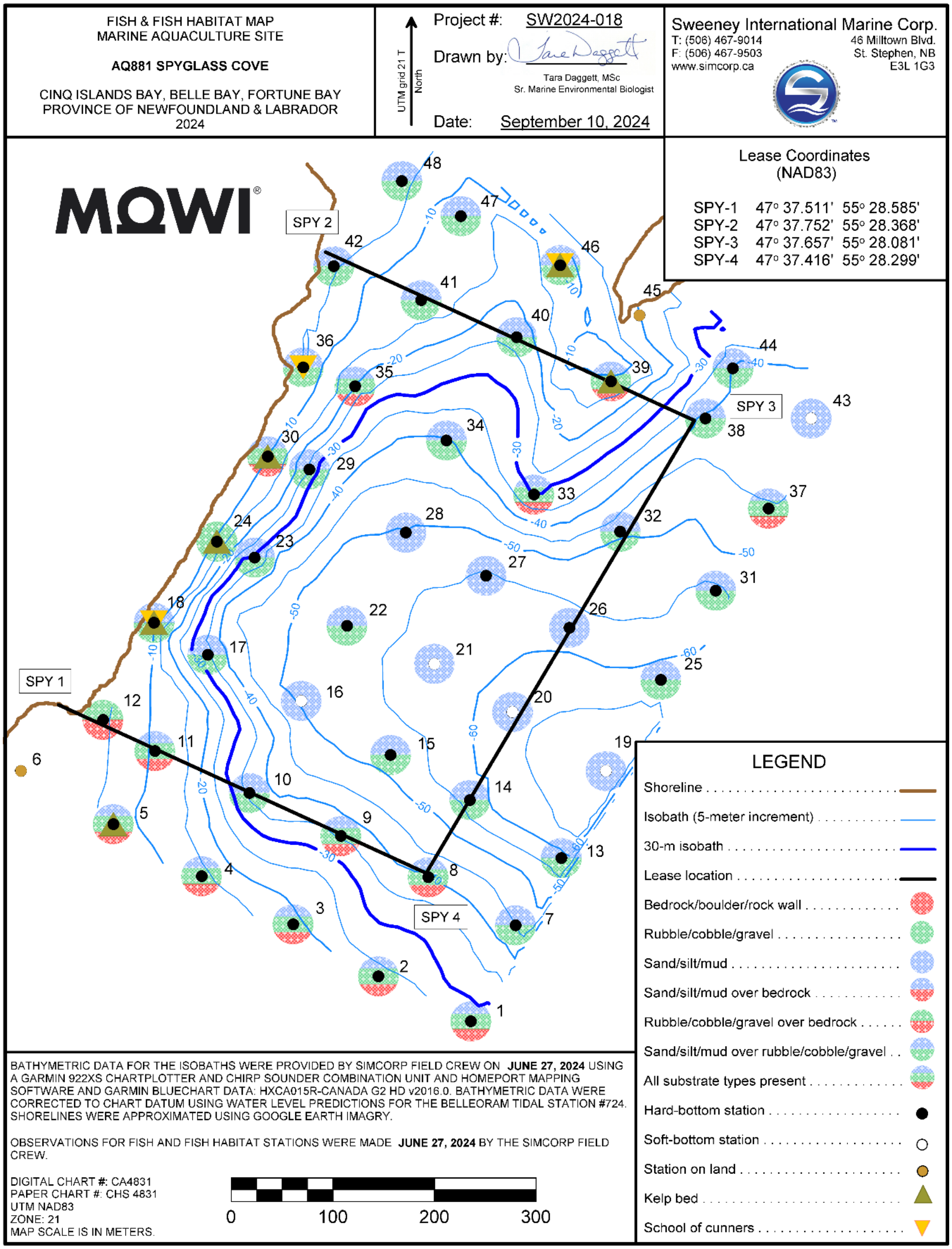


Figure 6.14. Habitat observations at sampling stations in the Spyglass Cove sea farm (June 2024).

Table 6.4. Summary of bottom type and observed flora and fauna at the Spyglass Cove sea farm (June 2024).

Spyglass Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SPY	1	47 37.336	55 28.266	26	Hard	Hard		50%			5%	<5%	20%	25%		yellow round sponge (2), ctenophore (2), Atlantic scallop (1), *Lithothamnion* (<5%), *Palmaria palmata* (15%), *Ascophyllum* sp. (<5%), *Saccharina* sp. (<5%)
SPY	2	47 37.361	55 28.338	24	Hard	Hard		5%			10%	45%	10%	30%		*Henricia* sea star (1), ctenophore (1), *Spirorbis* worm (>20), *Agarum* sp. (5%), *Lithothamnion* (5%), *Palmaria palmata* (10%), *Ascophyllum* sp. (<5%), *Saccharina* sp. (5%), *Desmarestia* (<5%), *Sagina subulata* (<5%)
SPY	3	47 37.390	55 28.404	19	Hard	Hard		5%			10%	55%	5%	25%		*Spirorbis* worm (>20), *Sagina subulata* (10%), *Lithothamnion* (5%), *Agarum* sp. (<5%), *Saccharina* sp. (15%), *Ascophyllum* sp. (<5%)
SPY	4	47 37.417	55 28.475	14	Hard	Hard		60%			5%	15%	10%	10%		*Spirorbis* worm (>20), unidentified flounder (1), Rhodophyta (5%), *Lithothamnion* (<5%), *Saccharina* sp. (25%)
SPY	5	47 37.446	55 28.544	7	Hard	Hard		70%				25%	5%	<5%		American lobster (1), *Spirorbis* worm (>20), cunner (3), ctenophore (1), unidentified flatfish (2), *Laminaria* sp. (40%), unidentified brown algae (25%)
SPY	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station located on land
SPY	7	47 37.387	55 28.229	42	Hard				<5%	30%	5%		65%			*Hormathia* anemone (3), Rhodophyta (5%)
SPY	8	47 37.414	55 28.297	41	Hard		5%		5%	25%	35%		30%			branching bryozoan (1), *Lithothamnion* (5%), *Hildenbrandia* (<5%)
SPY	9	47 37.437	55 28.365	36	Hard			5%	25%	15%	15%		40%			*Hormathia* anemone (1), *Lithothamnion* (20%), *Hildenbrandia* (15%)
SPY	10	47 37.461	55 28.436	37	Hard					40%	40%		20%			*Spirorbis* worm (>20), *Saccharina* sp. (10%), *Lithothamnion* (10%), *Hildenbrandia* (5%)
SPY	11	47 37.485	55 28.510	11	Hard		40%			10%	15%		35%			American plaice (3), unidentified flounder (4), cunner (6), Atlantic scallop (1), *Saccharina* sp. (10%), unidentified brown algae (<5%), *Fucus* sp. (<5%), Rhodophyta (<5%)
SPY	12	47 37.502	55 28.550	4	Hard		15%				85%					*Spirorbis* worm (>20), unidentified flounder (3), cunner (4), ctenophore (1), unidentified brown algae (15%), *Saccharina* sp. (5%), *Ascophyllum* (15%), Rhodophyta (<5%)
SPY	13	47 37.423	55 28.192	60	Hard					10%	5%		85%			*Hormathia* anemone (16), yellow round sponge (1)
SPY	14	47 37.455	55 28.263	58	Hard					30%	15%		55%			*Hormathia* anemone (11), yellow round sponge (1)
SPY	15	47 37.480	55 28.325	52	Hard			<5%	<5%	40%	10%		50%			*Hormathia* anemone (19), yellow encrusting sponge (<5%), *Lithothamnion* (<5%)
SPY	16	47 37.510	55 28.394	51	Soft								100%	<5%		*Spirorbis* worm (>20), *Hormathia* anemone (1), infaunal burrow (>20)

Spyglass Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SPY	17	47 37.536	55 28.467	35	Hard					65%	25%		10%			branching bryozoan (>20), Atlantic scallop (1), encrusting orange sponge (<5%), *Laminaria* sp. (< 5%), unidentified brown algae (<5%), *Ascophyllum* (<5%), *Lithothamnion* (<5%)
SPY	18	47 37.554	55 28.509	11	Hard				40%	30%	25%		5%			*Spirorbis* worm (>20), cunner (>20), *Saccharina* sp. (75%), unidentified brown algae (<5%), *Desmarestia* (<5%)
SPY	19	47 37.469	55 28.156	68	Soft							10%	90%			krill (>20), worm tube (1), infaunal burrow (>20)
SPY	20	47 37.502	55 28.228	64	Soft							15%	85%			krill (3), infaunal burrow (>20)
SPY	21	47 37.529	55 28.289	56	Soft							20%	80%			krill (3), infaunal burrow (6)
SPY	22	47 37.557	55 28.357	58	Hard				<5%	<5%	5%	20%	75%			infaunal burrow (10)
SPY	23	47 37.588	55 28.429	30	Hard				<5%	20%	60%	10%	10%			yellow encrusting sponge (<5%), *Lithothamnion* (5%), *Hildenbrandia* (<5%), Rhodophyta (<5%)
SPY	24	47 37.597	55 28.458	11	Hard				40%	60%						cunner (7), *Spirorbis* worm (>20), Rhodophyta (<5%), *Saccharina* sp. (95%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)
SPY	25	47 37.518	55 28.111	63	Hard					5%		10%	85%			*Gersemia* soft coral (3), worm tube (3), *Hormathia* anemone (>20), krill (2), infaunal burrow (12)
SPY	26	47 37.547	55 28.182	58	Hard						<5%	10%	90%			yellow round sponge (1), *Gersemia* soft coral (1), infaunal burrow (6), ctenophore (1), *Hormathia* anemone (>20)
SPY	27	47 37.576	55 28.247	57	Hard							25%	75%			brittle star (1), infaunal burrow (5), ctenophore (1)
SPY	28	47 37.600	55 28.309	50	Hard							20%	80%			ctenophore (2), infaunal burrow (5)
SPY	29	47 37.635	55 28.384	26	Hard				5%	15%	80%		<5%			*Spirorbis* worm (>20), ctenophore (4), *Lithothamnion* (<5%), *Hildenbrandia* (<5%), *Agarum* sp. (<5%), Rhodophyta (<5%)
SPY	30	47 37.642	55 28.417	10	Hard			5%		10%	35%	35%	15%			*Spirorbis* worm (>20), cunner (11), American plaice (1), *Saccharina* sp. (70%), Rhodophyta (<5%), unidentified brown algae (<5%), *Agarum* sp. (<5%)
SPY	31	47 37.565	55 28.067	57	Hard			<5%	<5%	30%	10%		60%			*Hormathia* anemone (7), *Henricia* star (1), infaunal burrow (10), *Gersemia* soft coral (1), *Lithothamnion* (<5%),
SPY	32	47 37.598	55 28.141	50	Hard					40%	20%		40%			*Hormathia* anemone (3), ctenophore (1), Rhodophyta (<5%)
SPY	33	47 37.619	55 28.208	28	Hard		5%	10%	40%	20%	10%		15%			ctenophore (1), *Spirorbis* worm (>20), *Henricia* seastar (1), yellow encrusting sponge (<5%), *Lithothamnion* (35%), *Hildenbrandia* (10%), *Agarum* sp. (10%), Rhodophyta (5%), *Saccharina* sp. (<5%)
SPY	34	47 37.649	55 28.276	41	Hard				<5%	10%	<5%	25%	65%			infaunal burrow (>20)

Spyglass Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SPY	35	47 37.679	55 28.347	24	Hard			10%	10%	40%	30%	5%	5%			*Spirorbis* worm (>20), ctenophore (3), *Lithothamnion* (5%), Rhodophyta (5%), *Agarum* sp. (10%), *Saccharina* sp. (<5%), *Ascophyllum* (<5%)
SPY	36	47 37.690	55 28.387	5	Hard				<5%	40%	50%	10%	5%			cunner (>20), unidentified flounder (2), *Agarum* sp. (<5%), *Ascophyllum* (<5%), *Desmarestia* (10%), Rhodophyta (<5%), *Saccharina* (5%)
SPY	37	47 37.609	55 28.024	46	Hard			5%	25%	20%	10%	30%	10%			burrowing anemone (1), *Hormathia* anemone (6), *Gersemia* soft coral (5), whelk (6), encrusting orange sponge (<5%), encrusting white sponge (<5%), *Lithothamnion* (20%), *Hildenbrandia* (15%)
SPY	38	47 37.658	55 28.072	41	Hard				<5%	15%	30%	30%	25%			Atlantic scallop (5), burrowing anemone (1), unidentified burrowing organism (1), whelk (14), *Lithothamnion* (<5%), unidentified Rhodophyta (<5%)
SPY	39	47 37.679	55 28.146	12	Hard			30%	25%	15%	<5%	10%	20%			*Asterias* sea star (1), cunner (2), white branching bryozoan (>20), Lacy crust bryozoan (<5%), *Lithothamnion* (35%), *Hildenbrandia* (10%), *Desmarestia* (10%), *Saccharina* (50%), sea colander (5%), Rhodophyta (15%)
SPY	40	47 37.704	55 28.219	30	Hard				<5%	35%	45%	15%	5%			Atlantic scallop (6), *Spirorbis* worm (>20), *Lithothamnion* (25%), *Hildenbrandia* (<5%), *Saccharina* (15%), *Agarum* sp. (20%), Rhodophyta (5%)
SPY	41	47 37.725	55 28.294	14	Hard				<5%	10%	30%	55%	5%			cunner (2), Atlantic scallop (1), *Spirorbis* worm (>20), *Lithothamnion* (<5%), *Ascophyllum* (<5%), *Desmarestia* (15%), *Saccharina* (10%), *Agarum* sp. (<5%), Rhodophyta (5%)
SPY	42	47 37.744	55 28.362	5	Hard				<5%	15%	30%	45%	10%			cunner (10), summer flounder (1), winter flounder (6), infaunal burrow (4), *Lithothamnion* (<5%), *Ascophyllum* (5%), *Desmarestia* (40%), *Saccharina* (<5%)
SPY	43	47 37.657	55 27.989	44	Soft					<5%	<5%	60%	40%			infaunal burrow (11), *Desmarestia* (<5%)
SPY	44	47 37.685	55 28.050	41	Hard				<5%	15%	10%	45%	30%			burrowing anemone (1), winter flounder (1), Rhodophyta (<5%)
SPY	45	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station located on land
SPY	46	47 37.742	55 28.184	12	Hard				<5%	10%	70%	20%	<5%			*Asterias* sea star (1), cunner (>20), American lobster (2), unidentified worm (1), *Lithothamnion* (<5%), *Desmarestia* (10%), *Saccharina* (55%), Rhodophyta (<5%)
SPY	47	47 37.770	55 28.261	13	Hard				<5%	25%	60%	15%	<5%			cunner (6), Atlantic scallop (1), winter

Spyglass Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																flounder (1), *Lithothamnion* (55%), *Hildenbrandia* (<5%), *Desmarestia* (<5%), *Saccharina* (5%), *Agarum* sp. (15%), Rhodophyta (15%)
SPY	48	47 37.789	55 28.307	4	Hard			<5%	<5%	15%	30%	45%	10%			cunner (3), Icelandic scallop (1), periwinkle (3), *Ascophyllum* sp. (<5%), *Desmarestia* (20%), *Fucus* (<5%), *Saccharina* (10%)

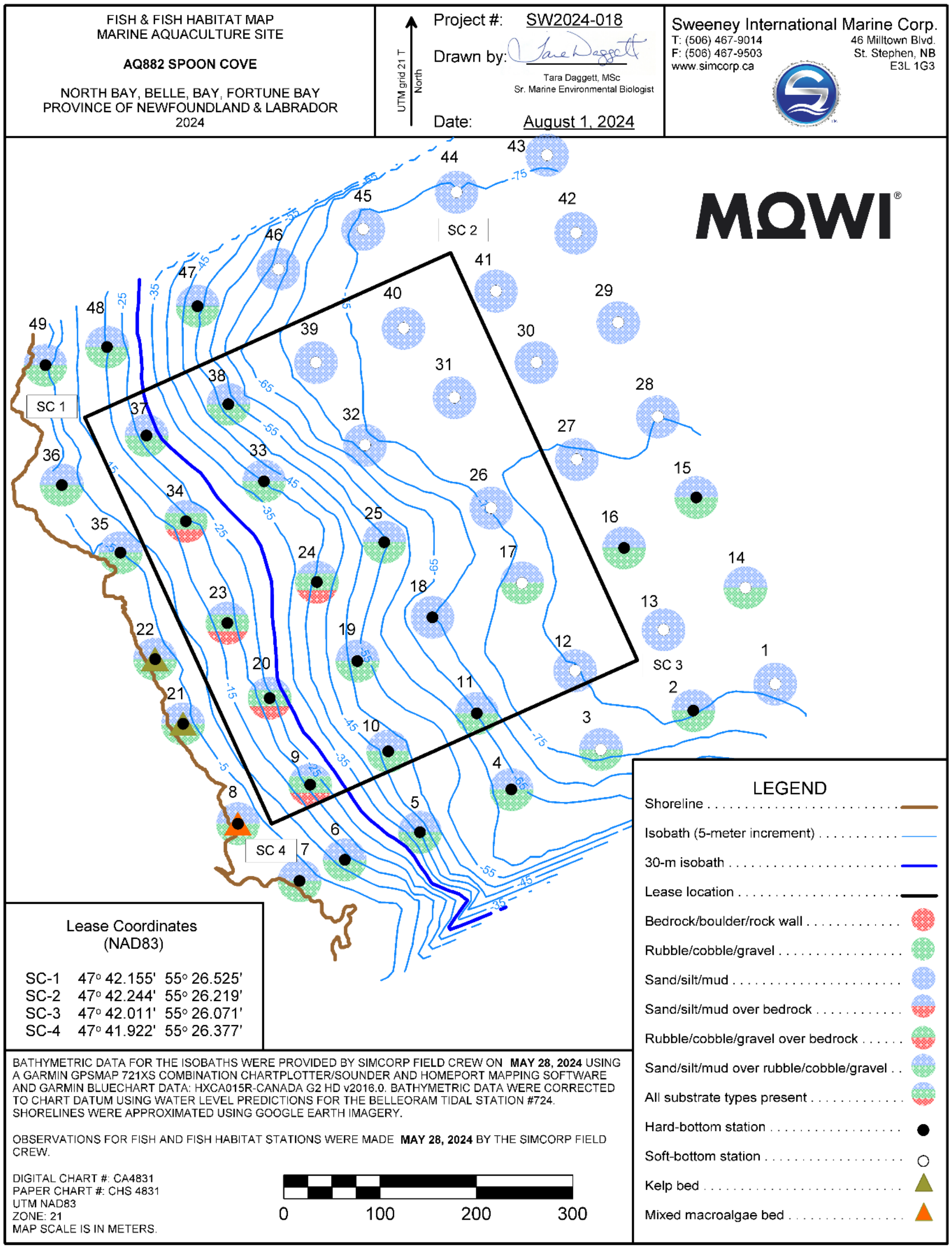


Figure 6.15. Habitat observations at sampling stations in the Spoon Cove sea farm (May 2024).

Table 6.5. Summary of bottom type and observed flora and fauna at the Spoon Cove sea farm (May 2024).

Spoon Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SPC	1	47 41.996	55 25.957	81	Soft			<5%		<5%		35%	65%			*Crangon* shrimp (3), ctenophore (1), *Hormathia* anemone (>20), *Gersemia* soft coral (13), Nephtheid soft coral (4), Irish moss (<5%)
SPC	2	47 41.982	55 26.025	81	Hard					5%		40%	55%			*Hormathia* anemone (>20), *Gersemia* soft coral (>20), Nephtheid soft coral (4)
SPC	3	47 41.961	55 26.103	77	Soft					5%		30%	65%			*Asterias* sea star (1), *Hormathia* anemone (>20), *Gersemia* soft coral (5), Nephtheid soft coral (1)
SPC	4	47 41.939	55 26.178	64	Hard				5%	15%	20%	15%	45%			ctenophore (2), *Hormathia* anemone (>20), *Gersemia* soft coral (9)
SPC	5	47 41.916	55 26.254	44	Hard				5%	25%	45%	25%				ctenophore (1), *Saccharina* (<5%), *Desmarestia* (<5%)
SPC	6	47 41.901	55 26.317	12	Hard					5%	20%	70%	5%			ctenophore (1), *Saccharina* (5%), *Desmarestia* (30%)
SPC	7	47 41.890	55 26.355	3	Hard						35%	60%	5%			ctenophore (1), *Desmarestia* (40%), eelgrass (<5%)
SPC	8	47 41.923	55 26.405	2	Hard						15%	85%				ctenophore (8), *Desmarestia* (60%), eelgrass (10%)
SPC	9	47 41.944	55 26.345	21	Hard			25%	15%	5%	25%	30%				ctenophore (1), American lobster (2), *Hildenbrandia* (10%), sea colander (10%), *Lithothamnion* (25%)
SPC	10	47 41.962	55 26.279	46	Hard					10%		20%	70%			ctenophore (2), *Hormathia* anemone (7), scallop (2), *Lithothamnion* (<5%)
SPC	11	47 41.983	55 26.205	65	Hard					15%	20%	20%	45%			*Hormathia* anemone (>20), *Gersemia* soft coral (5)
SPC	12	47 42.006	55 26.123	79	Soft							10%	90%			*Hormathia* anemone (2), infaunal hole (>20)
SPC	13	47 42.028	55 26.049	84	Soft							25%	75%			arrow worm (1), ctenophore (1), Atlantic cod (1), *Hormathia* anemone (>20), *Gersemia* soft coral (1), infaunal hole (>20)
SPC	14	47 42.051	55 25.980	83	Soft					5%	5%	30%	60%			ctenophore (4), feather star (2), *Hormathia* anemone (>20), *Gersemia* soft coral (>20), infaunal hole (>20), Nephtheid soft coral (3)
SPC	15	47 42.103	55 26.019	82	Hard						5%	25%	70%			Atlantic cod (1), ctenophore (4), *Hormathia* anemone (>20), *Gersemia* soft coral (>20), infaunal hole (7), Nephtheid soft coral (2)
SPC	16	47 42.075	55 26.080	83	Hard						5%	35%	60%			*Crangon* shrimp (3), ctenophore (6), *Hormathia* anemone (>20), *Gersemia* soft coral (4), infaunal hole (>20), Nephtheid soft coral (1)
SPC	17	47 42.056	55 26.165	78	Soft						5%	25%	70%			ctenophore (1), *Hormathia* anemone (>20), infaunal hole (>20)
SPC	18	47 42.038	55 26.240	71	Hard							20%	80%			*Hormathia* anemone (8), infaunal hole (>20)
SPC	19	47 42.014	55 26.303	51	Hard					20%	15%	20%	45%			ctenophore (4), Geodiid sponge (>20), scallop (4), *Lithothamnion* (<5%)
SPC	20	47 41.994	55 26.377	24	Hard			5%		30%	30%	30%	5%			*Hildenbrandia* (<5%), *Saccharina*

Spoon Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(<5%), sea colander (5%), *Lithothamnion* (10%), unidentified Rhodophyta (<5%)
SPC	21	47 41.980	55 26.449	4	Hard						25%	75%				ctenophore (2), cunner (13), *Saccharina* (90%)
SPC	22	47 42.017	55 26.471	2	Hard						25%	75%				cunner (1), *Saccharina* (80%), sea colander (10%)
SPC	23	47 42.037	55 26.411	18	Hard			5%		15%	30%	50%				ctenophore (1), scallop (3), *Saccharina* (<5%), sea colander (5%)
SPC	24	47 42.059	55 26.336	40	Hard			5%	5%	5%		20%	65%			Geodiidae sponge (>20), encrusting sponge (<5%), *Saccharina* (<5%)
SPC	25	47 42.081	55 26.279	55	Hard				5%	5%	25%	25%	40%			*Hormathia* anemone (4), *Lithothamnion* (<5%)
SPC	26	47 42.099	55 26.190	76	Soft							15%	85%			*Hormathia* anemone (>20), infaunal hole (9)
SPC	27	47 42.126	55 26.118	82	Soft							25%	75%			ctenophore (6), *Hormathia* anemone (8)
SPC	28	47 42.149	55 26.050	81	Soft							15%	85%			*Hormathia* anemone (>20), unidentified fish (1), *Gersemia* soft coral (2), infaunal hole (>20)
SPC	29	47 42.203	55 26.081	79	Soft							25%	75%			ctenophore (5), *Hormathia* anemone (2), infaunal hole (>20)
SPC	30	47 42.181	55 26.150	80	Soft							15%	85%			ctenophore (7)
SPC	31	47 42.162	55 26.218	79	Soft							35%	65%			ctenophore (5), *Hormathia* anemone (3), encrusting sponge (<5%)
SPC	32	47 42.136	55 26.293	76	Soft							20%	80%			ctenophore (5), *Hormathia* anemone (1)
SPC	33	47 42.117	55 26.378	40	Hard					5%	25%	45%	25%			ctenophore (5), *Hormathia* anemone (1), encrusting sponge (<5%)
SPC	34	47 42.095	55 26.443	21	Hard		60%	5%	5%		10%	20%				ctenophore (1), *Hildenbrandia* (10%), *Lithothamnion* (45%), *Saccharina* (5%), sea colander (15%)
SPC	35	47 42.078	55 26.498	4	Hard					10%	60%	30%				ctenophore (1), *Ascophyllum* (<5%), *Desmarestia* (10%), *Saccharina* (20%)
SPC	36	47 42.117	55 26.546	7	Hard					25%	50%	25%				*Asterias* sea star (2), ctenophore (3), *Ascophyllum* (5%), *Desmarestia* (5%), *Saccharina* (25%), sea colander (5%)
SPC	37	47 42.144	55 26.475	27	Hard					35%	15%	30%	20%			scallop (5), *Hildenbrandia* (<5%), *Lithothamnion* (10%), unidentified brown algae (<5%)
SPC	38	47 42.161	55 26.406	54	Hard					5%		10%	85%			*Saccharina* (<5%)
SPC	39	47 42.184	55 26.333	74	Soft							15%	75%	10%		
SPC	40	47 42.202	55 26.259	79	Soft							10%	90%			ctenophore (2), *Hormathia* anemone (4)
SPC	41	47 42.222	55 26.182	78	Soft							15%	85%			ctenophore (2), fan bryozoan (1), *Hormathia* anemone (6)
SPC	42	47 42.254	55 26.115	78	Soft							10%	90%			ctenophore (5), *Hormathia* anemone (2), krill (3), Irish moss (<5%)
SPC	43	47 42.299	55 26.137	76	Soft							10%	90%			ctenophore (7), fan bryozoan (2), *Hormathia* anemone (2)

Spoon Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SPC	44	47 42.279	55 26.213	76	Soft							30%	70%			ctenophore (2), fan bryozoan (5), *Hormathia* anemone (7)
SPC	45	47 42.259	55 26.291	77	Soft							10%	90%			ctenophore (5), infaunal hole (>20)
SPC	46	47 42.237	55 26.362	63	Soft							20%	80%			sculpin (2)
SPC	47	47 42.217	55 26.430	50	Hard					5%	5%	15%	75%			ctenophore (3)
SPC	48	47 42.195	55 26.506	20	Hard				10%	30%	20%	25%	15%			ctenophore (3), *Hormathia* anemone (2), *Ascophyllum* (<5%), *Desmarestia* (<5%), *Hildenbrandia* (5%), *Lithothamnion* (20%), *Saccharina* (<5%), sea colander kelp (<5%)
SPC	49	47 42.185	55 26.557	8	Hard					20%	40%	30%	10%			cunner (4), *Hildenbrandia* (<5%), *Lithothamnion* (<5%), *Saccharina* (30%), sea colander kelp (<5%)

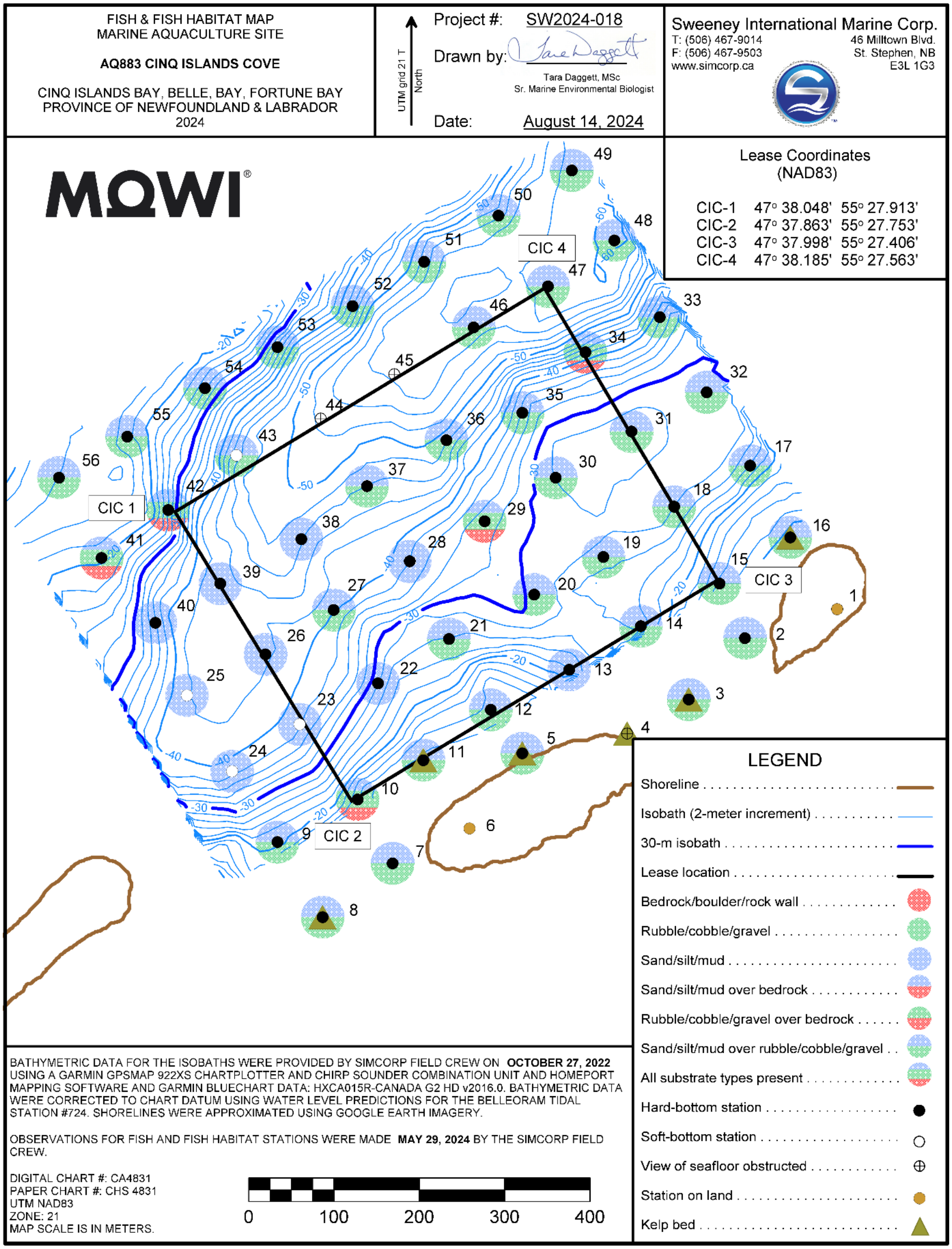


Figure 6.16. Habitat observations at sampling stations in the Cinq Island Cove sea farm (May 2024).

Table 6.6. Summary of bottom type and observed flora and fauna at the Cinq Island Cove sea farm (May 2024).

Cinq Island Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
CIC	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station on land
CIC	2	47 37.961	55 27.382	6	Hard					20%	15%	60%	5%			cunner (1); unidentified flounder (1), *Desmarestia* (30%), unidentified flora (10%), *Saccharina* (5%), *Ulva* (<5%)
CIC	3	47 37.923	55 27.436	15	Hard				5%	15%	25%	50%	5%			*Lithothamnion* (15%), *Desmarestia* (10%), *Hildenbrandia* (5%), *Saccharina* (40%), sea colander (10%)
CIC	4	47 37.902	55 27.494	6	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cunner (19), *Saccharina* (95%),
CIC	5	47 37.891	55 27.592	2	Hard					60%	15%	20%	5%			cunner (6), *Saccharina* (95%)
CIC	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station on land
CIC	7	47 37.823	55 27.716	5	Hard					10%	40%	40%	10%			cunner (19), *Desmarestia* (20%); *Saccharina* (20%)
CIC	8	47 37.790	55 27.782	15	Hard				<5%	5%	45%	35%	15%			comb jelly (2), ctenophore (1), *Spirorbis* worm (>20), *Saccharina* (50%), *Desmarestia* (<5%)
CIC	9	47 37.838	55 27.823	20	Hard						40%	45%	15%			*Desmarestia* (30%), *Saccharina* (<5%)
CIC	10	47 37.864	55 27.747	15	Hard			5%	5%	15%	10%	55%	10%			*Lithothamnion* (20%); unidentified Rhodophyta (25%); *Saccharina* (15%).
CIC	11	47 37.888	55 27.685	11	Hard					10%	15%	60%	15%			cunner (1), *Lithothamnion* (5%), *Saccharina* (70%), *Desmarestia* (10%)
CIC	12	47 37.919	55 27.621	13	Hard					<5%	10%	80%	10%			winter flounder (1), *Desmarestia* (25%), *Saccharina* (5%)
CIC	13	47 37.943	55 27.547	20	Hard					<5%	<5%	90%	10%			*Asterias* sea star (1)
CIC	14	47 37.970	55 27.479	28	Hard					20%	20%	45%	15%			Atlantic scallop (2), ctenophore (1), winter flounder (1), moon jellyfish (1), unidentified Rhodophyta (15%)
CIC	15	47 37.996	55 27.405	15	Hard					<5%	20%	70%	10%			unidentified *Rhodophyta* (5%)
CIC	16	47 38.024	55 27.338	8	Hard				<5%	<5%	10%	80%	10%			cunner (18), branching bryozoan (10%), lacy crust bryozoan (<5%), *Saccharina* (90%), *Desmarestia* (<5%)
CIC	17	47 38.070	55 27.374	24	Hard				<5%	<5%	15%	75%	10%			whelk (5), *Desmarestia* (<5%); *Saccharina* (10%); unidentified Rhodophyta (10%), yellow encrusting sponge (<5%),
CIC	18	47 38.045	55 27.446	30	Hard				<5%	25%	15%	45%	15%			Atlantic scallop (2), comb jelly (1), Iceland scallop (1), whelk (6), unidentified Rhodophyta (15%); *Lithothamnion* (<5%)
CIC	19	47 38.014	55 27.513	28	Hard				<5%	5%	5%	80%	10%			Atlantic scallop (4), whelk (16), unidentified jellyfish (1), *Lithothamnion* (<5%), *Hildenbrandia* (<5%), unidentified Rhodophyta (25%), sea colander (<5%), *Saccharina* (<5%)
CIC	20	47 37.991	55 27.578	30	Hard					<5%	5%	85%	10%			green sea urchin (1), *Lithothamnion* (<5%), unidentified Rhodophyta (5%)

Cinq Island Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
CIC	21	47 37.964	55 27.659	26	Hard				<5%	10%	35%	45%	10%			Atlantic scallop (5), whelk (7), *Lithothamnion* (5%), unidentified Rhodophyta (20%), sea colander (5%)
CIC	22	47 37.937	55 27.726	27	Hard					<5%	<5%	75%	25%			infaunal hole (1), *Lithothamnion* (5%); unidentified Rhodophyta (5%)
CIC	23	47 37.912	55 27.800	38	Soft							40%	50%	10%		comb jelly (1)
CIC	24	47 37.883	55 27.864	40	Soft							50%	45%	5%		
CIC	25	47 37.932	55 27.905	113	Soft							55%	45%	<5%		
CIC	26	47 37.957	55 27.831	43	Hard					<5%		60%	40%	<5%	<5%	
CIC	27	47 37.984	55 27.766	42	Hard					<5%	5%	75%	20%			whelk (1)
CIC	28	47 38.014	55 27.694	39	Hard						<5%	75%	25%			whelk (1)
CIC	29	47 38.038	55 27.623	34	Hard			5%	5%	5%	5%	65%	15%			*Asterias* sea star (1), comb jelly (3), whelk (2), unidentified juvenile fish (1), infaunal hole (2), lacy crust bryozoan (<5%); sea colander (<5%), *Saccharina* (<5%), unidentified Rhodophyta (5%)
CIC	30	47 38.065	55 27.556	29	Hard			<5%	15%	20%	5%	40%	20%			*Henricia* sea star (2), Atlantic scallop (2), comb jelly (3), whelk (>20), *Lithothamnion* (30%), *Saccharina* (<5%), sea colander (5%), unidentified Rhodophyta (20%)
CIC	31	47 38.093	55 27.484	31	Hard				10%	25%	20%	35%	10%			*Henricia* sea star (2), Atlantic scallop (9), comb jelly (1), unidentified sponge (1), whelk (>20), *Lithothamnion* (15%), *Saccharina* (<5%), sea colander (15%), unidentified Rhodophyta (20%)
CIC	32	47 38.117	55 27.413	30	Hard				<5%	10%	20%	50%	20%			arrow worm (1), comb jelly (2), Atlantic scallop (3), whelk (>20), *Lithothamnion* (10%), *Hildenbrandia* (<5%), *Saccharina* (<5%), sea colander (<5%), unidentified Rhodophyta (25%)
CIC	33	47 38.165	55 27.456	39	Hard			<5%	10%	10%	25%	45%	10%			*Asterias* sea star (1), Geodiidae sponge (2), *Hormathia* anemone (3), *Pandalus* shrimp (3), whelk (2), encrusting yellow sponge (<5%), *Lithothamnion* (5%), *Hildenbrandia* (10%), unidentified Rhodophyta
CIC	34	47 38.144	55 27.526	47	Hard			5%	10%	10%	15%	45%	15%			comb jelly (3), whelk (2), burrowing anemone (2), *Lithothamnion* (5%); *Hildenbrandia* (<5%); unidentified Rhodophyta (<5%)
CIC	35	47 38.106	55 27.586	36	Hard				<5%	15%	20%	50%	15%			Atlantic scallop (1), whelk (3), *Desmarestia* (<5%); *Lithothamnion* (5%); *Hildenbrandia* (<5%); unidentified Rhodophyta (<5%)
CIC	36	47 38.090	55 27.658	51	Hard					10%	20%	30%	40%			Atlantic scallop (1), ocean pout (1), whelk (2), unidentified Rhodophyta (<5%)
CIC	37	47 38.062	55 27.733	48	Hard			<5%		25%	20%	35%	20%			

Cinq Island Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Geodiidae sponge (>20), unidentified Rhodophyta (<5%)
CIC	38	47 38.029	55 27.795	49	Hard						<5%	45%	55%			
CIC	39	47 38.002	55 27.872	45	Hard			<5%	<5%	<5%	<5%	65%	35%			comb jelly (1)
CIC	40	47 37.978	55 27.933	37	Hard					<5%	<5%	50%	50%			
CIC	41	47 38.020	55 27.982	21	Hard			5%	<5%	20%	15%	40%	20%			*Spirorbis* (>20), winter flounder (1), whelk (2), infaunal hole (2), encrusting yellow sponge (<5%), *Desmarestia* (<5%); *Lithothamnion* (10%); *Saccharina* (10%); sea colander (15%); unidentified Rhodophyta (10%); *Hildenbrandia* (<5%)
CIC	42	47 38.049	55 27.919	28	Hard			10%	15%	10%	25%	25%	15%			winter flounder (1), encrusting yellow sponge (<5%), sea cucumber (1), *Lithothamnion* (40%), *Hildenbrandia* (25%) *Desmarestia* (<5%), unidentified Rhodophyta (20%)
CIC	43	47 38.083	55 27.854	47	Soft					<5%	5%	30%	35%	30%		winter flounder (2), sea colander (<5%)
CIC	44	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
CIC	45	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
CIC	46	47 38.161	55 27.630	60	Hard					20%	45%	25%	10%			Atlantic scallop (1), unidentified anemone (2), whelk (4)
CIC	47	47 38.186	55 27.560	60	Hard				<5%	5%	10%	40%	45%			*Hormathia* anemone (12), *Crangon* shrimp (3), whelk (2)
CIC	48	47 38.214	55 27.497	62	Hard					<5%	5%	40%	55%			*Hormathia* anemone (>20), infaunal hole (3)
CIC	49	47 38.259	55 27.535	61	Hard					15%	10%	40%	35%			burrowing anemone (2), *Hormathia* anemone (>20), whelk (1)
CIC	50	47 38.231	55 27.605	57	Hard				5%	55%	10%	20%	10%			*Hormathia* anemone (6), tube worm (10), whelk (2), *Lithothamnion* (5%); *Desmarestia* (<5%)
CIC	51	47 38.203	55 27.675	56	Hard				<5%	25%	15%	40%	20%	<5%		winter flounder (2)
CIC	52	47 38.176	55 27.743	45	Hard					10%	25%	45%	20%			*Hormathia* anemone (2), winter flounder (1)
CIC	53	47 38.151	55 27.814	32	Hard			<5%	10%	20%	20%	35%	15%			winter flounder (2), *Lithothamnion* (<5%); unidentified Rhodophyta (5%); *Desmarestia* (<5%)
CIC	54	47 38.126	55 27.883	26	Hard					5%	25%	40%	30%			winter flounder (2), unidentified Rhodophyta (5%); sea colander (<5%)
CIC	55	47 38.096	55 27.956	17	Hard					<5%	10%	65%	25%			Atlantic scallop (1), comb jelly (2), *Spirorbis* worm (>20), *Saccharina* (25%), sea colander (20%), unidentified Rhodophyta (5%)
CIC	56	47 38.071	55 28.021	15	Hard				5%	5%	15%	55%	20%			*Asterias* sea star (6), comb jelly (1), *Lithothamnion* (<5%), *Saccharina* (65%), sea colander (20%), unidentified Rhodophyta (<5%)

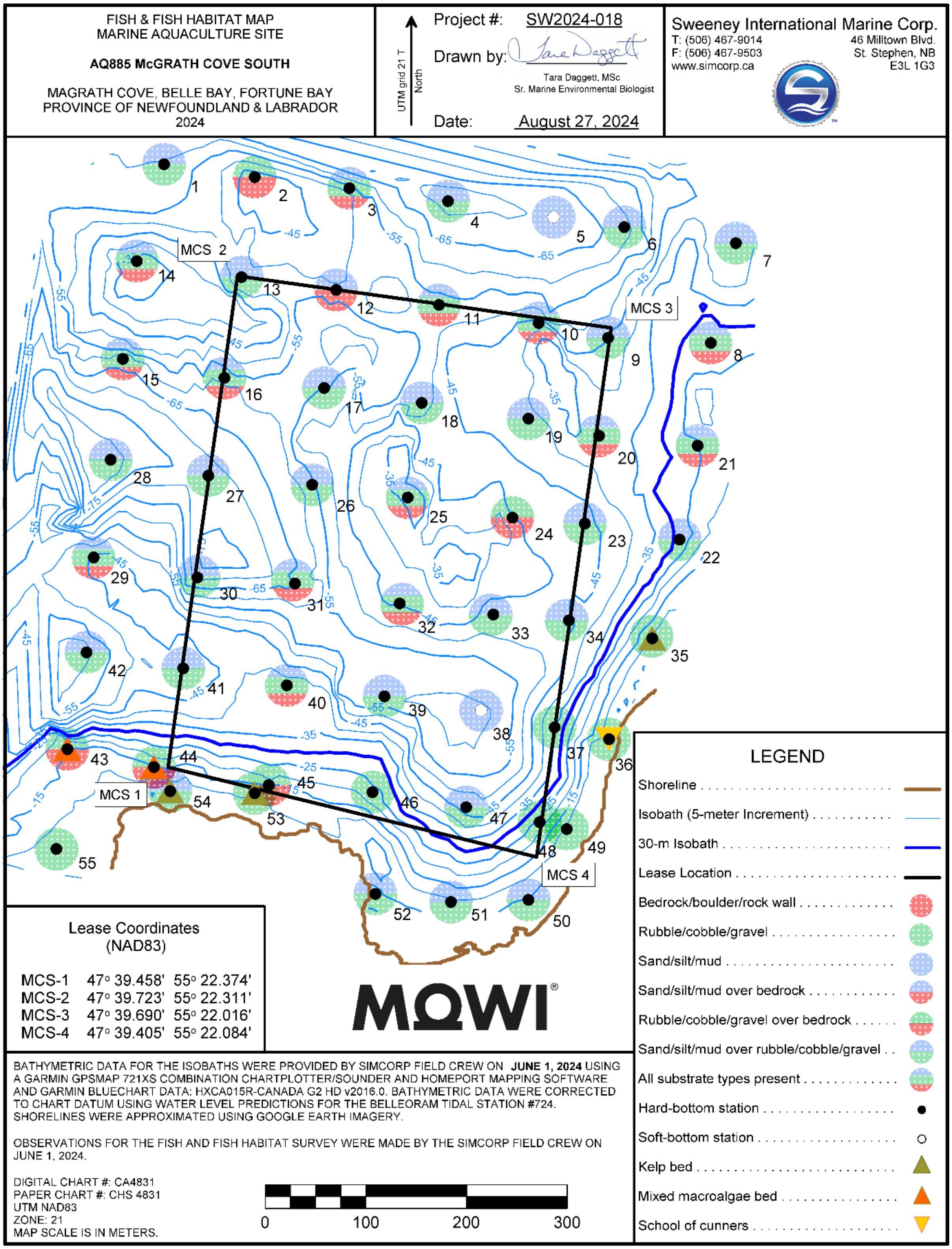


Figure 6.17. Habitat observations at sampling stations in the McGrath Cove South sea farm (June 2024).

Table 6.7. Summary of bottom type and observed flora and fauna at the McGrath Cove South sea farm (June 2024).

McGrath Cove South																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
MCS	1	47 39.784	55 22.368	61	Hard				<5%	10%	50%	20%	20%			*Hormathia* anemone (4), whelk (3), *Gersemia* soft coral (1), *Lithothamnion* (5%)
MCS	2	47 39.776	55 22.296	45	Hard	25%	30%	10%	15%	10%	10%	<5%				*Henricia* sea star (3), Geodiidae sponge (9), encrusting sponge (<5%), *Lithothamnion* (55%), *Hildenbrandia* (25%)
MCS	3	47 39.769	55 22.221	53	Hard	35%	10%	5%	20%	5%	5%	20%				*Hormathia* anemone (>20), cerianthid anemone (>20), Geodiidae sponge (1), *Asterias* sea star (1), encrusting sponge (<5%), *Lithothamnion* (20%)
MCS	4	47 39.761	55 22.143	72	Hard					10%	5%	45%	40%			*Hormathia* anemone (>20), brittle star (1)
MCS	5	47 39.751	55 22.059	69	Soft							50%	50%			*Hormathia* anemone (12)
MCS	6	47 39.745	55 22.004	63	Hard					5%	25%	40%	30%			*Hormathia* anemone (>20), unidentified flounder (1), infaunal burrow (1), *Gersemia* soft coral (3), unidentified tube worm (1), cerianthid anemone (2)
MCS	7	47 39.735	55 21.915	44	Hard					25%	10%	35%	30%			unidentified tube worm (3), *Hormathia* anemone (2), Atlantic scallop (2), *Lithothamnion* (<5%)
MCS	8	47 39.681	55 21.937	27	Hard			10%	10%	20%	25%	35%				encrusting sponge (<5%), *Henricia* sea star (1), unidentified Rhodophyta (10%), sea colander (15%), *Lithothamnion* (15%)
MCS	9	47 39.685	55 22.018	47	Hard					10%	85%	5%				cerianthid anemone (1), *Hormathia* anemone (2), tube worm (2), Atlantic scallop (1), *Lithothamnion* (<5%)
MCS	10	47 39.694	55 22.073	47	Hard			30%	20%	10%	5%	35%				*Hormathia* anemone (>20), Atlantic scallop (1), Geodiidae sponge (1) Acadian redfish (2), *Lithothamnion* (25%)
MCS	11	47 39.705	55 22.152	35	Hard			5%	10%	10%	30%	25%	20%			*Hormathia* anemone (>20), Gersemia soft coral (4), encrusting sponge (<5%), *Lithothamnion* (15%), *Hildenbrandia* (<5%)
MCS	12	47 39.714	55 22.233	50	Hard	10%	70%	5%	<5%			10%	5%			*Hormathia* anemone (>20), *Gersemia* soft coral (4), tube worm (1), encrusting sponge (<5%), *Lithothamnion* (25%), *Hildenbrandia* (15%)
MCS	13	47 39.722	55 22.308	53	Hard	<5%				20%	40%	20%	20%			whelk (2), *Hormathia* anemone (20), *Gersemia* soft coral (2), *Lithothamnion* (5%)
MCS	14	47 39.732	55 22.391	35	Hard		80%	10%	<5%	5%		5%				*Asterias* sea star (1), encrusting sponge (<5%), comb jelly (2),

McGrath Cove South																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Lithothamnion (80%), *Hildenbrandia* (10%), unidentified Rhodophyta (5%), *Saccharina* (<5%)
MCS	15	47 39.679	55 22.404	65	Hard		30%	15%	10%	10%	5%	15%	15%			*Hormathia* anemone (>20), tube worm (3), *Asterias* sea star (1), encrusting sponge (<5%), *Lithothamnion* (10%)
MCS	16	47 39.668	55 22.323	59	Hard			10%	15%	15%	35%	15%	10%			*Hormathia* anemone (>20), *Gersemia* soft coral (1), cerianthid anemone (1), *Lithothamnion* (20%)
MCS	17	47 39.661	55 22.244	59	Hard			<5%	10%	15%	45%	30%				*Hormathia* anemone (>20), *Gersemia* soft coral (3), whelk (1), *Lithothamnion* (5%)
MCS	18	47 39.652	55 22.167	52	Hard			<5%	5%	35%	35%	25%				tube worm (11), Geodiidae sponge (11), *Hormathia* anemone (2), whelk (1), unidentified flounder (1), *Lithothamnion* (15%)
MCS	19	47 39.642	55 22.083	43	Hard					15%	65%	20%				whelk (>20), comb jelly (1), tube worm (1), *Lithothamnion* (5%)
MCS	20	47 39.632	55 22.027	37	Hard			5%	10%	30%	30%	15%	10%			whelk (12), Atlantic scallop (3), *Hormathia* anemone (1), *Lithothamnion* (15%), *Hildenbrandia* (10%), unidentified Rhodophyta (<5%)
MCS	21	47 39.626	55 21.949	27	Hard	10%		5%	15%	15%	40%	15%				*Asterias* sea star (2), *Lithothamnion* (10%), *Hildenbrandia* (5%), unidentified Rhodophyta (5%), *Saccharina* (5%), sea colander (15%), *Ascophyllum* (<5%)
MCS	22	47 39.575	55 21.965	30	Hard					15%	40%	45%				*Lithothamnion* (<5%), *Hildenbrandia* (<5%), sea colander (<5%), unidentified Rhodophyta (<5%)
MCS	23	47 39.585	55 22.040	48	Hard				<5%	<5%	10%	50%	40%			*Hormathia* anemone (3)
MCS	24	47 39.589	55 22.097	42	Hard	10%	55%	20%	5%		10%	<5%				Atlantic scallop (1), *Asterias* sea star (1), encrusting sponge (<5%), *Lithothamnion* (25%), *Hildenbrandia* (20%)
MCS	25	47 39.601	55 22.180	32	Hard	40%		10%	5%	10%	20%		15%			brittle star (1), Acadian redfish (1), encrusting sponge (<5%), *Lithothamnion* (30%), *Hildenbrandia* (20%)
MCS	26	47 39.609	55 22.256	55	Hard					5%	35%	45%	15%			*Hormathia* anemone (>20), Geodiidae sponge (3), tube worm (6), encrusting sponge (<5%), *Lithothamnion* (<5%)
MCS	27	47 39.615	55 22.338	72	Hard					<5%	30%	35%	35%			*Hormathia* anemone (>20), *Gersemia* soft coral (1), unidentified tube worm (5)

McGrath Cove South																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
MCS	28	47 39.625	55 22.415	82	Hard				<5%	20%	30%	35%	15%			*Hormathia* anemone (>20), *Gersemia* soft coral (14), unidentified tube worm (1), Geodiidae sponge (4), *Henricia* sea star (1)
MCS	29	47 39.572	55 22.430	45	Hard	30%	55%		5%	5%		5%				encrusting sponge (<5%), Geodiidae sponge (>20), *Gersemia* soft coral (6), *Lithothamnion* (60%), *Hildenbrandia* (20%), unidentified Rhodophyta (<5%)
MCS	30	47 39.560	55 22.348	73	Hard				<5%	15%	10%	40%	35%			*Hormathia* anemone (>20), *Gersemia* soft coral (4), Geodiidae sponge (>20), unidentified tube worm (2)
MCS	31	47 39.556	55 22.271	63	Hard	45%	20%	<5%	<5%	5%	15%		15%			*Hormathia* anemone (20), *Asterias* sea star (1), arrow worm (2), Geodiidae sponge (2), encrusting sponge (<5%), *Lithothamnion* (20%)
MCS	32	47 39.544	55 22.188	45	Hard		30%	35%	20%				15%			*Asterias* sea star (1), Geodiidae sponge (4), *Hormathia* anemone (2), encrusting sponge (<5%), *Lithothamnion* (65%), *Hildenbrandia* (5%)
MCS	33	47 39.537	55 22.114	47	Hard					<5%	20%	50%	30%			tube worm (>20), *Hormathia* anemone (1), *Metridium* anemone (2)
MCS	34	47 39.533	55 22.054	46	Hard					35%	25%	25%	15%			round sponge (1), Geodiidae sponge (1), tube worm (>20), blue mussel (>20)
MCS	35	47 39.522	55 21.988	8	Hard				20%	5%	75%					cunner (12), *Spirorbis* worm (>20), *Saccharina* (75%), sea colander (<5%), *Lithothamnion* (<5%)
MCS	36	47 39.468	55 22.024	5	Hard					20%	80%					cunner (>20), *Saccharina* (25%), *Desmarestia* (5%), *Lithothamnion* (<5%)
MCS	37	47 39.475	55 22.067	35	Hard				<5%	5%	95%					*Lithothamnion* (<5%), *Hildenbrandia* (<5%)
MCS	38	47 39.485	55 22.125	65	Soft								100%			*Hormathia* anemone (1), *Metridium* anemone (1), blue mussel (>20), unidentified brown algae (<5%), blue mussel (>20)
MCS	39	47 39.494	55 22.202	59	Hard					10%	70%	10%	10%			yellowtail flounder (1), *Lithothamnion* (<5%)
MCS	40	47 39.501	55 22.279	39	Hard		65%	10%	5%		15%	5%				encrusting sponge (<5%), breadcrumb sponge (<5%), unidentified Rhodophyta (<5%), *Lithothamnion* (60%), *Hildenbrandia* (20%)
MCS	41	47 39.511	55 22.361	48	Hard					10%	55%	35%				*Hormathia* anemone (1), *Lithothamnion* (<5%)
MCS	42	47 39.521	55 22.437	63	Hard					10%	50%	40%				*Hormathia* anemone (13), whelk

McGrath Cove South																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(3), encrusting sponge (<5%), *Lithothamnion* (<5%)
MCS	43	47 39.469	55 22.454	17	Hard		70%		10%		20%					*Spirorbis* worm (>20), *Saccharina* (45%), sea colander (25%), unidentified Rhodophyta (5%), *Lithothamnion* (15%)
MCS	44	47 39.458	55 22.386	14	Hard			10%	5%	10%	75%					*Asterias* sea star (1), *Saccharina* (20%), sea colander (25%), unidentified Rhodophyta (5%), *Lithothamnion* (10%)
MCS	45	47 39.447	55 22.295	12	Hard		15%			70%	15%					cunner (2), *Saccharina* (<5%), sea colander (20%), *Desmarestia* (<5%), *Lithothamnion* (10%)
MCS	46	47 39.442	55 22.213	20	Hard					70%	30%					*Asterias* sea star (1), cunner (1), *Saccharina* (5%), sea colander (10%), unidentified Rhodophyta (<5%), *Lithothamnion* (25%)
MCS	47	47 39.433	55 22.139	45	Hard					55%		40%	5%			blue mussel (>20), *Desmarestia* (<5%), *Lithothamnion* (<5%)
MCS	48	47 39.424	55 22.081	25	Hard					45%	55%					Atlantic cod (1), unidentified flounder (2), cunner (1), sculpin (1)
MCS	49	47 39.420	55 22.059	10	Hard					10%	90%					cunner (4), infaunal burrow (9), *Desmarestia* (20%), *Saccharina* (5%), *Chorda* (<5%), *Ulva* (<5%)
MCS	50	47 39.382	55 22.091	3	Hard					5%	80%	15%				periwinkle (>20), *Ascophyllum* (<5%)
MCS	51	47 39.382	55 22.152	9	Hard					25%	65%	10%				cunner (2), Atlantic scallop (1), American lobster (1), unidentified fish (1), *Ascophyllum* (<5%)
MCS	52	47 39.387	55 22.212	5	Hard				<5%	40%	55%	5%				cunner (16), *Saccharina* (15%), *Desmarestia* (<5%), *Lithothamnion* (<5%)
MCS	53	47 39.443	55 22.306	10	Hard					45%	55%	<5%				cunner (5), *Saccharina* (65%)
MCS	54	47 39.445	55 22.373	6	Hard					20%	65%	15%				cunner (1), *Spirorbis* (>20), *Saccharina* (60%)
MCS	55	47 39.415	55 22.465	7	Hard					80%	20%					Atlantic scallop (1), *Desmarestia* (35%), *Lithothamnion* (20%)

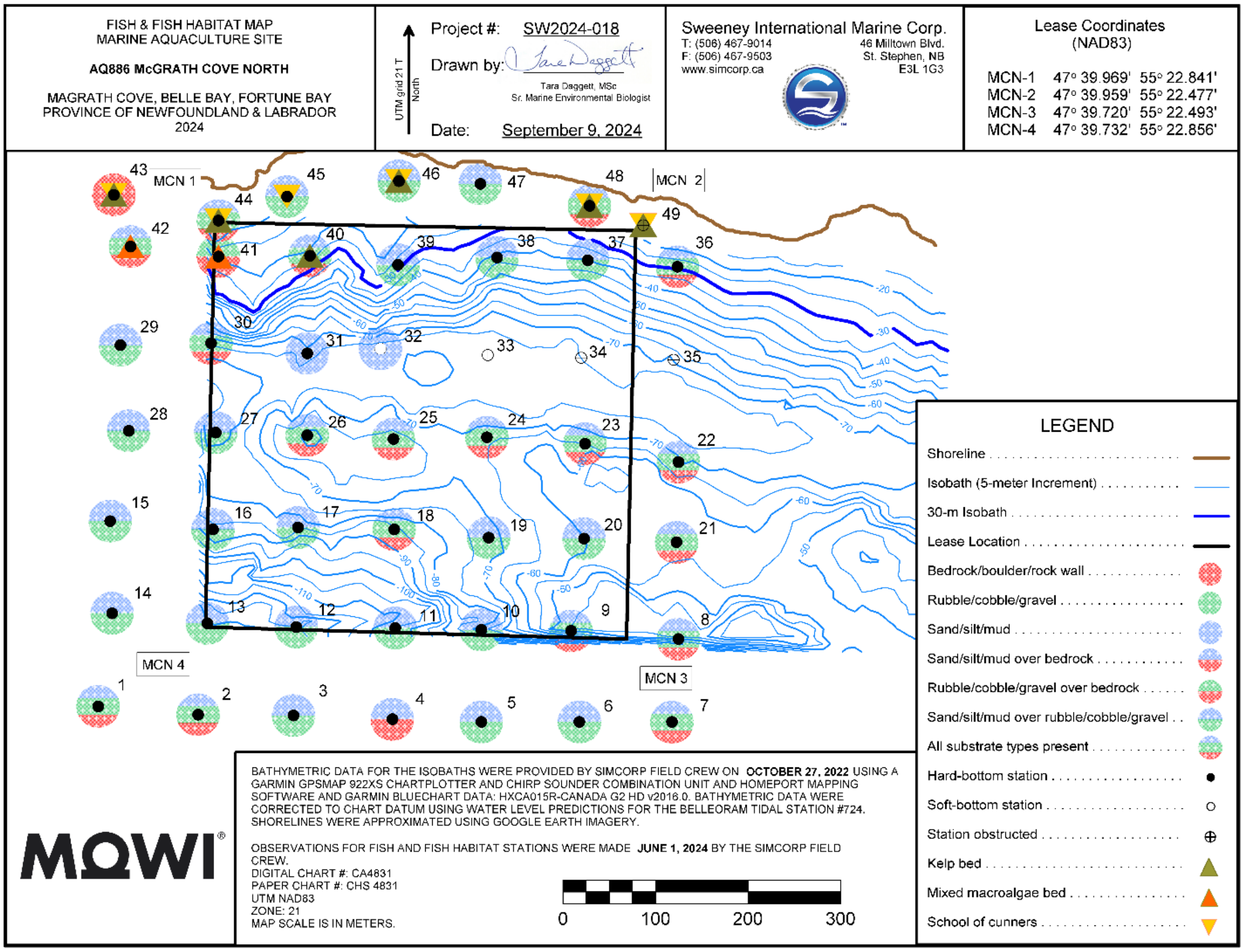


Figure 6.18. Habitat observations at sampling stations in the McGrath Cove North sea farm (June 2024).

Table 6.8. Summary of bottom type and observed flora and fauna at the McGrath Cove North sea farm (June 2024).

McGrath Cove North																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
MCGN	1	47 39.687	55 22.950	121	Hard		50%	5%	10%	5%	5%	15%	10%			arrow worm (2), brittle star (3), Acadian redfish (2), Geodiidae sponge (>20), *Hormathia* anemone (>20), round sponge (3), *Serpula* spp. (>20), encrusting yellow sponge (10%)
MCGN	2	47 39.681	55 22.864	118	Hard		20%	40%	10%	<5%	<5%	15%	15%			brittle star (3), Acadian redfish (5), Geodiidae sponge (>20), *Hormathia* anemone (11), round sponge (10), *Serpula spp.* (6), encrusting yellow sponge (5%), *Henricia* sea star (1), *Pandalus* shrimp (1)
MCGN	3	47 39.679	55 22.782	126	Hard					10%	10%	60%	20%			encrusting yellow sponge (<5%), Geodiidae sponge (13), *Gersemia* (2), *Hormathia* anemone (>20), round sponge (2), unidentified round worm (1) , unidentified sea star (1)
MCGN	4	47 39.676	55 22.696	128	Hard	50%						25%	25%			encrusting yellow sponge (5%), Geodiidae sponge (>20), *Hormathia* anemone (>20), round sponge (4), *Serpula* (1),
MCGN	5	47 39.673	55 22.620	106	Hard				<5%	25%	10%	40%	25%			Geodiidae sponge (3), *Hormathia* anemone (>20), burrowing anemone (1), unidentified jellyfish (2)
MCGN	6	47 39.672	55 22.535	91	Hard				5%	40%	30%	15%	10%			comb jelly (1), Geodiidae sponge (10), *Gersemia* soft coral (>20), Nephtheidae soft coral (3), *Hormathia* anemone (>20), warty sponge (<5%), encrusting yellow sponge (<5%)
MCGN	7	47 39.671	55 22.455	74	Hard			5%	15%	15%	15%	25%	25%			*Hormathia* anemone (>20), Geodiidae sponge (2), burrowing anemone (8), *Gersemia* soft coral (3), yellow encrusting sponge (5%), *Lithothamnion* (5%)
MCGN	8	47 39.719	55 22.448	44	Hard			10%	10%	20%	20%	30%	10%			*Asterias* sea star (5), encrusting yellow sponge (<5%), round sponge (2), unidentified Rhodophyta (<5%), *Lithothamnion* (30%), *Hildenbrandia* (15%)
MCGN	9	47 39.725	55 22.540	45	Hard		85%	5%	5%	<5%	<5%	<5%	5%			*Asterias* sea star (2), breadcrumb sponge (<5%), encrusting sponge (<5%), Geodiidae sponge (15), round sponge (3), *Serpula* (2), unidentified sponge (3), *Lithothamnion* (45%); *Hildenbrandia* (45%)
MCGN	10	47 39.727	55 22.618	93	Hard					30%	25%	25%	20%			arrow worm (1), unidentified tube worm (3), *Hormathia* anemone (>20)
MCGN	11	47 39.729	55 22.692	112	Hard			<5%	<5%	10%	20%	35%	35%			brittle star (2), burrowing anemone (2), Geodiidae sponge (17), *Gersemia* soft coral (4), *Hormathia* anemone (>20), *Serpula* (1), encrusting yellow sponge (<5%)
MCGN	12	47 39.731	55 22.778	123	Hard					5%	20%	25%	50%			arrow worm (5), unidentified tube worm (2), *Gersemia* soft coral (1) *Hormathia* anemone (>20), toad crab (1), fan

McGrath Cove North																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																worm (1), encrusting yellow sponge (<5%)
MCGN	13	47 39.734	55 22.854	134	Hard					<5%	35%	30%	35%			arrow worm (5), brittle star (2), burrowing anemone (1), *Stomphia* anemone (1), *Gersemia* soft coral (8), *Hormathia* anemone (>20), *Pandalus* shrimp (1), encrusting yellow sponge (<5%)
MCGN	14	47 39.741	55 22.936	145	Hard				<5%	20%	20%	30%	30%			Geodiidae sponge (2), *Gersemia* soft coral (12), *Hormathia* anemone (>20), encrusting yellow sponge (<5%), unidentified Rhodophyta (<5%)
MCGN	15	47 39.795	55 22.936	116	Hard					15%	35%	25%	25%			Geodiidae sponge (1), *Hormathia* anemone (>20), encrusting yellow sponge (<5%)
MCGN	16	47 39.789	55 22.848	0	Hard			<5%	25%	10%	20%	20%	25%			Geodiidae sponge (13), *Hormathia* anemone (>20), *Serpula* (9), encrusting yellow sponge (<5%), breadcrumb sponge (<5%)
MCGN	17	47 39.789	55 22.774	88	Hard			<5%	15%	10%	15%	25%	35%			arrow worm (1), *Asterias* sea star (1), Geodiidae sponge (4), *Hormathia* anemone (>20), *Serpula* (4), encrusting yellow sponge (10%)
MCGN	18	47 39.787	55 22.691	84	Hard		20%	10%	25%	15%	5%	15%	10%			Geodiidae sponge (>20), *Polymastia* sponge (2), *Gersemia* soft coral (1), *Hormathia* anemone (>20), *Serpula* (16), encrusting yellow sponge (<5%), white encrusting sponge (<5%)
MCGN	19	47 39.781	55 22.610	76	Hard				<5%	15%	40%	30%	15%			*Hormathia* anemone (>20), burrowing anemone (2), comb jelly (1), *Lithothamnion* (<5%)
MCGN	20	47 39.779	55 22.528	61	Hard			<5%	5%	25%	30%	30%	10%			*Hormathia* anemone (10), comb jelly (1), encrusting yellow sponge (<5%), infaunal hole (2), *Lithothamnion* (15%)
MCGN	21	47 39.776	55 22.448	57	Hard		10%	<5%	10%	20%	25%	25%	10%			*Asterias* sea star (1), *Gersemia* soft coral (2), *Hormathia* anemone (7), comb jelly (1), *Pandalus* shrimp (1), *Lithothamnion* (30%), *Hildenbrandia* (<5%), ctenophore (1)
MCGN	22	47 39.823	55 22.445	73	Hard		15%	<5%	20%	10%	15%	25%	15%			*Hormathia* anemone (>20), summer flounder (1), whelk (1), infaunal hole (2), *Lithothamnion* (<5%)
MCGN	23	47 39.835	55 22.525	65	Hard	35%	40%		15%	<5%	<5%	5%	5%			*Asterias* sea star (1), *Hormathia* anemone (8), unidentified fish (1), *Lithothamnion* (65%), *Hildenbrandia* (<5%)
MCGN	24	47 39.840	55 22.610	71	Hard		25%	<5%	20%	15%	25%	10%	5%			*Asterias* sea star (1), burrowing anemone (1), *Hormathia* anemone (13), *Lithothamnion* (40%), *Serpula* (1), *Asterias* sea star (4), Geodiidae sponge (7), sea cucumber (2), whelk (1), *Lithothamnion* (80%)
MCGN	25	47 39.840	55 22.690	67	Hard		65%		25%	5%		5%	<5%			

McGrath Cove North																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
MCGN	26	47 39.843	55 22.765	60	Hard		70%		10%	5%	10%	5%	<5%			Geodiidae sponge (2), *Gersemia* soft coral (2), *Hormathia* anemone (2), *Serpula* (3), *Metridium* anemone (1), *Asterias* sea star (1), yellow encrusting sponge (<5%), orange encrusting sponge (<5%)
MCGN	27	47 39.846	55 22.844	83	Hard					25%	55%	15%	5%			comb jelly (1), *Hormathia* anemone (1), *Serpula* (1), whelk (1)
MCGN	28	47 39.848	55 22.919	89	Hard				5%	40%	35%	20%	<5%			burrowing anemone (1), *Hormathia* anemone (>20), unidentified tube worm (1)
MCGN	29	47 39.898	55 22.924	80	Hard					50%	25%	15%	10%			arrow worm (1), burrowing anemone (3), *Hormathia* anemone (1), *Lithothamnion* (<5%), *Desmarestia* (<5%), whelk (1)
MCGN	30	47 39.898	55 22.846	68	Hard			10%	40%	15%	5%	15%	15%			green sea urchin (1), *Hormathia* anemone (>20), *Lithothamnion* (5%), Acadian redfish (2), krill (1)
MCGN	31	47 39.891	55 22.763	75	Hard					<5%		75%	25%			
MCGN	32	47 39.893	55 22.700	79	Soft							5%	30%	35%	30%	unidentified brown algae (<5%)
MCGN	33	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MCGN	34	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MCGN	35	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MCGN	36	47 39.937	55 22.442	29	Hard			5%	20%	15%	25%	25%	10%			American lobster (1), moon jelly (1), *Lithothamnion* (30%); *Hildenbrandia* (10%), *Desmarestia* (<5%), sea colander (35%)
MCGN	37	47 39.942	55 22.519	38	Hard				<5%	5%	70%	15%	10%			*Asterias* sea star (1), *Lithothamnion* (<5%), unidentified Rhodophyta (<5%)
MCGN	38	47 39.945	55 22.598	39	Hard					30%	45%	20%	5%			Iceland scallop (2), *Lithothamnion* (5%), *Hildenbrandia* (5%), whelk (1), unidentified fish (1), *Fucus* sp. (<5%)
MCGN	39	47 39.942	55 22.683	34	Hard					5%	70%	15%	10%			*Lithothamnion* (10%), *Hildenbrandia* (<5%), unidentified Rhodophyta (<5%)
MCGN	40	47 39.948	55 22.759	23	Hard		30%	<5%	25%	15%	10%	10%	10%			*Asterias* sea star (3), comb jelly (1), cunner (3), *Metridium* anemone (1), *Lithothamnion* (45%), *Hildenbrandia* (10%), *Saccharina* (5%), sea colander (45%), unidentified Rhodophyta (5%)
MCGN	41	47 39.949	55 22.838	19	Hard		50%		25%	20%	5%					*Asterias* sea star (7), cunner (2), *Lithothamnion* (25%), *Hildenbrandia* (10%), *Desmarestia* (5%), *Saccharina* (20%), sea colander (45%), unidentified Rhodophyta (<5%)
MCGN	42	47 39.956	55 22.914	25	Hard		30%	<5%	15%	15%	15%	15%	10%			*Asterias* sea star (3), comb jelly (3), *Lithothamnion* (50%), *Hildenbrandia* (10%), *Spirorbis* (>20), unidentified Rhodophyta (15%), *Saccharina* (10%), sea colander (50%), yellow encrusting sponge (<5%)
MCGN	43	47 39.986	55 22.626	13	Hard		100%									*Asterias* sea star (2), cunner (>20), *Lithothamnion* (5%), *Hildenbrandia* (<5%), *Saccharina* (80%)

McGrath Cove North																
Station		**Coordinates (NAD83)**		**Depth (m)**	**Bottom Type**	**Bottom Type and Condition**										**Description, Comments and Observations** [a]
		Latitude	**Longitude**			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
MCGN	44	47 39.970	55 22.837	8	Hard		10%		5%	<5%	65%	10%	10%			cunner (>20), comb jelly (1), *Lithothamnion* (20%), *Saccharina* (80%), *Desmarestia* (<5%)
MCGN	45	47 39.983	55 22.778	9	Hard					15%	55%	20%	10%			cunner (>20), *Saccharina* (45%), *Lithothamnion* (<5%)
MCGN	46	47 39.991	55 22.681	7	Hard					5%	80%	15%	<5%			cunner (>20), *Saccharina* (75%)
MCGN	47	47 39.988	55 22.611	11	Hard					50%	30%	15%	5%			cunner (5), unidentified fish (1), *Saccharina* (<5%)
MCGN	48	47 39.974	55 22.517	17	Hard		10%		5%	15%	45%	15%	10%			cunner (>20), *Lithothamnion* (10%), lacy crust bryozoan (<5%), *Desmarestia* (5%), *Saccharina* (60%), sea colander (15%)
MCGN	49	47 39.962	55 22.471	11	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cunner (>20), moon jelly (1), *Saccharina* (95%)

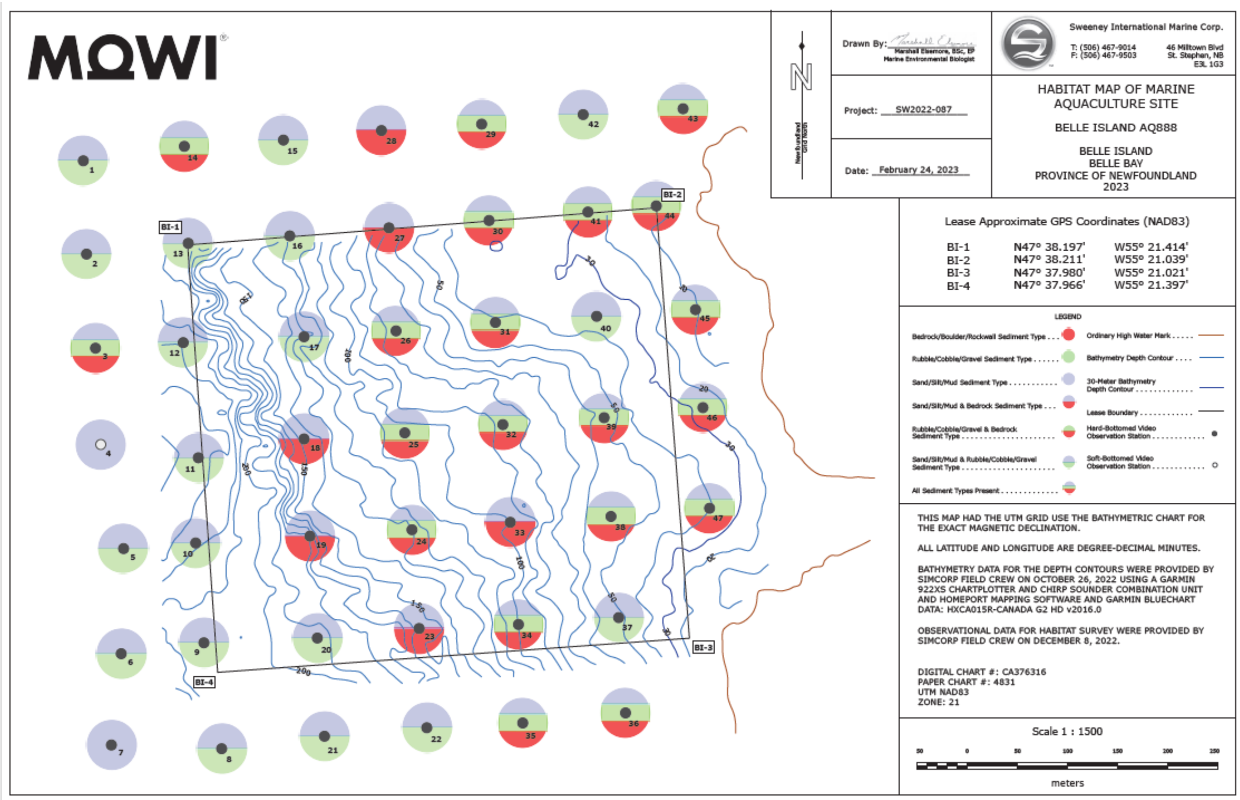


Figure 6.19. Habitat observations at sampling stations in the Belle Island sea farm (December 2022).

Table 6.9. Summary of bottom type and observed flora and fauna at the Belle Island sea Farm (December 2022).

Belle Island																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
BI	1	47 38.243	55 21.495	199	Hard					5%			95%			brittle star (>20), *Hormathia* anemone (>20), arrow worm (3), krill (>20)
BI	2	47 38.193	55 21.494	203	Hard					5%			95%			brittle star (>20), *Hormathia* anemone (>20), arrow worm (3), yellow sponge (<5%), krill (>20)
BI	3	47 38.142	55 21.490	218	Hard		10%		15%	5%			70%			brittle star (17), *Hormathia* anemone (18), unidentified jellyfish (1), Geodiidae sponge (13), arrow worm (2), krill (>20), yellow sponge (<5%)
BI	4	47 38.090	55 21.486	250	Soft								100%			brittle star (5), *Pandalus* shrimp (3), arrow worm (9), krill (>20), *Hormathia* anemone (2)
BI	5	47 38.034	55 21.470	230	Hard						5%		95%			brittle star (7), krill (>20), arrow worm (1), *Hormathia* anemone (>20)
BI	6	47 37.977	55 21.474	190	Hard				15%	15%	5%		65%			brittle star (>20), *Hormathia* anemone (1), unidentified jellyfish (2), krill (>20), *Serpula* (5), arrow worm (>20)
BI	7	47 37.928	55 21.484	190	Hard								100%			brittle star (>20), *Hormathia* anemone (16)
BI	8	47 37.925	55 21.396	192	Hard				20%	10%	15%		55%			vase sponge (1), Geodiidae sponge (>20), yellow sponge (<5%), krill (>20)
BI	9	47 37.982	55 21.408	203	Hard				15%	5%	5%		75%			*Hormathia* anemone (10), brittle star (13), lobster (1), winter flounder (1), *Serpula* (5), *Pandalus* shrimp (1), Geodiidae sponge (1)
BI	10	47 38.036	55 21.413	218	Hard				5%	15%	10%		70%			*Hormathia* anemone (>20), brittle star (8), krill (>20), arrow worm (3)
BI	11	47 38.082	55 21.409	228	Hard					35%			65%			*Hormathia* anemone (>20), arrow worm (2), brittle star (15), whelk (1)
BI	12	47 38.144	55 21.419	213	Hard					25%			75%			brittle star (11), *Pandalus* shrimp (4), *Hormathia* anemone (16)
BI	13	47 38.194	55 21.421	201	Hard					10%			90%			spiny sunstar (1), *Hormathia* anemone (>20), brittle star (11), *Pandalus* shrimp (2), unidentified jellyfish (1)
BI	14	47 38.245	55 21.415	166	Hard	10%	30%			5%			55%			*Hormathia* anemone (>20), *Serpula* (6), Geodiidae sponge (>20), yellow sponge (<5%), unidentified jellyfish (3), *Polymastia* sponge (2), *Pandalus* shrimp (3)
BI	15	47 38.242	55 21.346	128	Hard					10%			90%			*Hormathia* anemone (>20), Geodiidae sponge (>20), unidentified jellyfish

Belle Island																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(1), arrow worm (3), yellow sponge (<5%)
BI	16	47 38.196	55 21.333	129	Hard					10%	10%		80%			*Hormathia* anemone (>20), round sponge (1), yellow sponge (<5%), arrow worm (3)
BI	17	47 38.144	55 21.326	118	Hard					10%	30%		60%			*Hormathia* anemone (>20), *Pandalus* shrimp (2), Geodiidae sponge (4), unidentified jellyfish (1), *Cerianthus* anemone (1), arrow worm (2), yellow sponge (<5%)
BI	18	47 38.089	55 21.322	135	Hard	30%	40%						30%			Geodiidae sponge (>20), *Pandalus* shrimp (4), unidentified jellyfish (2), *Hormathia* anemone (7), yellow sponge (<5%), arrow worm (1), *Serpula* (4)
BI	19	47 38.035	55 21.313	155	Hard	50%	40%						10%			lobster (1), Geodiidae sponge (>20), *Serpula* (3), yellow sponge (<5%), brittle star (13), *Polymastia* sponge (1), white encrusting sponge (10%), *Pandalus* shrimp (1), *Urticina* anemone (1), *Hormathia* anemone (3)
BI	20	47 37.979	55 21.321	196	Hard					15%	20%		65%			unidentified jellyfish (1), *Hormathia* anemone (7), brittle star (>20), arrow worm (2), Geodiidae sponge (>20), krill (4)
BI	21	47 37.922	55 21.313	208	Hard					60%			40%			brittle star (>20), *Pandalus* shrimp (3), krill (>20), eelpout (1), *Spirorbis* worm (>20), *Cerianthus* anemone (1)
BI	22	47 37.935	55 21.230	170	Hard					45%			55%			unidentified jellyfish (3), brittle star (>20), *Hormathia* anemone (13)
BI	23	47 37.989	55 21.234	157	Hard	20%	20%						60%			*Hormathia* anemone (>20), *Pandalus* shrimp (5), yellow sponge (<5%), *Polymastia* sponge (1), unidentified jellyfish (4), brittle star (1), Geodiidae sponge (>20), vase sponge (1), unidentified white round sponge (1), *Serpula* (1), lobster (1), krill (3)
BI	24	47 38.033	55 21.245	122	Hard		15%		5%	15%	20%		45%			*Pandalus* shrimp (4), Geodiidae sponge (>20), yellow sponge (<5%), *Hormathia* anemone (>20), unidentified jellyfish (2), Acadian redfish (1)
BI	25	47 38.090	55 21.242	110	Hard		5%			30%	25%		40%			unidentified jellyfish (1), *Hormathia* anemone (12)

Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
Belle Island																
BI	26	47 38.148	55 21.248	74	Hard		80%				5%		15%			*Hormathia* anemone (>20), yellow sponge (5%), *Asterias* sea star (1), Geodiidae sponge (>20), Acadian redfish (1), *Polymastia* sponge (1), vase sponge (2)
BI	27	47 38.198	55 21.260	64	Hard		70%						30%			*Hormathia* anemone (>20), *Polymastia* sponge (1), Geodiidae sponge (>20), *Henricia* sea star (1)
BI	28	47 38.253	55 21.260	67	Hard		75%					10%	15%			*Hormathia* anemone (>20), Geodiidae sponge (>20), yellow sponge (10%), white encrusting sponge (<5%), orange encrusting sponge (<5%), *Asterias* sea star (1), lobster (1)
BI	29	47 38.254	55 21.180	41	Hard		40%		15%	20%	10%	15%				scallop (>20), encrusting yellow sponge (<5%), encrusting orange sponge (<5%), *Asterias* sea star (1)
BI	30	47 38.206	55 21.172	34	Hard	15%	45%		5%	5%	15%	15%				scallop (1), *Henricia* sea star (3), encrusting orange sponge (<5%), rock cod (1), *Spirorbis* (>20), yellow sponge (<5%)
BI	31	47 38.153	55 21.171	41	Hard		60%				20%	20%				scallop (1), yellow sponge (<5%), encrusting orange sponge (<5%), *Stomphia* anemone (9), *Hormathia* anemone (16)
BI	32	47 38.091	55 21.166	90	Hard	20%	35%			5%		10%	30%			Geodiidae sponge (>20), *Hormathia* anemone (>20), *Serpula* (4), unidentified jellyfish (2), *Pandalus* shrimp (1), yellow sponge (<5%), whelk (1)
BI	33	47 38.039	55 21.158	98	Hard	40%	30%	<5%					30%			*Hormathia* anemone (>20), large white sponge (<5%), yellow sponge (<5%), *Geodiidae* sponge (>20), unidentified jellyfish (2), *Serpula* (3), *Polymastia* sponge (3), encrusting orange sponge (<5%)
BI	34	47 37.984	55 21.150	99	Hard		10%			20%	20%		50%			*Cerianthus* anemone (1), *Serpula* (6), *Pandalus* shrimp (7), unidentified jellyfish (1), encrusting white sponge (<5%), arrow worm (1), *Geodiidae* sponge (>20)
BI	35	47 37.930	55 21.144	109	Hard	30%	35%			15%			20%			unidentified jellyfish (>20), *Hormathia* anemone (4), *Pandalus* shrimp (3), *Polymastia* sponge (1), *Geodiidae* sponge (>20)
BI	36	47 37.935	55 21.066	57	Hard		45%	10%		15%	30%					*Hormathia* anemone (19), yellow sponge (<5%), *Polymastia* sponge (2), *Gersemia* soft coral (1)

Belle Island															
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition									Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
BI	37	47 37.985	55 21.071	53	Hard					40%	35%		25%			*Asterias* sea star (2), scallop (1)
BI	38	47 38.044	55 21.084	54	Hard	20%	50%		<5%		10%		20%			*Hormathia* anemone (5), *Asterias* sea star (1), encrusting orange sponge (<5%), *Serpula* (1), *Stomphia* anemone (3)
BI	39	47 38.095	55 21.081	51	Hard	60%				5%	10%		25%			*Hormathia* anemone (>20), encrusting orange sponge (<5%), *Henricia* sea star (1)
BI	40	47 38.146	55 21.083	42	Hard					60%			40%			scallop (7), encrusting orange sponge (<5%), *Cerianthus* anemone (1)
BI	41	47 38.201	55 21.088	21	Hard		65%				20%	15%				*Spirorbis* (>20), lobster (1), encrusting orange sponge (<5%), yellow sponge (<5%), *Henricia* sea star (3)
BI	42	47 38.259	55 21.092	27	Hard					40%	20%	20%	20%			*Spirorbis* (>20), scallop (1)
BI	43	47 38.259	55 21.020	10	Hard		20%	55%			10%	15%				*Metridium* anemone (>20), *Membranipora* bryozoan (<5%)
BI	44	47 38.206	55 21.038	13	Hard		60%	15%			5%	10%	10%			*Henricia* sea star (1), *Membranipora* bryozoan (<5%)
BI	45	47 38.152	55 21.001	8	Hard	35%	45%			5%		10%	5%			*Spirorbis* (>20)
BI	46	47 38.097	55 21.001	27	Hard		40%		15%	5%		15%	25%			*Cerianthus* anemone (1), *Spirorbis* (>20)
BI	47	47 38.043	55 20.985	34	Hard		45%			10%	30%		15%			scallop (1), *Henricia* sea star (3), *Spirorbis* (>20), *Membranipora* bryozoan (<5%), encrusting yellow sponge (<5%)

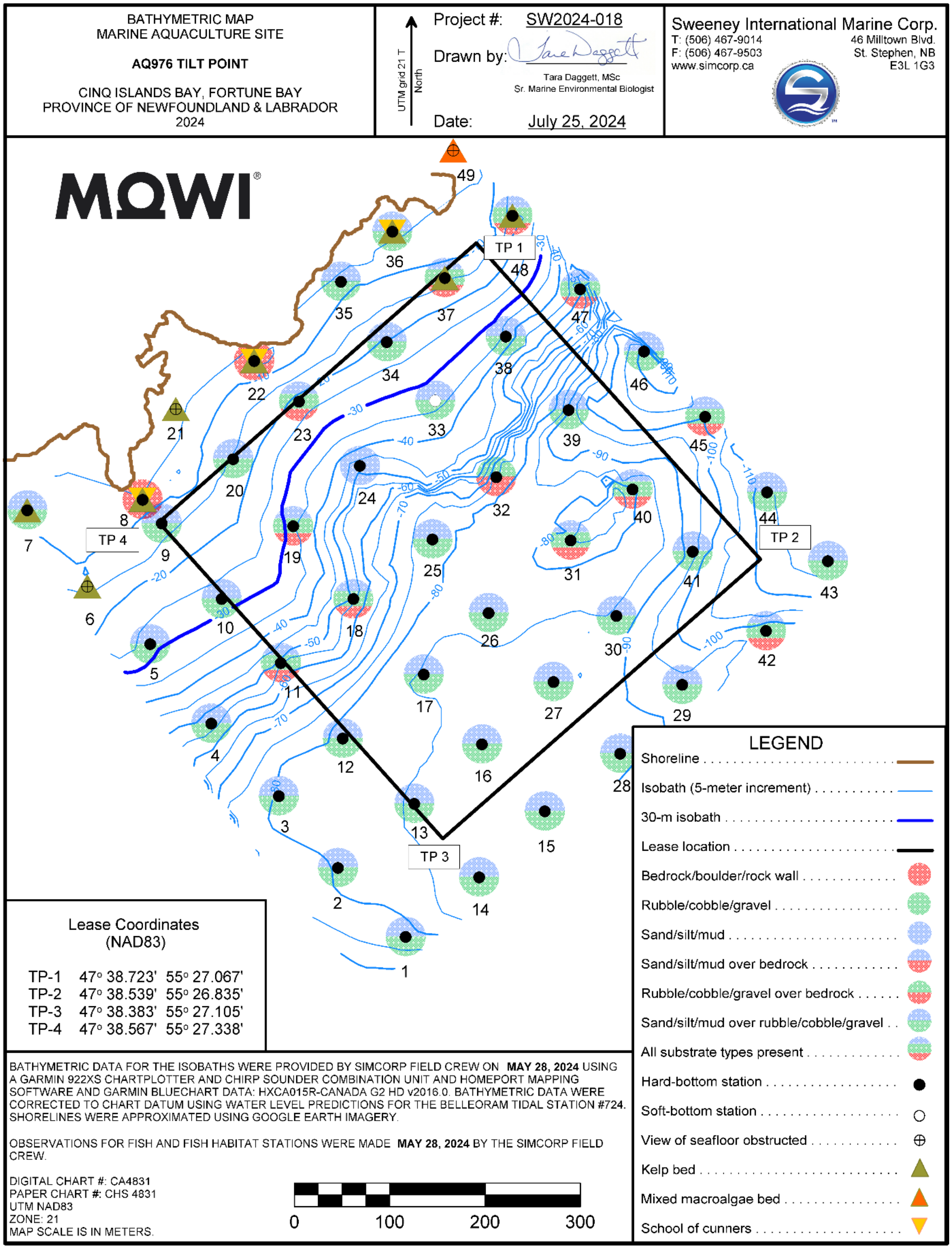


Figure 6.20. Habitat observations at sampling stations in the Tilt Point sea farm (May 2024).

Table 6.10. Summary of bottom type and observed flora and fauna at the Tilt Point sea Farm (May 2024).

Tilt Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
TIP	1	47 38.327	55 27.138	78	Hard			<5%		<5%	30%	30%	40%			*Hormathia* anemone (>20), unidentified fish (1), arrow worm (3), *Gersemia* soft coral (4), *Geodiidae* sponge (4), Nephtheidae soft coral (4), *Lithothamnion* (<5%)
TIP	2	47 38.367	55 27.193	81	Hard					10%	75%		15%			*Gersemia* soft coral (11), *Hormathia* anemone (>20), unidentified anemone (1)
TIP	3	47 38.409	55 27.242	81	Hard				5%	45%	25%		25%			*Hormathia* anemone (>20), brittle star (1), Atlantic cod (1)
TIP	4	47 38.451	55 27.297	54	Hard					60%	5%		35%			brittle star (1), cerianthid anemone (7),*Lithothamnion* (<5%), *Hildenbrandia* (<5%)
TIP	5	47 38.497	55 27.347	28	Hard						30%	70%	<5%			scallop (2), Irish moss (5%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)
TIP	6	47 38.531	55 27.399	13	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Spirorbis* worm (>20), cunner (3), *Laminaria* sp. (100%)
TIP	7	47 38.575	55 27.448	9	Hard						70%	30%				comb jelly (1), *Spirorbis* worm (>20), branching bryozoan (>20), *Membranipora* bryozoan (5), cunner (9), unidentified brown algae (<5%), *Laminaria* sp. (90%)
TIP	8	47 38.580	55 27.351	7	Hard		50%	50%								cunner (>20), *Spirorbis* worm (>20), *Lithothamnion* (<5%), *Hildenbrandia* (<5%), *Laminaria* sp. (100%), Rhodophyta (<5%)
TIP	9	47 38.566	55 27.335	13	Hard					<5%	80%	20%				*Laminaria* sp. (10%), Rhodophyta (<5%), unidentified brown algae (15%)
TIP	10	47 38.522	55 27.286	28	Hard					5%	45%	50%				comb jelly (4), unidentified fish (3), unidentified brown algae (5%), *Laminaria* sp. (<5%)
TIP	11	47 38.485	55 27.238	56	Hard	40%				20%	35%		5%			comb jelly (1), *Lithothamnion* (15%), *Hildenbrandia* (10%)
TIP	12	47 38.441	55 27.187	84	Hard				5%	45%	30%		20%			*Stomphia* anemone (4), *Hormathia* anemone (>20), arrow worm (1), unidentified flounder (1), *Asterias* seastar (1), comb jelly (1), *Crangon* shrimp (1)
TIP	13	47 38.403	55 27.128	86	Hard				5%	40%	10%		45%			*Gersemia* soft coral (11), *Hormathia* anemone (>20), *Henricia* seastar (1), arrow worm (1), *Spirorbis* worm (>20)
TIP	14	47 38.360	55 27.075	87	Hard				<5%	35%	10%		55%			*Gersemia* soft coral (>20), *Stomphia* anemone (4), *Hormathia* anemone (>20), arrow worm (2)
TIP	15	47 38.397	55 27.019	88	Hard					50%	10%		40%			*Gersemia* soft coral (15), *Hormathia* anemone (>20), arrow worm (4), *Henricia* seastar (1), Atlantic cod (2)

Tilt Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
TIP	16	47 38.436	55 27.071	87	Hard					55%	5%		40%			*Gersemia* soft coral (>20), *Hormathia* anemone (>20), branching bryozoan (10), infaunal hole (2)
TIP	17	47 38.477	55 27.118	86	Hard					60%	10%		30%			*Stomphia* anemone (5), *Hormathia* anemone (>20), comb jelly (1), arrow worm (2), cerianthid anemone (1)
TIP	18	47 38.521	55 27.176	53	Hard	30%			<5%	5%	10%		55%			infaunal hole (>20), worm tube (>20), comb jelly (1)
TIP	19	47 38.563	55 27.225	34	Hard	30%	5%	5%		5%	15%		40%	<5%		comb jelly (6), yellow encrusting sponge (<5%), *Lithothamnion* (<5%), unidentified brown algae (<5%)
TIP	20	47 38.602	55 27.274	17	Hard				<5%	<5%	10%	90%				unidentified fish (1), *Spirorbis* worm (>20), cunner (2), branching bryozoan (>20), *Membranipora* bryozoan (6), unidentified brown algae (10%), *Laminaria* sp. (30%), *Agarum* sp. (<5%), *Ascophyllum* sp. (5%)
TIP	21	47 38.631	55 27.321	3	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Laminaria* sp. (85%), unidentified brown algae (15%)
TIP	22	47 38.658	55 27.255	5	Hard			100%								*Spirorbis* worm (>20), branching bryozoan (5), cunner (>20), *Lithothamnion* (<5%), unidentified brown algae (10%), *Laminaria* sp. (90%)
TIP	23	47 38.634	55 27.218	23	Hard			5%			45%	50%				*Spirorbis* worm (>20), cunner (1), *Lithothamnion* (<5%), *Laminaria* sp. (20%), unidentified brown algae (5%), *Agarum* sp. (10%)
TIP	24	47 38.597	55 27.168	48	Hard							85%			15%	worm tube (>20)
TIP	25	47 38.554	55 27.109	79	Hard				<5%	50%	20%		30%			cerianthid anemone (1)
TIP	26	47 38.511	55 27.063	85	Hard				5%	45%	15%		35%			arrow worm (2), Atlantic cod (1), *Stomphia* anemone (3), *Hormathia* anemone (14), *Henricia* seastar (2), unidentified fish (1), worm tube (>20)
TIP	27	47 38.471	55 27.010	87	Hard				<5%	20%	60%		20%			*Hormathia* anemone (12), branching bryozoan (1), *Gersemia* soft coral (4), arrow worm (6)
TIP	28	47 38.429	55 26.955	87	Hard					50%	25%		25%		<5%	unidentified fish (2), arrow worm (6), branching bryozoan (5), *Hormathia* anemone (>20), comb jelly (1), *Gersemia* soft coral (10), cerianthid anemone (1)
TIP	29	47 38.468	55 26.902	93	Hard					20%	40%		40%			*Gersemia* soft coral (9), *Hormathia* anemone (>20), comb jelly (2), arrow worm (3), burrowing anemone (1)
TIP	30	47 38.508	55 26.956	87	Hard				<5%	40%	30%	5%	25%			*Hormathia* anemone (18), *Gersemia* soft coral (3), yellow encrusting

Tilt Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																sponge (<5%), arrow worm (1), *Henricia* seastar (1), comb jelly (1), branching bryozoan (1)
TIP	31	47 38.552	55 26.993	76	Hard	70%		<5%	10%	10%	5%		5%			*Hormathia* anemone (18), *Gersemia* soft coral (1), comb jelly (1), *Henricia* seastar (3), yellow encrusting sponge (5%), *Lithothamnion* (20%), *Hildenbrandia* (10%)
TIP	32	47 38.589	55 27.054	77	Hard	90%				10%						*Hormathia* anemone (1), *Lithothamnion* (<5%)
TIP	33	47 38.633	55 27.104	35	Soft				<5%		15%	70%	5%	5%	5%	comb jelly (8), cerianthid anemone (1), infaunal hole (>20), worm tube (>20),
TIP	34	47 38.667	55 27.144	21	Hard						5%	95%				unidentified flounder (1), worm tube (>20), unidentified brown algae (10%), *Ascophyllum* sp. (<5%)
TIP	35	47 38.702	55 27.181	9	Hard					5%	10%	85%				cunner (4), *Spirorbis* worm (>20), comb jelly (1), branching bryozoan (>20), *Laminaria* sp. (40%), unidentified brown algae (5%)
TIP	36	47 38.730	55 27.137	5	Hard						10%	90%				branching bryozoan (>20), cunner (>20), *Laminaria* sp. (100%)
TIP	37	47 38.703	55 27.094	15	Hard		5%			5%	50%	40%				*Spirorbis* worm (>20), branching bryozoan (>20), comb jelly (1), *Lithothamnion* (<5%), *Hildenbrandia* (<5%), *Laminaria* sp. (90%)
TIP	38	47 38.669	55 27.044	36	Hard				<5%	<5%	85%	15%				unidentified brown algae (5%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)
TIP	39	47 38.626	55 26.992	87	Hard					5%	65%	30%	<5%			arrow worm (2), Atlantic cod (1)
TIP	40	47 38.580	55 26.940	83	Hard			20%	30%	25%	15%	10%				comb jelly (2), *Serpula sp.* (13), yellow encrusting sponge (<5%), *Geodiidae* sponge (2), *Hormathia* anemone (3), *Lithothamnion* (10%)
TIP	41	47 38.544	55 26.891	94	Hard				20%	55%	20%	5%				*Hormathia* anemone (17), yellow encrusting sponge (<5%), *Gersemia* soft coral (1), arrow worm (1), Atlantic cod (2)
TIP	42	47 38.498	55 26.831	97	Hard			5%	10%	25%	30%		30%			*Hormathia* anemone (>20), yellow encrusting sponge (<5%), white encrusting sponge (<5%), *Serpula* sp. (2), branching bryozoan (1), Atlantic cod (2), *Gersemia* soft coral (1), arrow worm (2), whelk (1)
TIP	43	47 38.537	55 26.778	118	Hard				<5%	60%	15%		25%			*Hormathia* anemone (>20), arrow worm (11), *Gersemia* soft coral (11), *Serpula* sp. (1)
TIP	44	47 38.577	55 26.828	118	Hard					25%	50%	10%	15%			*Hormathia* anemone (>20), arrow worm (2), unidentified fish (1), *Gersemia* soft coral (3)

Tilt Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
TIP	45	47 38.621	55 26.878	102	Hard			15%	10%	20%	45%		10%			yellow encrusting sponge (<5%), *Hormathia* anemone (9), round sponge (1), *Serpula* sp. (5), comb jelly (1), unidentified flounder (1)
TIP	46	47 38.659	55 26.928	113	Hard					40%	45%		15%			*Hormathia* anemone (>20), unidentified fish (1), arrow worm (3), *Serpula* sp. (1)
TIP	47	47 38.695	55 26.981	49	Hard		10%			30%	50%	10%				comb jelly (3), brittle star (1), *Lithothamnion* (10%), *Hildenbrandia* (5%), unidentified brown algae (15%)
TIP	48	47 38.738	55 27.036	18	Hard		10%		10%	10%	35%	35%				*Spirorbis* worm (>20), *Membranipora* bryozoan (>20), *Henricia* seastar (1), *Laminaria* sp. (25%), *Agarum* sp. (25%), *Lithothamnion* (30%), unidentified brown algae (5%)
TIP	49	47 38.776	55 27.085	5	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cunner (1), *Laminaria* sp. (55%), Rhodophyta (5%), *Desmarestia* (40%)

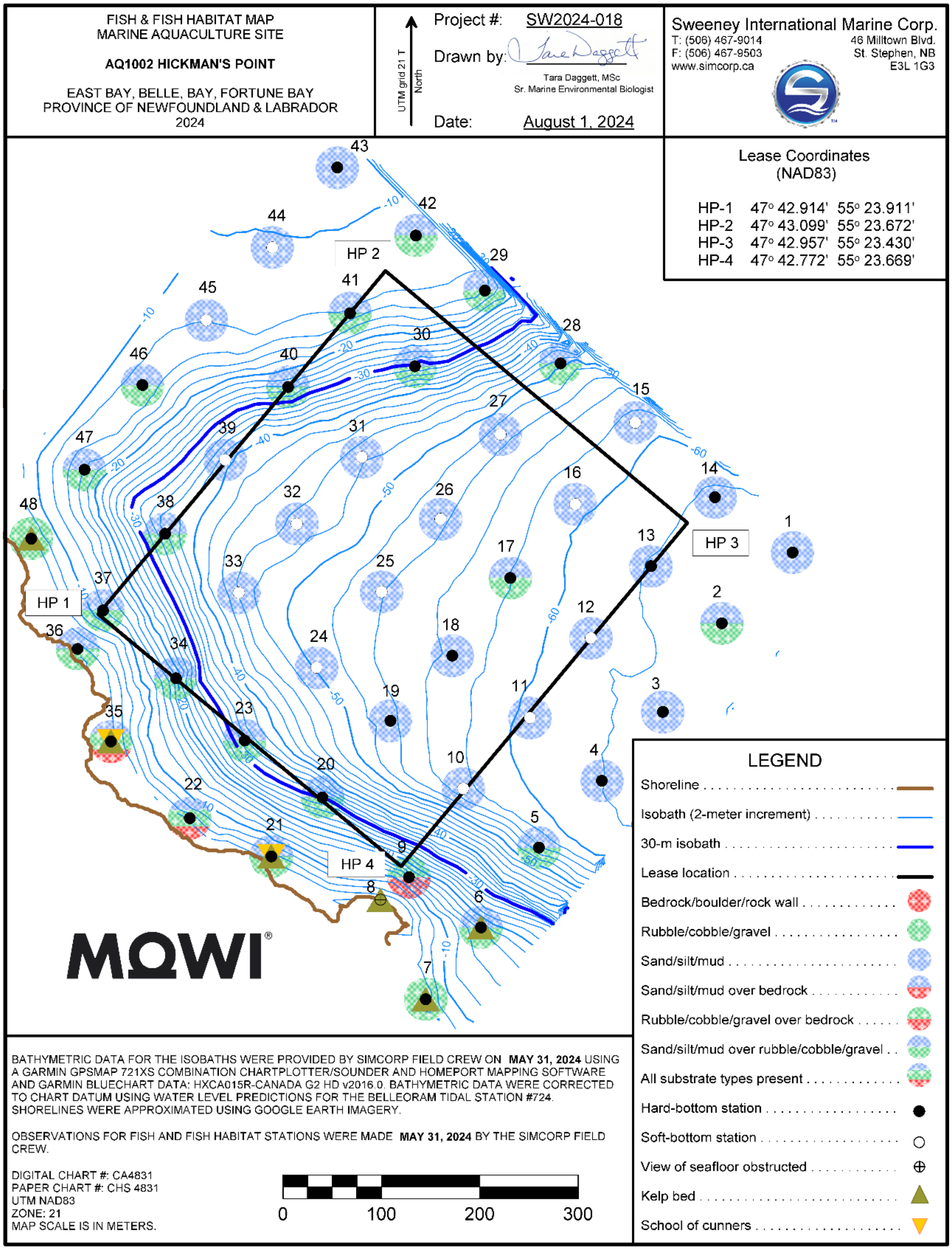


Figure 6.21. Habitat observations at sampling stations in the Hickman's Point sea farm (May 2024).

Table 6.11. Summary of bottom type and observed flora and fauna at the Hickman's Point sea Farm (May 2024).

Hickman's Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
HMP	1	47 42.940	55 23.345	64	Hard								100%			*Gersemia* soft coral (>20), *Hormathia* anemone (12), yellow round sponge (14), comb jelly (1), Nephtheidae soft coral (2), Atlantic cod (1)
HMP	2	47 42.902	55 23.404	62	Hard					<5%	15%		85%			*Gersemia* soft coral (6), *Hormathia* anemone (12), arrow worm (2)
HMP	3	47 42.854	55 23.454	64	Hard						<5%		100%			*Hormathia* anemone (>20)
HMP	4	47 42.817	55 23.504	63	Hard								100%			infaunal holes (>20), yellowtail flounder (2)
HMP	5	47 42.781	55 23.557	55	Hard					10%	35%		55%			*Hormathia* anemone (1), infaunal hole (4)
HMP	6	47 42.738	55 23.605	17	Hard				20%	30%	30%		20%			*Lithothamnion* (10%), *Hildenbrandia* (5%), *Agarum* sp. (35%), *Laminaria* sp. (30%)
HMP	7	47 42.699	55 23.651	6	Hard						100%					cunner (2), branching bryozoan (>20), *Laminaria* sp. (65%), *Desmarestia* (<5%)
HMP	8	47 42.754	55 23.686	3	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cunner (>20), *Spirorbis* worm (>20), *Membranipora* bryozoan (>20), *Laminaria* sp. (100%)
HMP	9	47 42.766	55 23.663	16	Hard	5%			20%	25%	50%					*Spirorbis* worm (>20), *Laminaria* sp. (30%), *Lithothamnion* (10%), *Hildenbrandia* (5%)
HMP	10	47 42.814	55 23.617	57	Soft								100%			infaunal hole (1), winter flounder (2), Atlantic scallop (1), Icelandic scallop (1)
HMP	11	47 42.852	55 23.562	61	Soft								100%			infaunal hole (10)
HMP	12	47 42.895	55 23.511	62	Soft								100%			Geodiidae sponge (2), infaunal hole (>20)
HMP	13	47 42.934	55 23.461	63	Hard							30%	70%			comb jelly (2), infaunal hole (5), whelk (2)
HMP	14	47 42.971	55 23.408	63	Hard					<5%		20%	80%			*Gersemia* soft coral (1), Geodiidae sponge (3), infaunal hole (3), whelk (3), *Hormathia* anemone (1)
HMP	15	47 43.013	55 23.471	60	Soft								100%			Geodiidae sponge (7), infaunal hole (>20), whelk (1)
HMP	16	47 42.969	55 23.521	60	Soft								100%			whelk (1), infaunal hole (>20), comb jelly (2)
HMP	17	47 42.929	55 23.575	51	Hard						10%	30%	60%			unidentified flounder (2), comb jelly (1), infaunal hole (1)
HMP	18	47 42.887	55 23.624	57	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	comb jelly (4)
HMP	19	47 42.852	55 23.675	54	Hard								100%			unidentified flatfish (1)
HMP	20	47 42.811	55 23.732	30	Hard					15%	80%		5%			
HMP	21	47 42.779	55 23.774	8	Hard						50%		50%			cunner (>20), comb jelly (1), *Laminaria* sp. (100%)
HMP	22	47 42.801	55 23.840	4	Hard			5%	5%	10%	60%	20%	<5%			*Spirorbis* worm (>20), comb jelly (3), *Lithothamnion*

Hickman's Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(5%), *Hildenbrandia* (<5%), *Laminaria* sp. (40%)
HMP	23	47 42.843	55 23.794	33	Hard					40%	35%		25%			*Lithothamnion* (5%), *Hildenbrandia* (<5%)
HMP	24	47 42.882	55 23.734	51	Soft								100%			rock crab (1), unidentified anemone (1)
HMP	25	47 42.923	55 23.680	54	Soft								100%			infaunal hole (>20)
HMP	26	47 42.962	55 23.631	54	Soft							40%	60%			comb jelly (1), infaunal hole (7)
HMP	27	47 43.008	55 23.581	54	Soft							20%	80%			comb jelly (2), infaunal hole (5)
HMP	28	47 43.046	55 23.531	49	Hard					10%	20%		70%			*Hormathia* anemone (2), brittle star (3)
HMP	29	47 43.087	55 23.591	15	Hard						20%	80%				unidentified flounder (1), Atlantic scallop (1)
HMP	30	47 43.046	55 23.649	33	Hard				<5%	10%	30%	60%				comb jelly (2)
HMP	31	47 42.997	55 23.694	48	Soft								100%			comb jelly (5), unidentified flounder (1), infaunal hole (>20)
HMP	32	47 42.961	55 23.748	48	Soft								100%			comb jelly (7), infaunal hole (>20)
HMP	33	47 42.924	55 23.796	47	Soft								100%			comb jelly (3), infaunal hole (2)
HMP	34	47 42.878	55 23.849	18	Hard			<5%	10%	50%	10%		30%			cunner (1), *Lithothamnion* (25%), *Hildenbrandia* (10%), *Agarum* (10%)
HMP	35	47 42.844	55 23.903	3	Hard		20%				55%		25%			cunner (>20), *Spirorbis* worm (>20), *Laminaria* sp. (100%), *Lithothamnion* (<5%)
HMP	36	47 42.895	55 23.928	2	Hard		<5%			50%	40%		10%			cunner (3), *Spirorbis* worm (>20), filamentous algae (<5%), *Laminaria* sp. (35%)
HMP	37	47 42.916	55 23.907	12	Hard					15%	40%		45%			unidentified flatfish (1), comb jelly (2), yellow encrusting sponge (<5%)
HMP	38	47 42.957	55 23.855	35	Hard			<5%	5%	10%	10%		75%			comb jelly (4)
HMP	39	47 42.997	55 23.805	39	Soft								100%			comb jelly (3), infaunal hole (10)
HMP	40	47 43.036	55 23.753	28	Hard						75%	25%				summer flounder (1), unidentified flounder (1)
HMP	41	47 43.076	55 23.701	13	Hard			<5%	5%	<5%	45%	50%				rock crab (1), infaunal hole (9), Rhodophyta (<5%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)
HMP	42	47 43.118	55 23.646	11	Hard						10%	85%	5%			comb jelly (2), infaunal hole (6), jellyfish (1), unidentified flounder (2), *Laminaria* sp. (<5%)
HMP	43	47 43.156	55 23.709	10	Hard							100%				comb jelly (1), infaunal hole (8), *Laminaria* sp. (<5%), unidentified brown algae (<5%)
HMP	44	47 43.113	55 23.763	11	Soft					<5%		100%				infaunal hole (1), unidentified brown algae (<5%)
HMP	45	47 43.074	55 23.818	13	Soft							100%				unidentified flounder (2), infaunal hole (13), *Laminaria* sp. (<5%)
HMP	46	47 43.039	55 23.871	14	Hard				<5%	10%	20%	70%				infaunal hole (3), *Laminaria* sp. (10%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)

Hickman's Point																
Station		**Coordinates (NAD83)**		**Depth (m)**	**Bottom Type**	**Bottom Type and Condition**										**Description, Comments and Observations** [a]
		Latitude	**Longitude**			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
HMP	47	47 42.993	55 23.920	17	Hard				<5%	10%	15%	75%				Spirorbis worm (>20), Membranipora bryozoan (3), comb jelly (1), infaunal hole (7), *Laminaria* sp. (10%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)
HMP	48	47 42.956	55 23.964	6	Hard				<5%	85%	15%		<5%			*Spirorbis* worm (>20), branching bryozoan (~10), yellowtail flounder (1), cunner (2), *Laminaria* sp. (75%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)

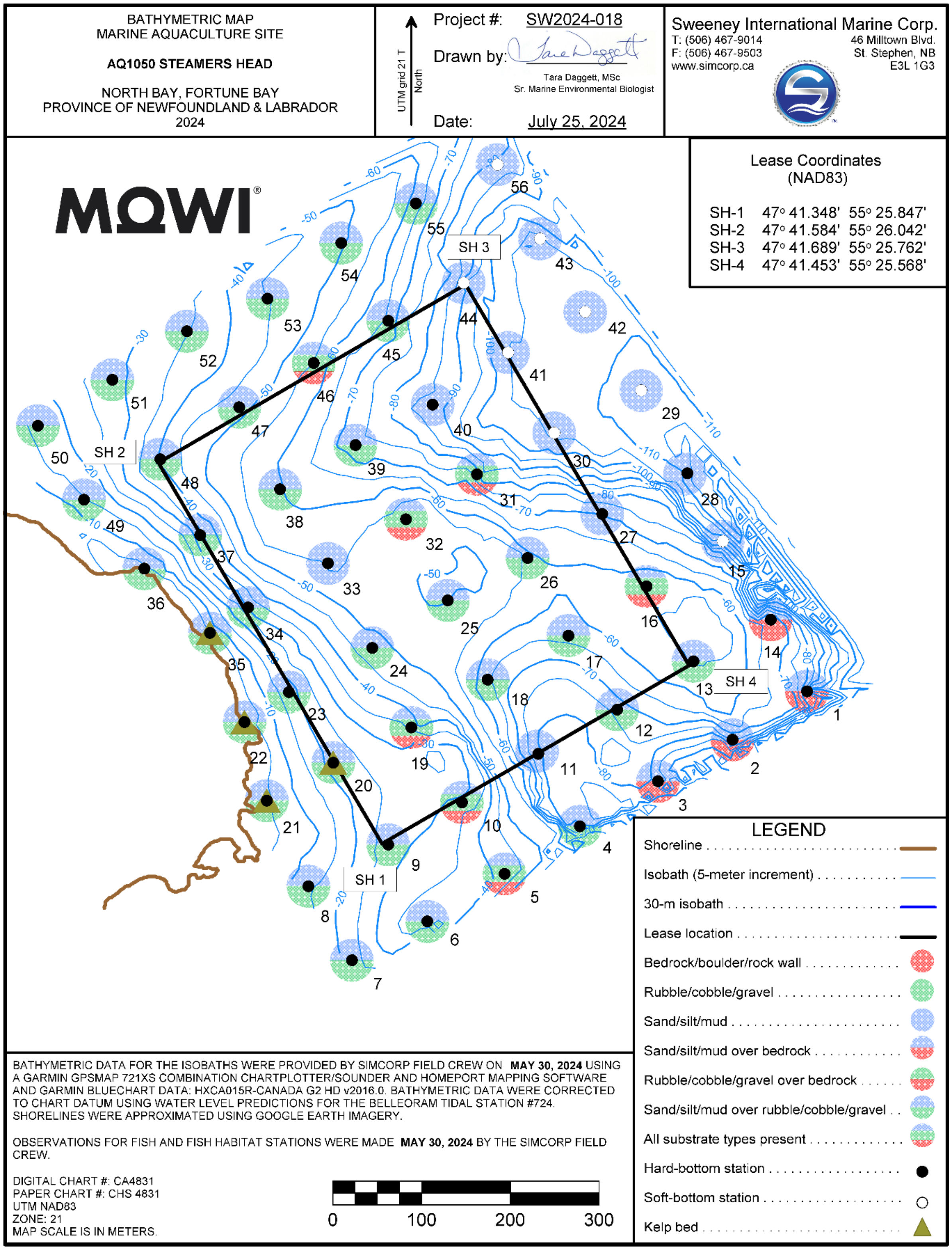


Figure 6.22. Habitat observations at sampling stations in the Steamers Head sea farm (May 2024).

Table 6.12. Summary of bottom type and observed flora and fauna at the Steamers Head sea farm (May 2024).

Steamers Head																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
STH	1	47 41.436	55 25.462	101	Hard	15%	50%					10%	25%			*Hormathia* anemone (>20), winter flounder (1) round sponge (1), *Polymastia* sponge (2), *Gersemia* soft coral (2), Geodiidae sponge (>20)
STH	2	47 41.407	55 25.530	78	Hard	40%	40%					<5%	20%			*Hormathia* anemone (>20), encrusting sponge (<5%), round sponge (3), Geodiidae sponge (>20), *Gersemia* soft coral (2)
STH	3	47 41.383	55 25.598	81	Hard		30%			<5%		30%	40%			*Hormathia* anemone (>20), mud star (1), breadcrumb sponge (1), Geodiidae sponge (>20), *Polymastia* sponge (1), *Gersemia* soft coral (1)
STH	4	47 41.356	55 25.669	80	Hard					<5%	20%	35%	45%			*Hormathia* anemone (1), arrow worm (1), scallop (1), infaunal hole (12), Geodiidae sponge (9)
STH	5	47 41.328	55 25.738	42	Hard			5%	10%	20%	15%	25%	25%			*Hormathia* anemone (1), tortoise shell limpet (1), barnacle (1), breadcrumb sponge (1), scallop (1), Geodiidae sponge (>20), *Lithothamnion* (20%), *Hildenbrandia* (<5%)
STH	6	47 41.300	55 25.808	39	Hard					25%	25%		50%			*Hormathia* anemone (1), waved whelk (3), *Saccharina* (<5%), *Lithothamnion* (15%), *Hildenbrandia* (<5%)
STH	7	47 41.277	55 25.877	23	Hard					10%	50%	30%	10%			comb jelly (2), *Saccharina* (<5%), *Agarum* (25%), *Lithothamnion* (30%), *Hildenbrandia* (5%)
STH	8	47 41.323	55 25.915	15	Hard					5%	85%		10%			cunner (1), waved whelk (1), round sponge (3), scallop (1), *Desmarestia* (<5%), *Saccharina* (<5%)
STH	9	47 41.347	55 25.842	27	Hard					10%	50%	40%				American lobster (2), moon jelly (1), mud star (2), breadcrumb sponge (1), scallop (1), *Lithothamnion* (5%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)
STH	10	47 41.372	55 25.775	32	Hard	<5%	15%	<5%	10%		50%	15%	10%			ctenophore (1), Geodiidae sponge (>20), *Lithothamnion* (35%), *Hildenbrandia* (10%), Rhodophyta (<5%)
STH	11	47 41.401	55 25.705	78	Hard							40%	60%			*Hormathia* anemone (1), infaunal hole (>20), Geodiidae sponge (1), unidentified flounder (2)
STH	12	47 41.427	55 25.633	75	Hard				<5%	15%	15%	15%	55%			*Hormathia* anemone (>20), Geodiidae sponge (>20), infaunal hole (>20)
STH	13	47 41.456	55 25.564	55	Hard				<5%	15%	20%	25%	40%			*Hormathia* anemone (>20), infaunal hole (>20), Geodiidae

Steamers Head																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																sponge (>20), *Lithothamnion* (15%)
STH	14	47 41.480	55 25.493	67	Hard	60%	20%			<5%		10%	10%			*Hormathia* anemone (4), unidentified fish (2), moon jelly (3), *Asterias* seastar (1), encrusting sponge (10%), *Gersemia* soft coral (11)
STH	15	47 41.529	55 25.535	100	Soft		<5%					30%	70%			*Hormathia* anemone (>20), hake (2), mud star (2), Geodiidae sponge (>20), *Gersemia* soft coral (2)
STH	16	47 41.502	55 25.605	58	Hard		50%		5%			20%	25%			*Hormathia* anemone (>20), mud star (1), waved whelk (1), Geodiidae sponge (>20), *Lithothamnion* (70%)
STH	17	47 41.473	55 25.676	63	Hard				5%	5%	60%	10%	20%			*Hormathia* anemone (>20), Geodiidae sponge (>20), infaunal hole (3), waved whelk (1), ctenophore (1), *Lithothamnion* (<5%)
STH	18	47 41.447	55 25.749	65	Hard					<5%	30%	55%	15%			*Hormathia* anemone (3), infaunal hole (>20), Geodiidae sponge (>20), mud star (1), comb jelly (1), lady crust bryozoan (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (<5%)
STH	19	47 41.419	55 25.819	37	Hard		70%	10%			10%	5%	5%			moon jelly (1), mud whelk (1), ctenophore (1), lady crust bryozoan (<5%), *Lithothamnion* (<5%), *Hildenbrandia* (20%)
STH	20	47 41.398	55 25.890	22	Hard					55%	15%	30%	<5%			scallop (1), *Spirorbis* (>20), *Ascophyllum* (<5%), *Lithothamnion* (55%), *Hildenbrandia* (5%), *Agarum* (60%), *Saccharina* (15%), lady crust bryozoan (<5%)
STH	21	47 41.376	55 25.951	5	Hard						75%	5%	20%			cunner (14), *Saccharina* (90%), *Lithothamnion* (<5%),
STH	22	47 41.424	55 25.969	3	Hard					<5%	85%	15%	<5%			cunner (5), hake (1), mud star (1), *Saccharina* (85%), *Lithothamnion* (<5%), *Ascophyllum* (<5%)
STH	23	47 41.442	55 25.929	18	Hard						30%	60%	10%			ctenophore (1), breadcrumb sponge (4), *Ascophyllum* (<5%), *Lithothamnion* (<5%), Rhodophyta (15%), *Agarum* (10%)
STH	24	47 41.468	55 25.853	48	Hard					5%	5%	70%	20%			infaunal hole (>20), breadcrumb sponge (3)
STH	25	47 41.496	55 25.784	50	Hard			<5%	15%	15%	35%	35%				unidentified flounder (1), ctenophore (2), breadcrumb sponge (3), *Lithothamnion* (45%)

Steamers Head																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
STH	26	47 41.521	55 25.711	60	Hard			<5%	20%	5%	10%	10%	55%			*Hormathia* anemone (>20), infaunal hole (>20), *Lithothamnion* (30%)
STH	27	47 41.547	55 25.643	70	Hard				<5%		<5%	20%	80%			*Hormathia* anemone (>20), ctenophore (1), *Gersemia* soft coral (3), unidentified sponge (1)
STH	28	47 41.571	55 25.566	107	Hard					<5%		20%	80%			*Hormathia* anemone (>20), infaunal hole (3), *Gersemia* soft coral (5), round sponge (1)
STH	29	47 41.622	55 25.606	112	Soft							40%	60%			infaunal hole (>20), Arrow worm (>20)
STH	30	47 41.597	55 25.685	107	Soft							30%	70%			infaunal hole (>20), unidentified flounder (1)
STH	31	47 41.573	55 25.755	80	Hard		20%				20%	30%	30%			*Hormathia* anemone (>20), waved whelk (1), *Gersemia* soft coral (3)
STH	32	47 41.546	55 25.820	54	Hard		45%	<5%	5%	10%	10%	10%	20%			infaunal hole (>20), comb jelly (1), Geodiidae sponge (>20), breadcrumb sponge (1), moon jelly (1), *Hormathia* anemone (1), *Lithothamnion* (15%), *Hildenbrandia* (<5%)
STH	33	47 41.520	55 25.891	56	Hard					<5%	<5%	60%	40%			infaunal hole (>20), moon jelly (1), leafy bryozoan (<5%)
STH	34	47 41.494	55 25.964	30	Hard					5%	85%	10%	<5%			*Lithothamnion* (70%)
STH	35	47 41.479	55 25.999	4	Hard						80%	20%	<5%			cunner (>20), *Saccharina* (85%)
STH	36	47 41.519	55 26.057	5	Hard						45%	45%	10%			comb jelly (1), infaunal hole (>20), American lobster (1), *Saccharina* (35%), *Ascophyllum* (<5%), *Desmarestia* (<5%), *Agarum* (5%)
STH	37	47 41.539	55 26.006	32	Hard					25%	60%	10%	5%			comb jelly (4), moon jelly (1), waved whelk (1), *Lithothamnion* (15%), *Ascophyllum* (<5%)
STH	38	47 41.566	55 25.933	60	Hard					<5%	15%	55%	30%			infaunal hole (>20)
STH	39	47 41.592	55 25.864	75	Hard					10%	10%	45%	35%			*Hormathia* anemone (8), infaunal hole (>20), unidentified flounder (1), sculpin (1), *Metridium* anemone (1)
STH	40	47 41.616	55 25.794	87	Hard					<5%	<5%	40%	60%			*Hormathia* anemone (>20), infaunal hole (>20), Geodiidae sponge (2), *Gersemia* soft coral (>20)
STH	41	47 41.647	55 25.725	105	Soft							30%	70%			infaunal hole (14), ctenophore (1), arrow worm (4)
STH	42	47 41.671	55 25.655	108	Soft							30%	70%			infaunal hole (>20), arrow worm (2)
STH	43	47 41.716	55 25.694	106	Soft							25%	75%			infaunal hole (>20)
STH	44	47 41.690	55 25.764	86	Soft					<5%	<5%	35%	65%			*Hormathia* anemone (>20), arrow worm (1), *Gersemia* soft coral (14)

Steamers Head																
Station		**Coordinates (NAD83)**		**Depth (m)**	**Bottom Type**	**Bottom Type and Condition**										**Description, Comments and Observations [a]**
		Latitude	**Longitude**			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
STH	45	47 41.668	55 25.832	68	Hard					5%	35%	40%	20%			*Hormathia* anemone (>20), Geodiidae sponge (2), *Gersemia* soft coral (2)
STH	46	47 41.643	55 25.900	56	Hard			5%	25%	25%	15%	25%	5%			infaunal hole (>20), *Lithothamnion* (10%)
STH	47	47 41.617	55 25.968	50	Hard				5%	15%	30%	40%	10%			comb jelly (4), infaunal hole (>20), *Lithothamnion* (<5%)
STH	48	47 41.586	55 26.040	41	Hard					10%	45%	30%	15%			*Hormathia* anemone (1), infaunal hole (>20), *Saccharina* (<5%), *Lithothamnion* (10%), Rhodophyta (<5%)
STH	49	47 41.562	55 26.110	13	Hard					5%	75%	10%	10%			American lobster (1), scallop (1), lady crust bryozoan (<5%), *Saccharina* (10%), *Lithothamnion* (20%), *Agarum* (<5%)
STH	50	47 41.608	55 26.150	17	Hard				<5%	40%	30%	20%	10%			scallop (1), *Lithothamnion* (55%), *Hildenbrandia* (<5%), *Saccharina* (5%), *Agarum* (15%)
STH	51	47 41.635	55 26.082	28	Hard					20%	25%	40%	15%			Moon jelly (1) *Asterias* sea star (1), *Lithothamnion* (15%), Rhodophyta (5%)
STH	52	47 41.664	55 26.014	35	Hard					<5%	30%	50%	20%			infaunal hole (>20), comb jelly (1), moon jelly (1), waved whelk (1), Rhodophyta (<5%)
STH	53	47 41.683	55 25.941	46	Hard				<5%	<5%	50%	25%	25%			comb jelly (1), *Hormathia* anemone (7), infaunal hole (9), Geodiidae sponge (15), *Lithothamnion* (5%)
STH	54	47 41.716	55 25.873	50	Hard				10%	10%	25%	25%	30%			infaunal hole (>20), mussel (2), *Hormathia* anemone (>20), Icelandic scallop (1), *Gersemia* soft coral (7), *Lithothamnion* (25%)
STH	55	47 41.739	55 25.805	62	Hard					5%	35%	40%	20%			*Hormathia* anemone (>20), infaunal hole (>20), *Lithothamnion* (<5%)
STH	56	47 41.762	55 25.731	82	Soft				<5%			50%	50%			*Hormathia* anemone (>20), infaunal hole (>20), arrow worm (1), Geodiidae sponge (2), *Gersemia* soft coral (12)

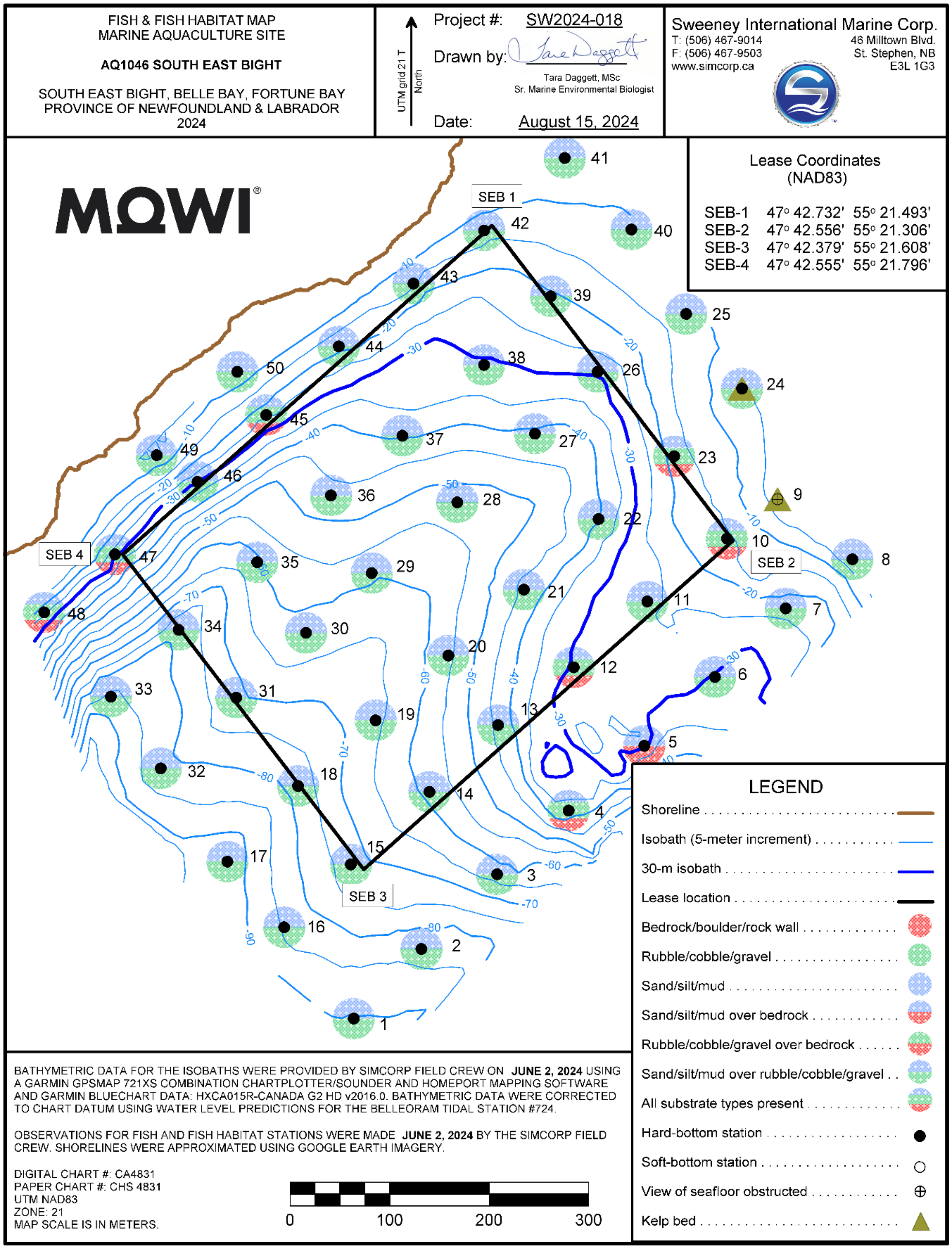


Figure 6.23. Habitat observations at sampling stations in the South East Bight sea farm (June 2024).

Table 6.13. Summary of bottom type and observed flora and fauna at the South East Bight sea farm (June 2024).

South East Bight																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SEB	1	47 42.297	55 21.618	91	Hard					20%	10%	25%	45%			*Hormathia* anemone (>20), *Gersemia* soft coral (>20)
SEB	2	47 42.335	55 21.563	84	Hard					25%	10%	20%	45%			ctenophore (2), Geodiidae sponge (>20), *Hormathia* anemone (>20), yellow encrusting sponge (<5%), *Gersemia* soft coral (>20), Nephtheidae soft coral (3)
SEB	3	47 42.375	55 21.501	64	Hard					30%	15%	20%	35%			*Asterias* sea star (2), ctenophore (2), *Hormathia* anemone (>20), Nephtheidae soft coral (2), yellow encrusting sponge (<5%), *Gersemia* soft coral (>20), *Lithothamnion* (<5%)
SEB	4	47 42.409	55 21.442	38	Hard		40%	15%	10%	5%	5%	5%	20%			Geodiidae sponge (>20), *Hormathia* anemone (3), yellow encrusting sponge (<5%), *Hildenbrandia* (10%), *Lithothamnion* (30%)
SEB	5	47 42.444	55 21.380	30	Hard	70%		20%				5%	5%			*Asterias* sea star (1), yellow encrusting sponge (<5%), *Desmarestia* (10%), unidentified Rhodophyta (10%), *Saccharina* (<5%), sea colander kelp (<5%), *Hildenbrandia* (10%), *Lithothamnion* (60%)
SEB	6	47 42.481	55 21.322	32	Hard				5%	30%	25%	25%	15%			fan bryozoan (1), unidentified flounder (1), cerianthid anemone (2), Geodiidae sponge (>20), scallop (1), unidentified Rhodophyta (<5%), *Saccharina* (5%), sea colander kelp (<5%), *Lithothamnion* (5%)
SEB	7	47 42.518	55 21.264	25	Hard					40%	20%	15%	25%			*Saccharina* (10%), sea colander kelp (10%), *Lithothamnion* (30%)
SEB	8	47 42.544	55 21.210	2	Hard					10%	50%	35%	5%			ctenophore (4), American lobster (1), *Desmarestia* (5%)
SEB	9	47 42.578	55 21.269	3	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Saccharina* (95%), sea colander (5%), *Desmarestia* (<5%)
SEB	10	47 42.557	55 21.310	16	Hard		25%				15%	55%	5%			*Asterias* sea star (1), ctenophore (12), *Desmarestia* (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (5%) *Saccharina* (35%), sea colander kelp (10%)
SEB	11	47 42.523	55 21.375	26	Hard				15%	30%	5%	30%	20%			*Asterias* sea star (2), ctenophore (>20), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Hildenbrandia* (5%), *Lithothamnion* (10%), unidentified Rhodophyta (<5%), *Saccharina* (5%), sea colander kelp (30%)
SEB	12	47 42.488	55 21.436	28	Hard			10%	10%	20%	10%	30%	20%			Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Desmarestia* (5%), *Hildenbrandia* (<5%), *Lithothamnion*

South East Bight																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(15%), *Saccharina* (10%), sea colander kelp (15%)
SEB	13	47 42.457	55 21.497	44	Hard				<5%	25%	20%	35%	20%			ctenophore (2), Geodiidae sponge (>20), *Hormathia* anemone (4), yellow encrusting sponge (<5%), *Gersemia* soft coral (7), *Hildenbrandia* (5%), *Lithothamnion* (<5%)
SEB	14	47 42.421	55 21.554	59	Hard				5%	10%	15%	25%	45%			ctenophore (1), *Hormathia* anemone (6), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Gersemia* soft coral (9), Nephtheidae soft coral (1), *Lithothamnion* (<5%)
SEB	15	47 42.382	55 21.618	72	Hard				5%	30%	20%	20%	25%			ctenophore (5), Geodiidae sponge (>20), *Hormathia* anemone (>20), yellow encrusting sponge (<5%), *Gersemia* soft coral (2)
SEB	16	47 42.348	55 21.673	85	Hard				5%	15%	20%	35%	25%			ctenophore (1), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Gersemia* soft coral (9)
SEB	17	47 42.385	55 21.717	93	Hard				5%	10%	15%	45%	25%			fan bryozoan (2), *Hormathia* anemone (>20), snow crab (1), *Gersemia* soft coral (>20), Nephtheidae soft coral (1)
SEB	18	47 42.426	55 21.659	80	Hard					20%	30%	30%	20%			ctenophore (4), Geodiidae sponge (>20), *Hormathia* anemone (>20), yellow encrusting sponge (<5%), *Gersemia* soft coral (7)
SEB	19	47 42.461	55 21.596	67	Hard				5%	15%	30%	25%	25%			ctenophore (4), Geodiidae sponge (>20), *Hormathia* anemone (>20), whelk (1), *Melonanchora* sponge (1), *Gersemia* soft coral (>20), *Lithothamnion* (<5%)
SEB	20	47 42.496	55 21.536	57	Hard				5%	20%	40%	20%	15%			ctenophore (5), feather star (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), whelk (1), *Gersemia* soft coral (11), Nephtheidae soft coral (1), *Lithothamnion* (<5%)
SEB	21	47 42.531	55 21.474	46	Hard				5%	20%	40%	20%	15%			feather star (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), orange encrusting sponge (<5%), whelk (1), yellow encrusting sponge (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (5%)
SEB	22	47 42.569	55 21.413	42	Hard					10%	40%	30%	20%			ctenophore (>20), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Lithothamnion* (<5%)
SEB	23	47 42.603	55 21.351	23	Hard			5%	5%	5%	70%	15%				ctenophore (5), *Desmarestia* (5%), *Saccharina* (10%), sea colander kelp (10%), *Hildenbrandia* (<5%), *Lithothamnion* (5%)

South East Bight																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SEB	24	47 42.639	55 21.296	7	Hard						60%	35%	5%			cunner (1), *Saccharina* (65%), sea colander kelp (30%)
SEB	25	47 42.681	55 21.339	13	Hard					10%	50%	30%	10%			ctenophore (4), unidentified flounder (1), American lobster (1), scallop (1), *Desmarestia* (10%), *Saccharina* (20%), sea colander (5%)
SEB	26	47 42.650	55 21.411	30	Hard					30%	55%	10%	5%			ctenophore (12), scallop (1), skate (1), *Desmarestia* (<5%), *Lithothamnion* (5%)
SEB	27	47 42.617	55 21.463	43	Hard					20%	20%	20%	40%			feather star (1), Geodiidae sponge (>20), *Hormathia* anemone (4), orange encrusting sponge (<5%), *Lithothamnion* (<5%)
SEB	28	47 42.580	55 21.526	54	Hard				10%	30%	10%	15%	35%			ctenophore (2), *Hormathia* anemone (9), *Metridium* anemone (2), mussel (1), whelk (1), *Gersemia* soft coral (>20), Nephtheidae soft coral (1), *Lithothamnion* (<5%)
SEB	29	47 42.542	55 21.596	60	Hard				5%	10%	10%	40%	35%			ctenophore (4), fan bryozoan (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), unidentified tube worm (4), whelk (1), yellow encrusting sponge (<5%), *Gersemia* soft coral (>20), Nephtheidae soft coral (6), *Lithothamnion* (<5%)
SEB	30	47 42.510	55 21.650	63	Hard				10%	25%	20%	25%	20%			ctenophore (3), Geodiidae sponge (>20), *Hormathia* anemone (11), orange encrusting sponge (<5%), yellow encrusting sponge (<5%), *Gersemia* soft coral (>20), Nephtheidae soft coral (1), *Lithothamnion* (<5%)
SEB	31	47 42.475	55 21.707	72	Hard				5%	15%	25%	30%	25%			*Henricia* sea star (1), ctenophore (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), *Metridium* anemone (3), orange encrusting sponge (<5%), yellow encrusting sponge (<5%), *Gersemia* soft coral (12), Nephtheidae soft coral (1), *Lithothamnion* (<5%)
SEB	32	47 42.437	55 21.769	83	Hard				5%	15%	30%	30%	20%			ctenophore (1), fan bryozoan (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), *Metridium* anemone (2), yellow encrusting sponge (<5%), *Gersemia* soft coral (9), *Lithothamnion* (<5%)
SEB	33	47 42.477	55 21.808	88	Hard					15%	15%	40%	30%			Atlantic cod (1), unidentified flounder (1) Geodiidae sponge (>20), *Hormathia* anemone (>20), *Metridium* anemone (4), scallop (7), whelk (1), *Gersemia* soft coral (>20), Nephtheidae soft coral (2)
SEB	34	47 42.513	55 21.752	81	Hard				5%	15%	30%	30%	20%			Geodiidae sponge (>20), *Hormathia* anemone (>20), *Metridium* anemone (2),

South East Bight																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																scallop (4), unidentified fish (1), *Gersemia* soft coral (8)
SEB	35	47 42.549	55 21.688	62	Hard				5%	20%	15%	25%	35%			Geodiidae sponge (>20), *Hormathia* anemone (>20), yellow encrusting sponge (<5%), *Gersemia* soft coral (>20), Nephtheidae soft coral (1), *Lithothamnion* (5%)
SEB	36	47 42.585	55 21.628	47	Hard					25%	30%	25%	20%			Geodiidae sponge (>20), *Hormathia* anemone (7), whelk (3), yellow encrusting sponge (<5%), *Gersemia* soft coral (17), Nephtheidae soft coral (1), *Lithothamnion* (<5%)
SEB	37	47 42.617	55 21.569	30	Hard					30%	40%	20%	10%			ctenophore (3), Geodiidae sponge (>20), whelk (1), *Hildenbrandia* (<5%), *Lithothamnion* (<5%), *Saccharina* (<5%)
SEB	38	47 42.655	55 21.502	32	Hard					40%	30%	15%	15%			Geodiidae sponge (>20), scallop (4), whelk (2), *Desmarestia* (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (5%), *Saccharina* (5%)
SEB	39	47 42.692	55 21.448	22	Hard				10%	50%	20%	15%	5%			ctenophore (4), scallop (2), *Desmarestia* (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (15%) *Saccharina* (10%), sea colander kelp (5%)
SEB	40	47 42.728	55 21.382	12	Hard					40%	30%	20%	10%			ctenophore (3), *Lithothamnion* (<5%), *Saccharina* (10%)
SEB	41	47 42.768	55 21.434	8	Hard					55%	30%	10%	5%			scallop (3), whelk (2), *Desmarestia* (<5%), *Lithothamnion* (<5%), *Saccharina* (25%), sea colander kelp (5%)
SEB	42	47 42.729	55 21.500	10	Hard					15%	60%	25%				Geodiidae sponge (>20), *Saccharina* (15%), sea colander (5%)
SEB	43	47 42.701	55 21.558	15	Hard				5%	10%	50%	30%	5%			*Asterias* sea star (1), ctenophore (2), Geodiidae sponge (>20), *Desmarestia* (10%), *Hildenbrandia* (<5%), *Lithothamnion* (<5%), *Saccharina* (10%), sea colander kelp (5%)
SEB	44	47 42.667	55 21.619	19	Hard					10%	50%	40%				ctenophore (>20), Geodiidae sponge (>20), *Desmarestia* (5%)
SEB	45	47 42.630	55 21.678	24	Hard			5%	5%	30%	35%	25%				Geodiidae sponge (>20), *Hildenbrandia* (<5%), *Lithothamnion* (5%), *Saccharina* (5%), sea colander kelp (10%)
SEB	46	47 42.594	55 21.735	30	Hard					30%	50%	20%				chalice sponge (2), ctenophore (14), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (5%)
SEB	47	47 42.555	55 21.802	28	Hard			30%	20%	10%	20%	15%	5%			Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Hildenbrandia* (5%),

South East Bight																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Lithothamnion (15%), unidentified brown algae (<5%)
SEB	48	47 42.524	55 21.860	25	Hard			35%	10%	20%	25%	10%				Geodiidae sponge (>20), *Desmarestia* (<5%), *Hildenbrandia* (<5%), *Lithothamnion* (30%), *Saccharina* (10%), sea colander kelp (15%)
SEB	49	47 42.609	55 21.767	5	Hard					10%	55%	35%				ctenophore (1), Geodiidae sponge (>20), *Desmarestia* (20%)
SEB	50	47 42.654	55 21.701	7	Hard					5%	55%	35%	5%			ctenophore (3), *Desmarestia* (25%)

6.3 Water Quality

The amount and temporal coverage of water quality data collected in the Fortune Bay West BMA are variable (Table 6.14). Seasonal water quality measurements at sea farms in the Fortune Bay West BMA are summarized in Tables 6.15–6.17, for water temperature, dissolved oxygen and salinity, respectively. Data are not available for the Spyglass Cove, Spoon Cove, McGrath Cove South, Belle Island, Tilt Point and South East Bight sea farms. Available data for Hickman's Point is limited to oxygen in the summer.

Table 6.14. Available water quality data for the Fortune Bay West BMA (2019–2024).

Available Data			
Year	**Water Quality Parameter**	**Water Depth(s)**	**Month(s)**
Ironskull Point			
2019	Temperature (°C)	all	14 Jun–20 Sep
	Dissolved Oxygen (mg/L)	all	14 Jun–20 Sep
	Salinity (‰)	all	14 Jun–20 Sep
2020	Temperature (°C)	all	6 May–30 Dec
	Oxygen (mg/L)	all	6 May–30 Dec
	Salinity (‰)	all	6 May–30 Dec
2021	Temperature (°C)	all	2 Jan–9 Aug
	Oxygen (mg/L)	all	2 Jan–9 Aug
	Salinity (‰)	all	2 Jan–9 Aug
2022	Temperature (°C)	all	25,28 Apr; 3,10,20,27 May; 3 Jun
	Oxygen (mg/L)	all	25,28 Apr; 3,10,20,27 May; 3 Jun
	Salinity (‰)	all	25,28 Apr; 3,10,20,27 May; 3 Jun
2023	Temperature (°C)	all	14 Apr–31 Dec
	Oxygen (mg/L)	all	7 May–31 Dec
	Salinity (‰)	all	7 May–31 Dec
2024	Temperature (°C)	all	2 Jan–8 Jul
	Oxygen (mg/L)	all	2 Jan–8 Jul
	Salinity (‰)	all	2 Jan–8 Jul
Spoon Cove			
2019	Temperature (°C)	*Shallow, Medium, Deep	14–16 Jun
	Oxygen (mg/L)	*Shallow, Medium	14–16 Jun
	Salinity (‰)	n/a	n/a
Cinq Island Cove			
2020	Temperature (°C)	all	27 May–31 Dec
	Oxygen (mg/L)	all	27 May–31 Dec
	Salinity (‰)	all	27 May–31 Dec
2021	Temperature (°C)	all	2 Jan–23 Feb
	Oxygen (mg/L)	all	2 Jan–10 Mar
	Salinity (‰)	all	2 Jan–10 Mar
2022	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2023	Temperature (°C)	all	6 Apr–31 Dec
	Oxygen (mg/L)	all	8 May–31 Dec
	Salinity (‰)	all	8 May–31 Dec
2024	Temperature (°C)	all	2 Jan–8 Jul
	Oxygen (mg/L)	all	2 Jan–8 Jul
	Salinity (‰)	all	2 Jan–8 Jul
McGrath Cove North			
2019	Temperature (°C)	0.5	14 Jun–4 Aug
		1	n/a
		5	14 Jun–4 Aug

Available Data			
Year	Water Quality Parameter	Water Depth(s)	Month(s)
		10	n/a
		15	14 Jun–4 Aug
		20	n/a
		30	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	all	11 May–31 Dec
	Oxygen (mg/L)	all	11 May–31 Dec
	Salinity (‰)	all	11 May–31 Dec
2021	Temperature (°C)	all	2 Jan–2 Aug
	Oxygen (mg/L)	all	2 Jan–9 Aug
	Salinity (‰)	all	2 Jan–9 Aug
2022	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2023	Temperature (°C)	all	6 Apr–31 Dec
	Oxygen (mg/L)	all	7 May–31 Dec
	Salinity (‰)	all	7 May–31 Dec
2024	Temperature (°C)	all	2 Jan–8 Jul
	Oxygen (mg/L)	all	2 Jan–8 Jul
	Salinity (‰)	all	2 Jan–8 Jul
Hickman's Point			
2019	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	0.5	12–15 Aug
		1	14 Jun–15 Aug
		5	14 Jun–15 Aug
		10	12-–5 Aug
		15	12–15 Aug
		20	14 Jun–15 Aug
		30	14 Jun–15 Aug
	Salinity (‰)	n/a	n/a
Steamers Head			
2020	Temperature (°C)	all	11 May–31 Dec
	Oxygen (mg/L)	all	11 May–31 Dec
	Salinity (‰)	all	11 May–31 Dec
2021	Temperature (°C)	all	2 Jan–3 Aug
	Oxygen (mg/L)	all	2 Jan–9 Aug
	Salinity (‰)	all	2 Jan–9 Aug

Notes:
"all" is inclusive of depths: 0.5,1,5,10,15,20 and 30 m.

6.3.1 Water Temperature

Seasonal water temperatures were generally consistent across sea farms with available data, as depths increase, water temperatures decreased except in winter (Table 6.15). Temperature trends are typical of those observed by MCE in coastal Newfoundland waters. A thermocline develops in spring as surface waters warm. This thermocline becomes more pronounced and deeper in summer until it breaks down in the fall as air temperature decreases. During winter, temperatures throughout the water column tend to be more uniform until spring, when the seasonal water temperature pattern repeats. Mean water temperatures ranged from 1.3 °C in winter at the Cinq Island Cove sea farm (0.5 m depth) to 18.3 °C in summer at the McGrath Cove North sea farm (0.5 m depth). Maximum water temperatures at the Ironskull Point, Cinq Island Cove, McGrath Cove North and Steamers Head sea farms were recorded at a depth of 0.5 m in summer, reaching 21.0°C, 23.1°C, 23.8°C and 21.6°C, respectively. Minimum temperatures occurred in winter at 1 m or above measuring 0.3°C, -0.7°C, 0.0°C and 0.5°C respectively.

Table 6.15. Average, maximum and minimum water temperatures (°C) at the sea farms in the Fortune Bay West BMA (2019–2024).

Water Depth	Sampling Period	Water Temperature Parameter	Winter	Spring	Summer	Fall
			Temperature (°C)			
Ironskull Point						
0.5 m	6 Apr 2023–8 Jul 2024	Average	1.9	7.2	17.2	8.9
		Maximum	4.1	15.5	21.0	14.7
		Minimum	0.3	1.7	11.9	3.0
1 m	6 Apr 2023–8 Jul 2024	Average	1.9	7.0	17.0	8.8
		Maximum	4.1	16.7	20.5	14.6
		Minimum	0.3	1.8	11.6	3.0
5 m	6 Apr 2023–8 Jul 2024	Average	1.8	6.0	16.1	8.9
		Maximum	4.3	13.2	18.9	14.3
		Minimum	0.6	1.6	9.6	3.3
10 m	6 Apr 2023–8 Jul 2024	Average	1.9	5.1	14.3	9.0
		Maximum	4.4	12.6	18.3	14.3
		Minimum	0.7	1.2	8.1	4.5
15 m	6 Apr 2023–8 Jul 2024	Average	1.9	4.3	12.1	8.8
		Maximum	4.5	11.6	17.7	13.9
		Minimum	0.8	1.1	6.3	4.7
20 m	6 Apr 2023–8 Jul 2024	Average	1.9	3.6	9.7	8.5
		Maximum	4.6	9.8	16.9	13.6
		Minimum	0.9	1.1	4.2	4.8
30 m	6 Apr 2023–8 Jul 2024	Average	1.9	2.9	7.4	8.0
		Maximum	4.6	7.4	16.6	13.5
		Minimum	0.9	1.0	3.4	4.0
Cinq Cove						
0.5 m	6 Apr 2023–8 Jul 2024	Average	1.3	8.1	17.8	8.1
		Maximum	4.3	16.6	23.1	14.3
		Minimum	-0.7	1.3	12.5	1.6
1 m	6 Apr 2023–8 Jul 2024	Average	1.4	7.7	17.3	8.2
		Maximum	4.3	15.7	21.9	14.3
		Minimum	-0.6	1.3	12.3	1.7
5 m	6 Apr 2023–8 Jul 2024	Average	1.5	6.1	16.0	8.8
		Maximum	4.5	13.5	19.3	14.2
		Minimum	0.6	1.3	9.4	3.0
10 m	6 Apr 2023–8 Jul 2024	Average	1.6	4.9	14.3	8.9
		Maximum	4.7	12.5	19.1	13.9
		Minimum	0.6	1.1	8.0	4.2
15 m	6 Apr 2023–8 Jul 2024	Average	1.7	4.1	12.1	8.6
		Maximum	4.7	11.0	18.3	13.6
		Minimum	0.8	1.1	6.0	4.3
20 m	6 Apr 2023–8 Jul 2024	Average	1.7	3.4	9.7	8.2
		Maximum	4.4	9.8	16.9	13.5
		Minimum	0.9	1.1	4.0	4.3
30 m	6 Apr 2023–8 Jul 2024	Average	1.8	2.8	7.5	7.5
		Maximum	4.1	8.1	16.0	12.9
		Minimum	0.9	1.1	2.8	3.5
McGrath Cove North						
0.5 m	6 Apr 2023–8 Jul 2024	Average	2.0	7.5	18.3	8.9
		Maximum	4.7	16.1	23.8	15.2
		Minimum	0.2	1.7	13.6	2.3
1 m	6 Apr 2023–8 Jul 2024	Average	1.9	6.9	17.7	8.9
		Maximum	4.4	15.3	22.9	15.1
		Minimum	0.0	1.6	12.6	3.7
5 m	6 Apr 2023–8 Jul 2024	Average	2.0	5.7	16.2	9.4
		Maximum	4.6	12.7	19.3	14.6

Water Depth	Sampling Period	Water Temperature Parameter	Winter	Spring	Summer	Fall
			Temperature (°C)			
		Minimum	0.8	1.3	9.6	4.2
10 m	6 Apr 2023–8 Jul 2024	Average	2.0	4.8	14.3	9.3
		Maximum	4.9	12.2	18.4	14.3
		Minimum	0.9	1.3	7.7	4.7
15 m	6 Apr 2023–8 Jul 2024	Average	2.1	3.9	11.7	8.9
		Maximum	4.9	10.8	17.2	13.8
		Minimum	1.0	1.2	5.4	5.0
20 m	6 Apr 2023–8 Jul 2024	Average	2.1	3.2	9.1	8.6
		Maximum	5.0	9.7	16.3	13.6
		Minimum	1.0	1.2	4.4	5.2
30 m	6 Apr 2023–8 Jul 2024	Average	2.1	2.6	6.6	8.9
		Maximum	5.1	8.1	15.4	53.5
		Minimum	1.0	1.1	3.2	4.2
Steamers Head						
0.5 m	11 May 2020–9 Aug 2021	Average	2.2	9.2	16.8	7.7
		Maximum	3.8	19.3	21.6	16.4
		Minimum	0.5	2.1	12.6	2.7
1 m	11 May 2020–9 Aug 2021	Average	2.5	8.7	16.6	7.8
		Maximum	4.2	17.8	21.1	15.8
		Minimum	0.5	1.2	12.5	3.1
5 m	11 May 2020–9 Aug 2021	Average	2.9	6.4	15.0	8.2
		Maximum	4.4	14.5	18.6	14.6
		Minimum	2.0	2.1	11.6	4.3
10 m	11 May 2020–9 Aug 2021	Average	3.1	5.2	12.8	8.1
		Maximum	4.7	12.5	17.4	14.5
		Minimum	2.0	2.1	4.5	4.5
15 m	11 May 2020–9 Aug 2021	Average	3.1	4.4	10.8	7.9
		Maximum	4.9	11.7	16.9	14.3
		Minimum	2.1	1.7	2.7	4.5
20 m	11 May 2020–9 Aug 2021	Average	3.2	3.8	9.2	7.7
		Maximum	5.0	10.8	16.4	14.1
		Minimum	2.0	1.5	1.9	4.6
30 m	11 May 2020–9 Aug 2021	Average	3.2	3.1	6.0	6.7
		Maximum	5.4	10.4	14.1	13.8
		Minimum	2.0	1.2	1.3	2.5

Notes:
n/a = not available.
* Based on a limited dataset.

Historical water temperature data for the Fortune Bay West BMA (Figure 6.24) are provided for measurements collected at a depth of 15 m. During 2019–2024, data collected at Ironskull Point sea farm showed a general water temperature increase from May–September, with average temperatures peaking in September and declining thereafter (Figure 6.24A). During 2020–2024, data collected at the Cinq Island Cove sea farm indicated an increase in average and maximum temperatures from May–August, while minimum temperatures increased from June–November (Figure 6.24B). Similarly, average temperatures were highest in August, with steady increase from April–September, followed by decreasing water temperatures from September onwards in the McGrath Cove North sea farm (Figure 6.24C). The Steamers Head sea farm (Figure 6.24D) follows the same trends as the Cinq Island Cove and McGrath Cove North sea farms. Lowest water temperatures were observed in March in all sea farms.

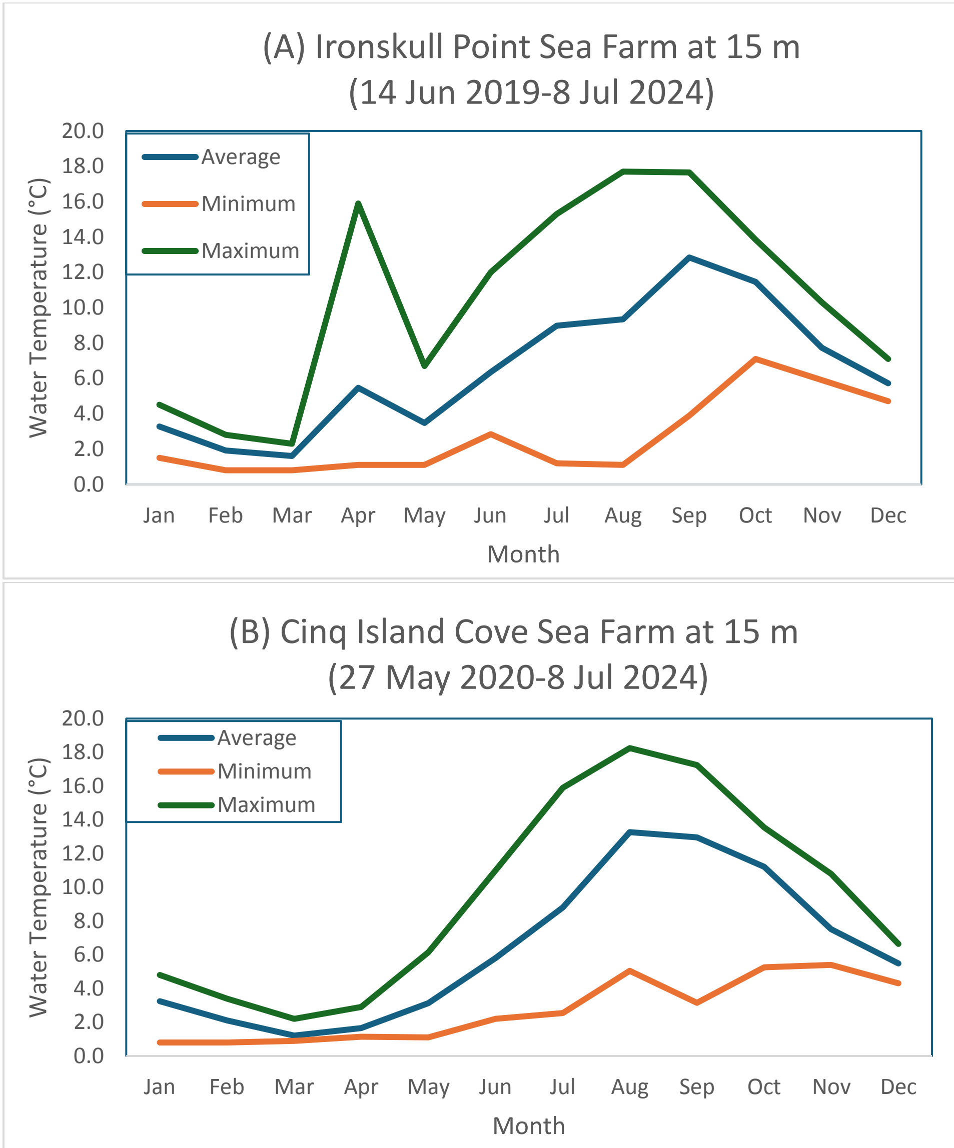


Figure 6.24. Historical water temperature (°C) data at the (A) Ironskull Point, (B) Cinq Island Cove, (C) McGraths Cove North and (D) Steamers Head sea farms in the Fortune Bay West BMA at 15 m depth.

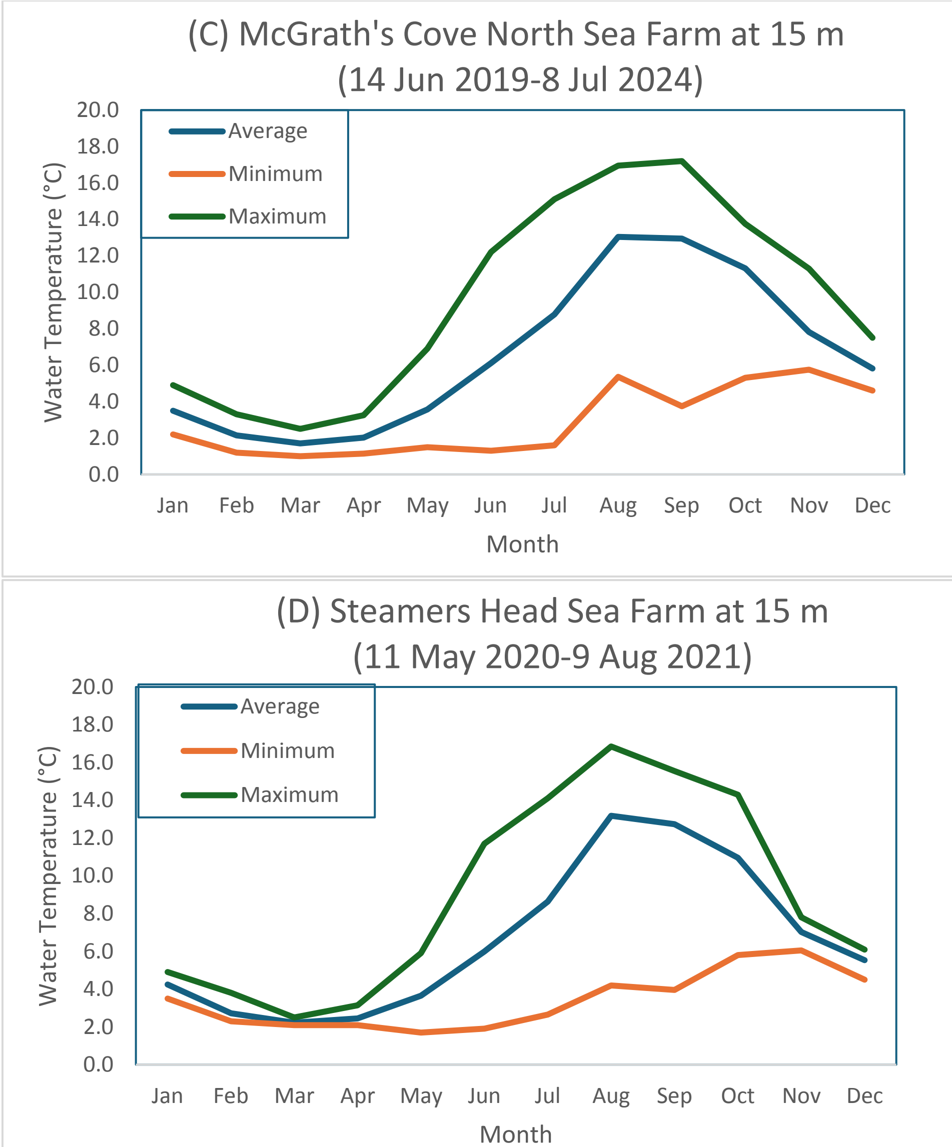


Figure 6.24 (continued). Historical water temperature (°C) data at the (A) Ironskull Point, (B) Cinq Island Cove, (C) McGraths Cove North and (D) Steamers Head sea farms in the Fortune Bay West BMA at 15 m depth.

6.3.2 Dissolved Oxygen

Dissolved oxygen levels were consistently lower in summer and fall compared to winter and spring. Mean dissolved oxygen ranged from 8.0 mg/L in summer to 11.7 mg/L in winter at 0.5 m depth (Table 6.16). Maximum observed dissolved oxygen was 15.6 mg/L, recorded at a depth of 1 m at the Ironskull Point sea farm in spring; minimum dissolved oxygen was 5.9 mg/L, measured at a depth of 1 m and 15 m in summer at the Cinq Island Cove sea farm.

Table 6.16. Average, maximum, and minimum dissolved oxygen (mg/L) at the sea farms in the Fortune Bay West BMA (2019–2024).

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
Ironskull Point						
0.5 m	6 Apr 2023–8 Jul 2024	Average	11.1	10.5	8.2	9.3
		Maximum	12.7	12.1	9.6	11.0
		Minimum	9.9	8.8	6.9	7.7
1 m	6 Apr 2023–8 Jul 2024	Average	11.2	10.6	8.3	9.3
		Maximum	13.3	15.6	9.8	11.0
		Minimum	10.2	9.1	6.9	7.4
5 m	6 Apr 2023–8 Jul 2024	Average	11.0	10.8	8.3	9.2
		Maximum	12.1	12.3	10.1	10.9
		Minimum	9.9	9.1	6.0	7.3
10 m	6 Apr 2023–8 Jul 2024	Average	11.0	11.0	8.5	9.2
		Maximum	12.0	12.6	10.6	10.4
		Minimum	10.2	9.4	7.3	7.6
15 m	6 Apr 2023–8 Jul 2024	Average	11.0	11.1	8.9	9.2
		Maximum	12.0	12.6	10.6	10.4
		Minimum	10.2	9.4	7.3	7.6
20 m	6 Apr 2023–8 Jul 2024	Average	11.0	11.2	9.3	9.2
		Maximum	11.9	12.4	10.7	10.3
		Minimum	10.2	9.8	7.6	7.9
30 m	6 Apr 2023–8 Jul 2024	Average	10.9	11.2	9.6	9.2
		Maximum	11.9	12.2	10.7	10.3
		Minimum	10.1	10.2	7.9	8.0
Cinq Island Cove						
0.5 m	6 Apr 2023–8 Jul 2024	Average	11.7	10.3	8.3	9.5
		Maximum	14.6	12.8	9.4	11.6
		Minimum	9.6	6.5	6.5	7.5
1 m	6 Apr 2023–8 Jul 2024	Average	11.6	10.3	8.2	9.4
		Maximum	14.4	12.5	9.9	11.2
		Minimum	9.6	6.4	5.9	7.3
5 m	6 Apr 2023–8 Jul 2024	Average	11.4	10.6	8.2	9.1
		Maximum	14.1	12.8	10.3	10.5
		Minimum	9.7	8.4	6.7	7.6
10 m	6 Apr 2023–8 Jul 2024	Average	11.3	10.8	8.3	9.0
		Maximum	13.7	13.3	10.4	10.1
		Minimum	9.6	9.1	6.8	7.7
15 m	6 Apr 2023–8 Jul 2024	Average	11.6	10.3	8.2	9.4
		Maximum	14.4	12.5	9.9	11.2
		Minimum	9.6	6.4	5.9	7.3
20 m	6 Apr 2023–8 Jul 2024	Average	11.1	10.9	9.0	9.0
		Maximum	13.5	13.5	10.8	9.8
		Minimum	9.6	6.0	7.4	7.8
30 m	6 Apr 2023–8 Jul 2024	Average	11.0	11.0	9.5	9.1
		Maximum	13.4	13.5	10.8	9.9
		Minimum	9.4	7.9	7.4	7.7
McGrath Cove North						
0.5 m	6 Apr 2023–8 Jul 2024	Average	11.1	10.4	8.1	9.4
		Maximum	12.8	12.7	9.4	11.3
		Minimum	10.1	6.9	7.2	7.7
1 m	6 Apr 2023–8 Jul 2024	Average	11.0	10.4	8.0	9.3
		Maximum	12.1	12.8	9.4	11.0
		Minimum	10.0	8.1	7.1	7.8
5 m	6 Apr 2023–8 Jul 2024	Average	10.9	10.8	8.3	9.2
		Maximum	11.6	13.0	10.2	10.6
		Minimum	9.9	8.6	7.1	8.1
10 m	6 Apr 2023–8 Jul 2024	Average	10.9	11.0	8.5	9.1
		Maximum	11.5	13.1	10.3	10.3
		Minimum	9.9	9.1	7.3	8.3

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
15 m	6 Apr 2023–8 Jul 2024	Average	10.8	11.2	8.9	9.1
		Maximum	11.5	13.3	10.4	10.1
		Minimum	9.6	9.3	7.0	8.1
20 m	6 Apr 2023–8 Jul 2024	Average	10.7	11.2	9.4	9.2
		Maximum	11.5	12.8	10.6	10.1
		Minimum	9.5	9.5	7.7	8.2
30 m	6 Apr 2023–8 Jul 2024	Average	10.7	11.2	9.9	9.3
		Maximum	11.4	12.6	11.1	10.1
		Minimum	9.9	9.6	8.2	8.2
Steamers Head						
0.5 m	11 May 2020–9 Aug 2021	Average	11.6	10.6	8.6	10.5
		Maximum	13.3	13.0	9.7	12.9
		Minimum	10.2	8.0	7.2	8.6
1 m	11 May 2020–9 Aug 2021	Average	11.2	10.5	8.4	10.1
		Maximum	13.1	13.1	10.2	12.6
		Minimum	9.9	6.4	6.8	8.3
5 m	11 May 2020–9 Aug 2021	Average	10.7	10.6	8.5	9.4
		Maximum	12.0	12.1	9.7	11.1
		Minimum	9.7	9.1	6.4	7.7
10 m	11 May 2020–9 Aug 2021	Average	10.6	10.8	8.9	9.2
		Maximum	11.9	12.0	10.5	10.8
		Minimum	9.8	9.2	7.1	7.7
15 m	11 May 2020–9 Aug 2021	Average	10.4	10.9	9.1	9.1
		Maximum	11.8	11.9	10.8	10.6
		Minimum	9.6	9.0	6.9	7.4
20 m	11 May 2020–9 Aug 2021	Average	10.3	10.9	9.4	9.2
		Maximum	11.8	11.8	10.8	10.5
		Minimum	9.6	8.9	7.1	7.4
30 m	11 May 2020–9 Aug 2021	Average	10.2	10.8	9.9	9.4
		Maximum	11.8	11.6	10.8	10.4
		Minimum	9.5	8.6	8.4	7.4

Notes:
n/a = not available.
* Based on a limited dataset.

During 2019–2024, a general seasonal decline in dissolved oxygen levels was recorded from June–September, followed by an increase in winter and early spring at the Ironskull Point sea farm (Figure 6.25A). Average oxygen levels peaked in May, while the lowest levels were recorded in September at the Ironskull Point sea farm. At the Cinq Island Cove sea farm, dissolved oxygen increased from October–May; average oxygen levels peaked in May whereas the lowest oxygen levels were observed in September (Figure 6.25B). For the McGrath's Cove North sea farm, highest dissolved oxygen levels were recorded in May and the lowest were recorded in September; dissolved oxygen levels began increasing again after September (Figure 6.25C). Steamers Head sea farm had the least variation between average, maximum and minimum values, with dissolved oxygen levels peaking in May and decreasing thereafter until October when an increase is observed (Figure 6.25D).

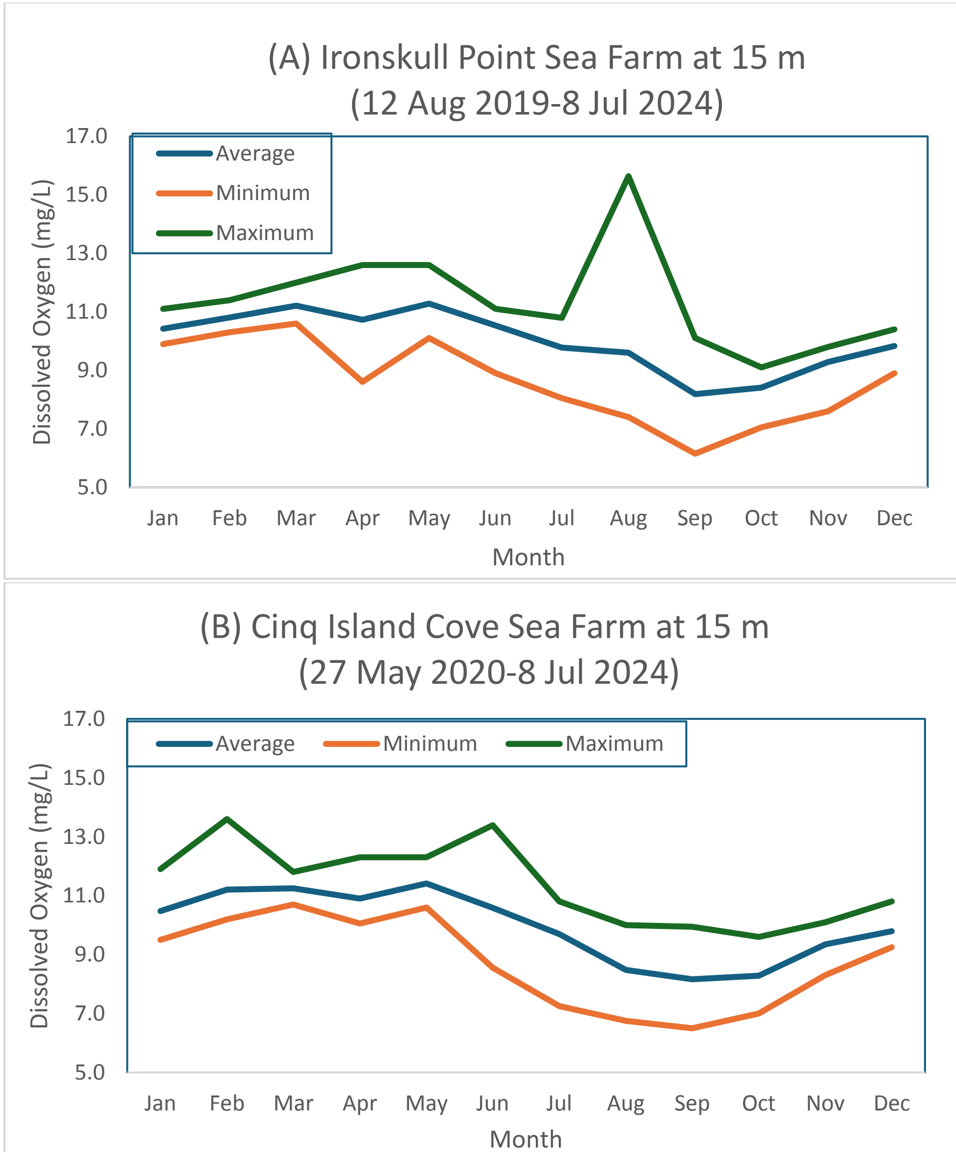
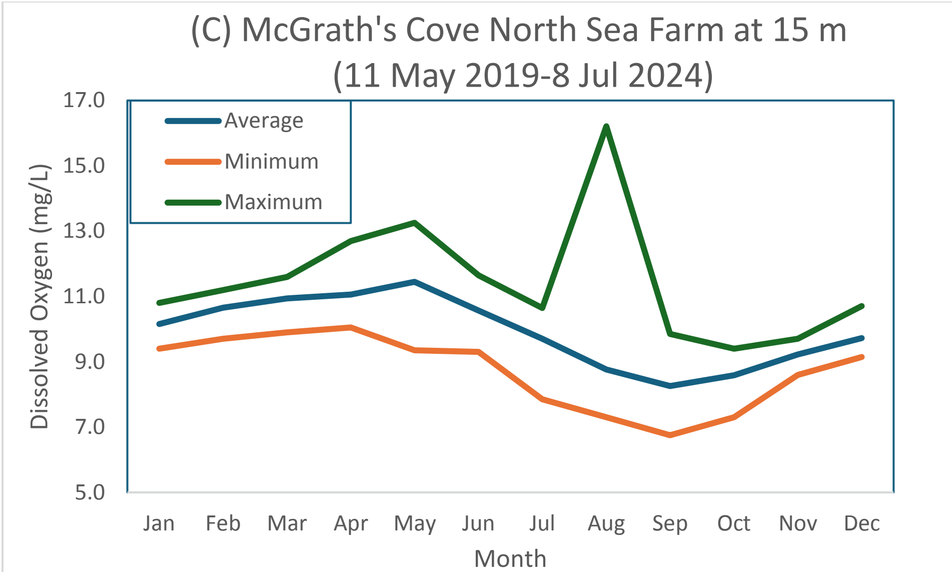


Figure 6.25. Historical Dissolved Oxygen (mg/L) data at the (A) Ironskull Point, (B) Cinq Island Cove, (C) McGraths Cove North and (D) Steamers Head sea farms in the Fortune Bay West BMA at 15 m depth.



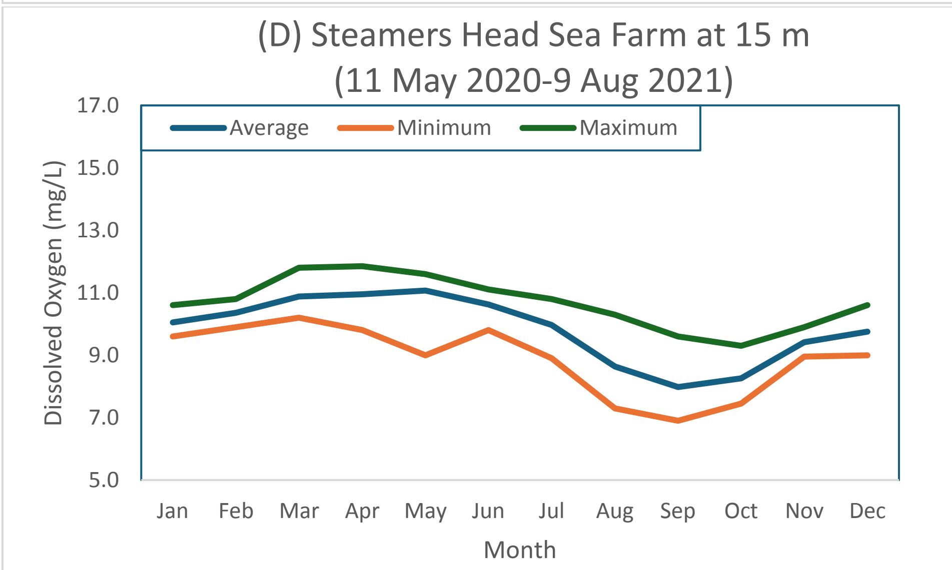


Figure 6.25 (continued). Historical Dissolved Oxygen (mg/L) data at the (A) Ironskull Point, (B) Cinq Island Cove, (C) McGraths Cove North and (D) Steamers Head sea farms in the Fortune Bay West BMA at 15 m depth.

6.3.3 Salinity

Available salinity data is summarized across sea farms and seasons. Results indicate a moderate freshwater influence near the surface that is more pronounced at Cinq Island Cove and Steamers Head (Table 6.17).

Table 6.17. Available average salinity (‰) at the sea farms in Fortune Bay West BMA (2020–2024).

Water Depth	Sampling Period	Winter	Spring	Summer	Fall
		Salinity (‰)			
Ironskull Point					
0.5 m	Jul 2023–Jun 2024	29.4	28.7	28.7	28.4
1 m	Jul 2023–Jun 2024	29.5	28.9	29.9	28.6
5 m	Jul 2023–Jun 2024	29.9	29.8	29.5	29.0
10 m	Jul 2023–Jun 2024	30.1	30.3	30.1	29.6
15 m	Jul 2023–Jun 2024	30.3	30.5	30.5	29.8
20 m	Jul 2023–Jun 2024	30.4	30.7	30.7	30.0
30 m	Jul 2023–Jun 2024	30.5	30.8	30.8	30.1
Cinq Island Cove					
0.5 m	Jul 2023–Jun 2024	27.3	24.7	25.1	25.7
1 m	Jul 2023–Jun 2024	28.8	26.5	26.8	26.9
5 m	Jul 2023–Jun 2024	30.3	29.5	29.3	29.5
10 m	Jul 2023–Jun 2024	30.6	30.2	29.9	30.0
15 m	Jul 2023–Jun 2024	30.8	30.5	30.3	30.1
20 m	Jul 2023–Jun 2024	30.8	30.7	30.5	30.3
30 m	Jul 2023–Jun 2024	31.0	30.8	30.8	30.4
McGrath Cove North					
Surface	Jul 2023–Jun 2024	29.0	27.2	26.1	27.5
1 m	Jul 2023–Jun 2024	29.3	28.7	27.1	28.2
5 m	Jul 2023–Jun 2024	30.5	30.2	29.5	30.0
10 m	Jul 2023–Jun 2024	30.8	30.5	30.0	30.0
15 m	Jul 2023–Jun 2024	30.9	30.8	30.4	30.2
20 m	Jul 2023–Jun 2024	31.0	30.9	30.7	30.3
30 m	Jul 2023–Jun 2024	31.1	31.0	30.9	30.5
Steamers Head					
Surface	Jul 2020–Jun 2021	24.1	18.3	23.5	18.7
1 m	Jul 2020–Jun 2021	26.7	21.0	25.9	21.9
5 m	Jul 2020–Jun 2021	30.3	29.6	29.2	28.9
10 m	Jul 2020–Jun 2021	30.5	30.1	29.8	29.5
15 m	Jul 2020–Jun 2021	30.6	30.5	30.1	29.9
20 m	Jul 2020–Jun 2021	30.7	30.6	30.3	30.0
30 m	Jul 2020–Jun 2021	30.7	30.8	30.6	30.3

Notes:
n/a = not available.

6.4 Oceanographic and Meteorological Data

Bathymetric, current, wind and wave data are available for all sea farms in the Fortune Bay West BMA.

6.4.1 Bathymetry

Water depths below the leases and sea cage arrays range from 0–230 m and 27–82 m, respectively (Table 6.18). The shallowest sea farm is Spyglass Cove where depths range from 28–43 m below the sea cage array. Water depth bathymetry maps acquired in October 2022, June 2024, or May 2024 are available for eleven leases (Figure 6.26–6.36).

Table 6.18. Water Depth range at sea farms in the Fortune Bay West BMA.

Site No.	Sea Farm	Lease Depth Range (m)	Sea Cage Array Depth Range (m)
AQ 865	Ironskull Point	0–87	53–71
AQ 881	Spyglass Cove	0–63	28–43
AQ 882	Spoon Cove	6–82	34–74
AQ 883	Cinq Island Cove	12–58	48–58
AQ 885	McGrath Cove South	11–76	31–60
AQ 886	McGrath Cove North	5–130	71–82
AQ 888	Belle Island	10–230	n/a
AQ 976	Tilt Point	9–111	27–63
AQ 1002	Hickman's Point	10–62	35–58
AQ 1050	Steamers Head	20–106	35–67
AQ 1046	South East Bight	13–78	n/a

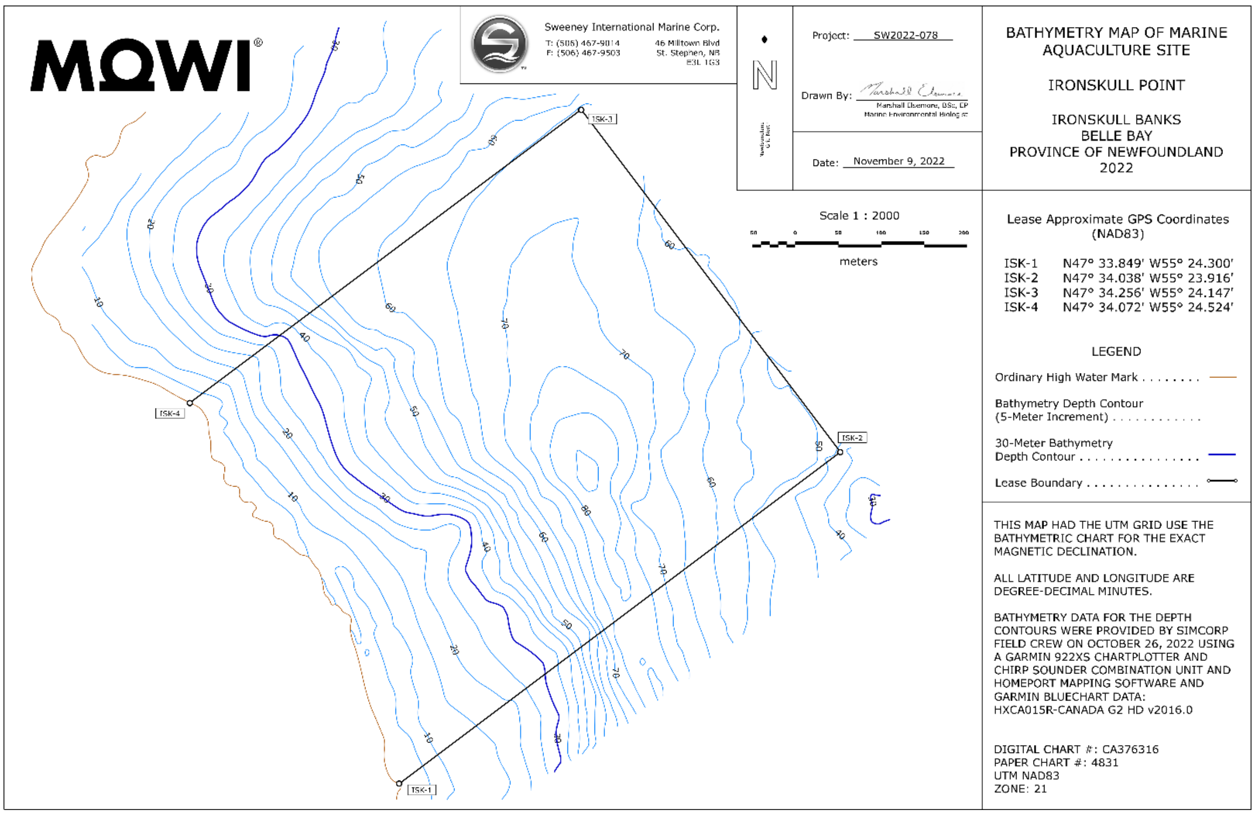


Figure 6.26. Bathymetric map of the Ironskull Point sea farm lease area (October 2022).

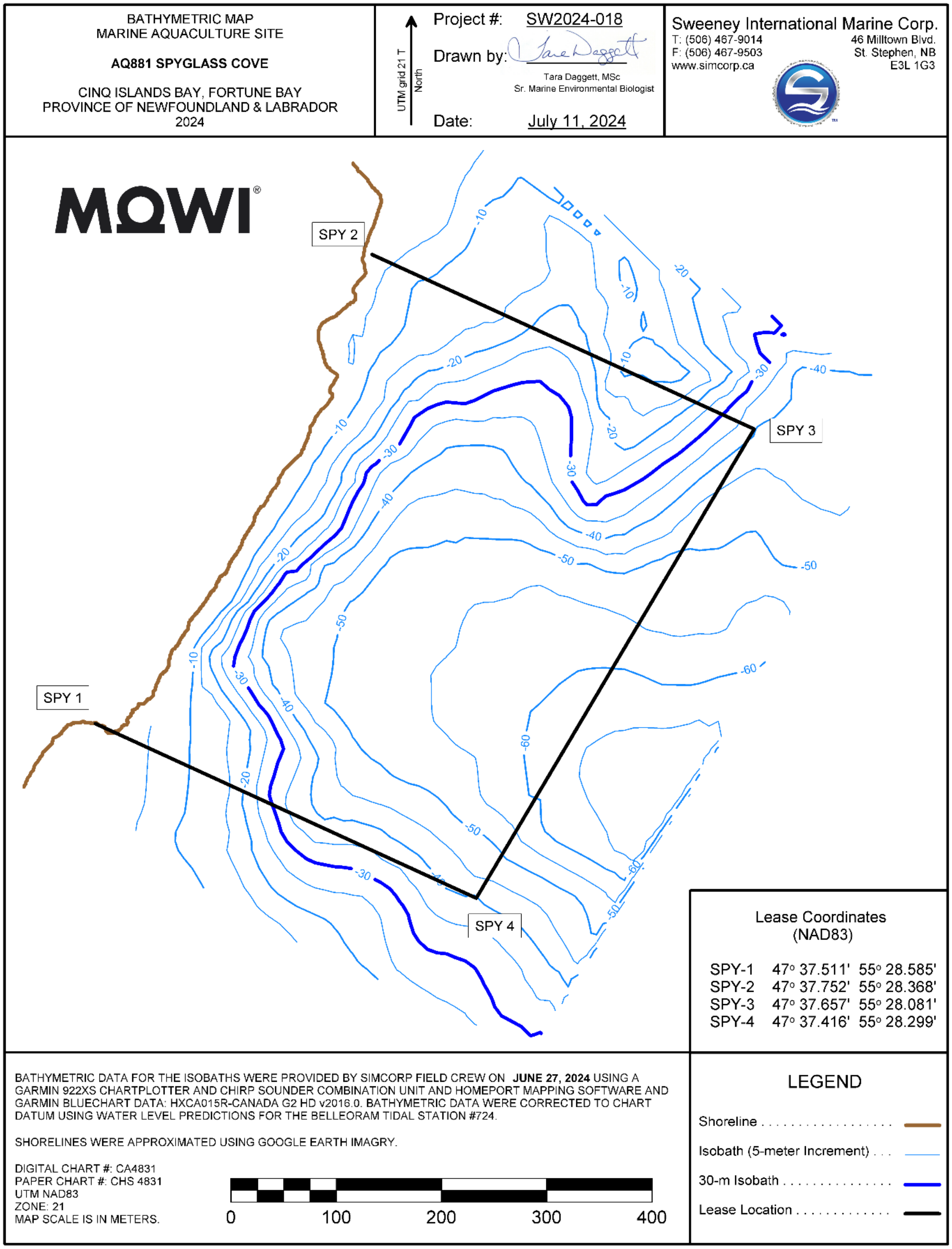


Figure 6.27. Bathymetric map of the Spyglass Cove sea farm lease area (June 2024).

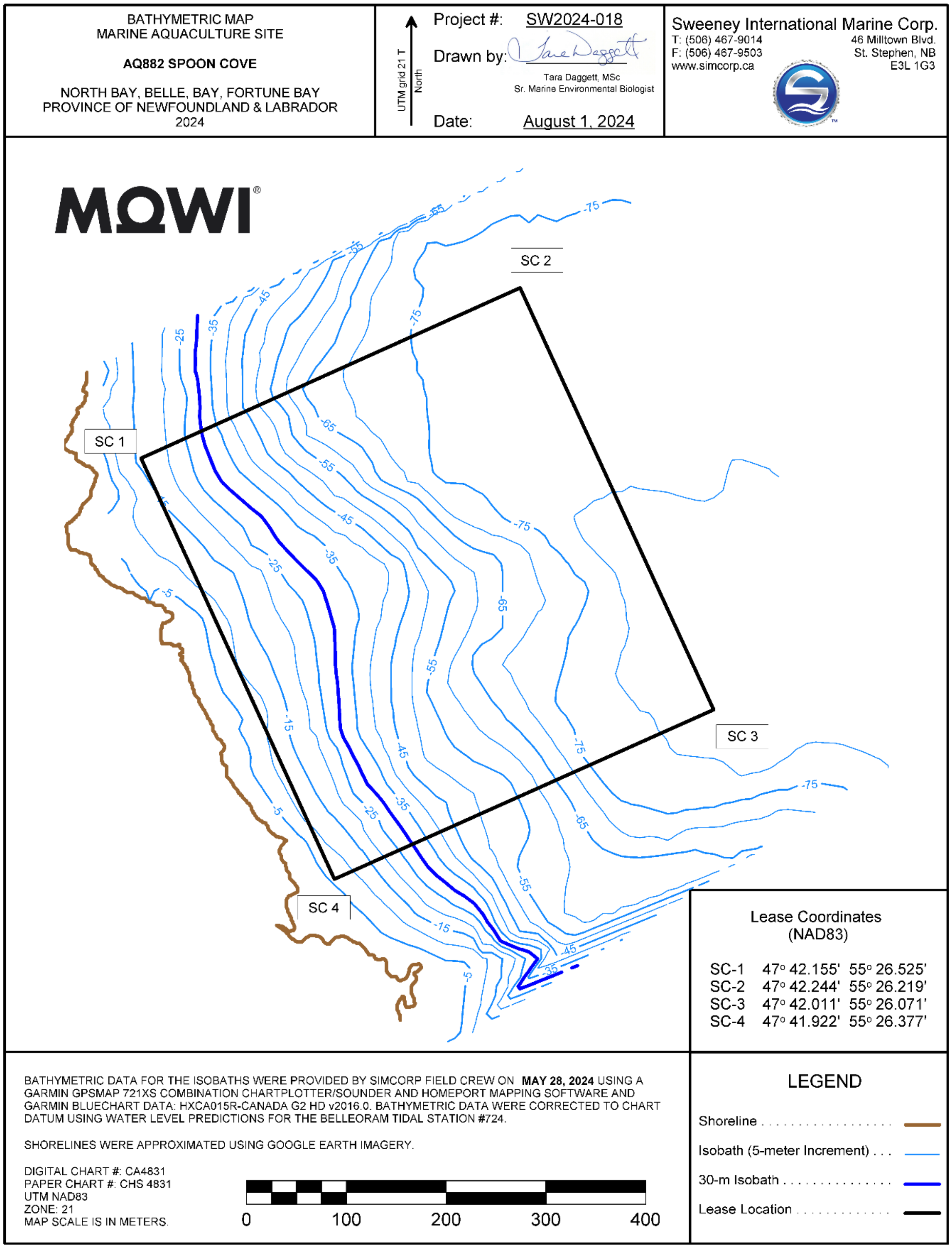


Figure 6.28. Bathymetric map of the Spoon Cove sea farm lease area (May 2024).

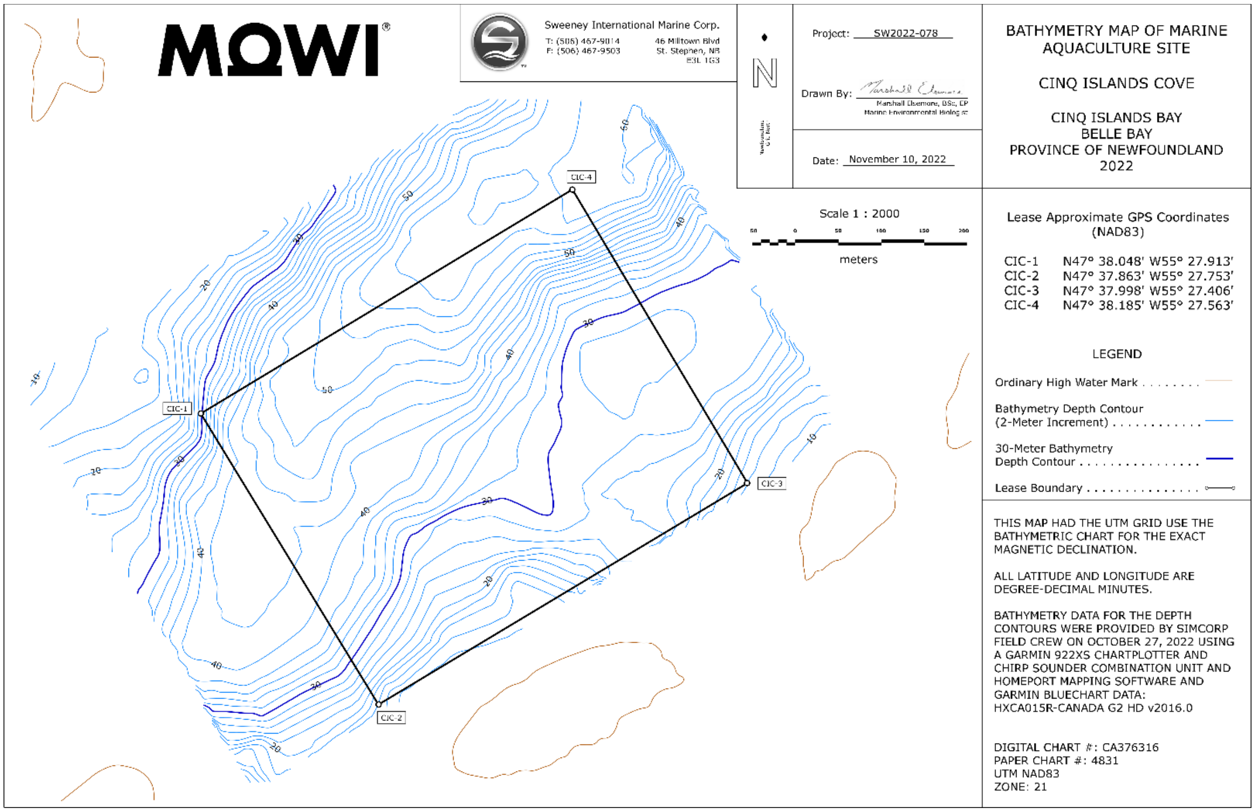


Figure 6.29. Bathymetric map of the Cinq Island Cove sea farm lease area (June 2024).

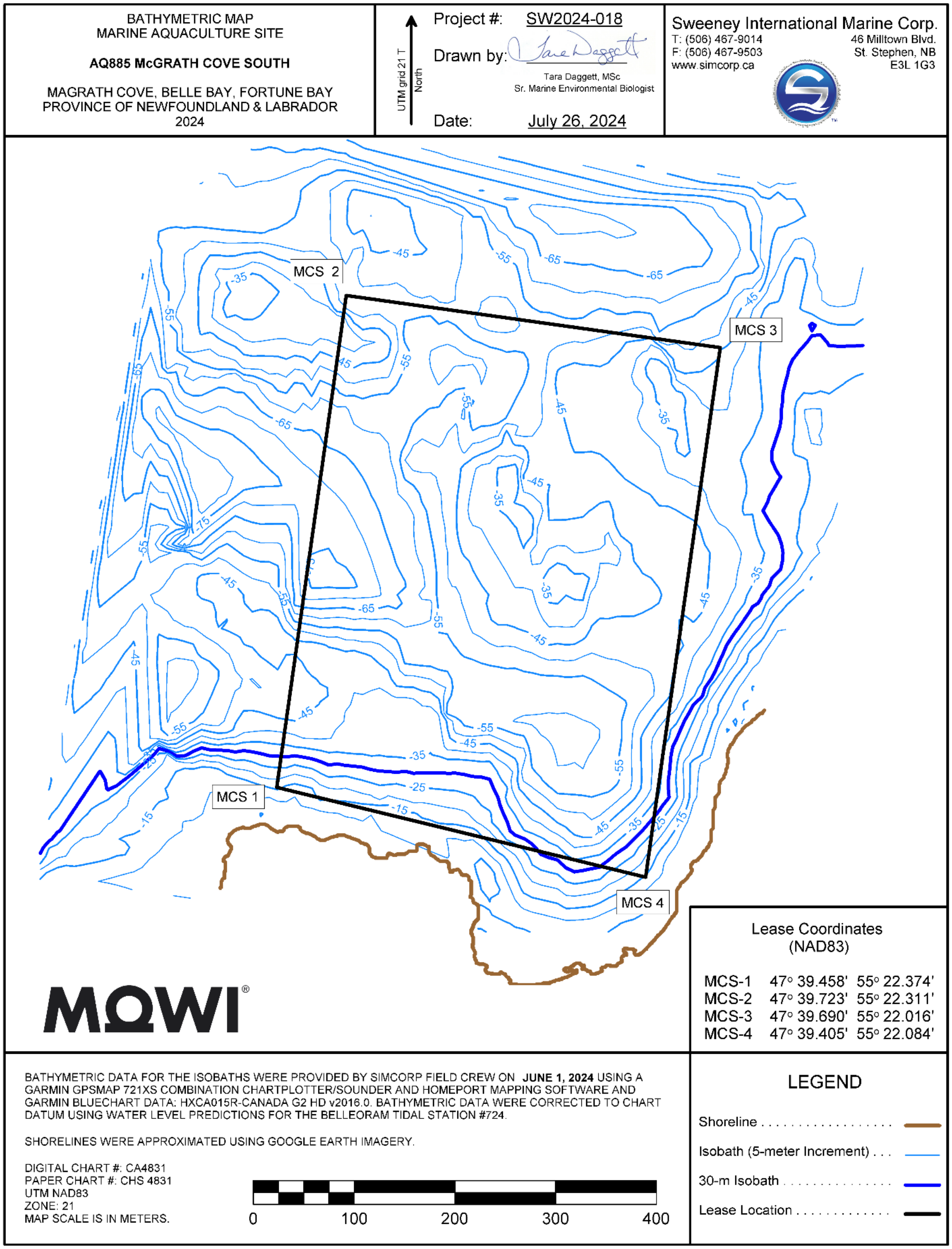


Figure 6.30. Bathymetric map of the McGrath Cove South sea farm lease area (June 2024).

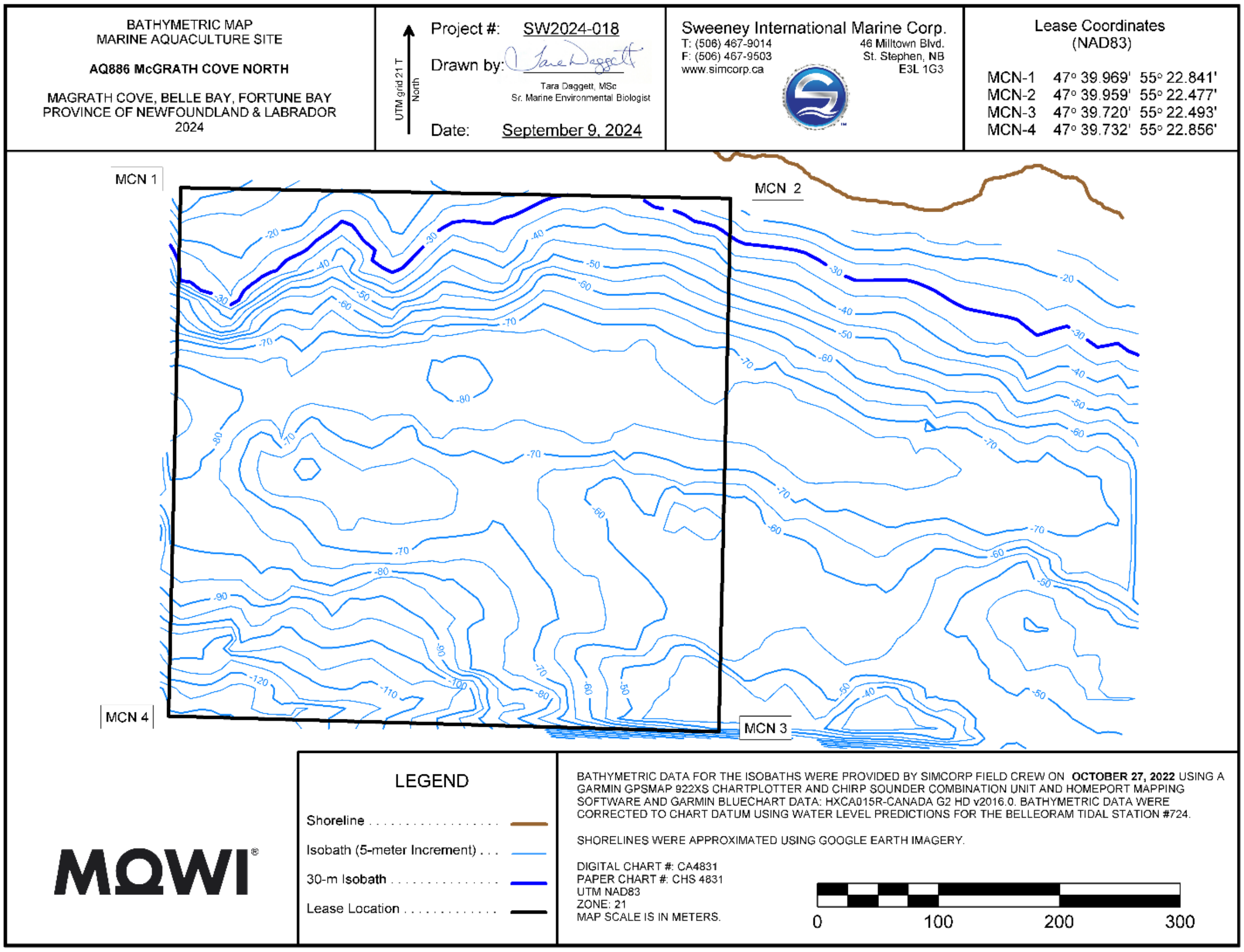


Figure 6.31. Bathymetric map of the McGrath Cove North sea farm lease area (June 2024).

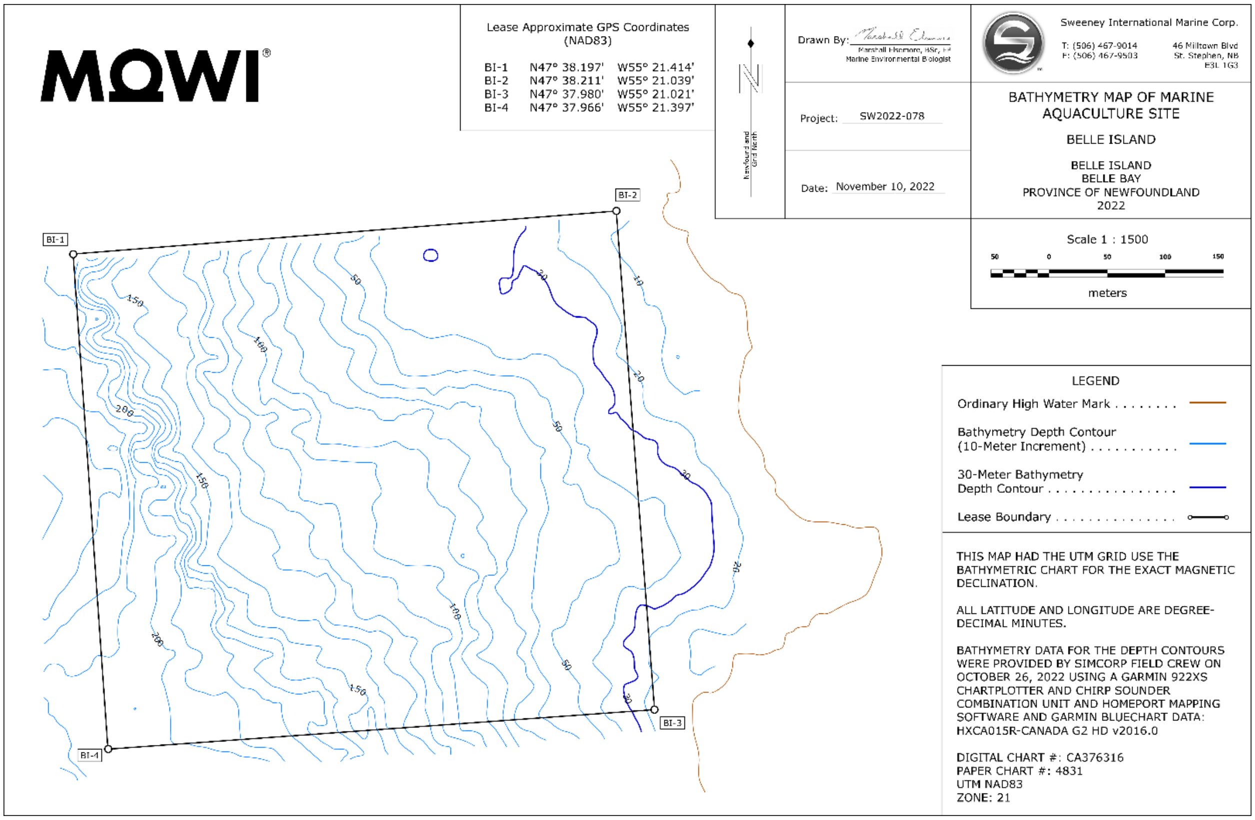


Figure 6.32. Bathymetric map of the Belle Island sea farm lease area (October 2022).

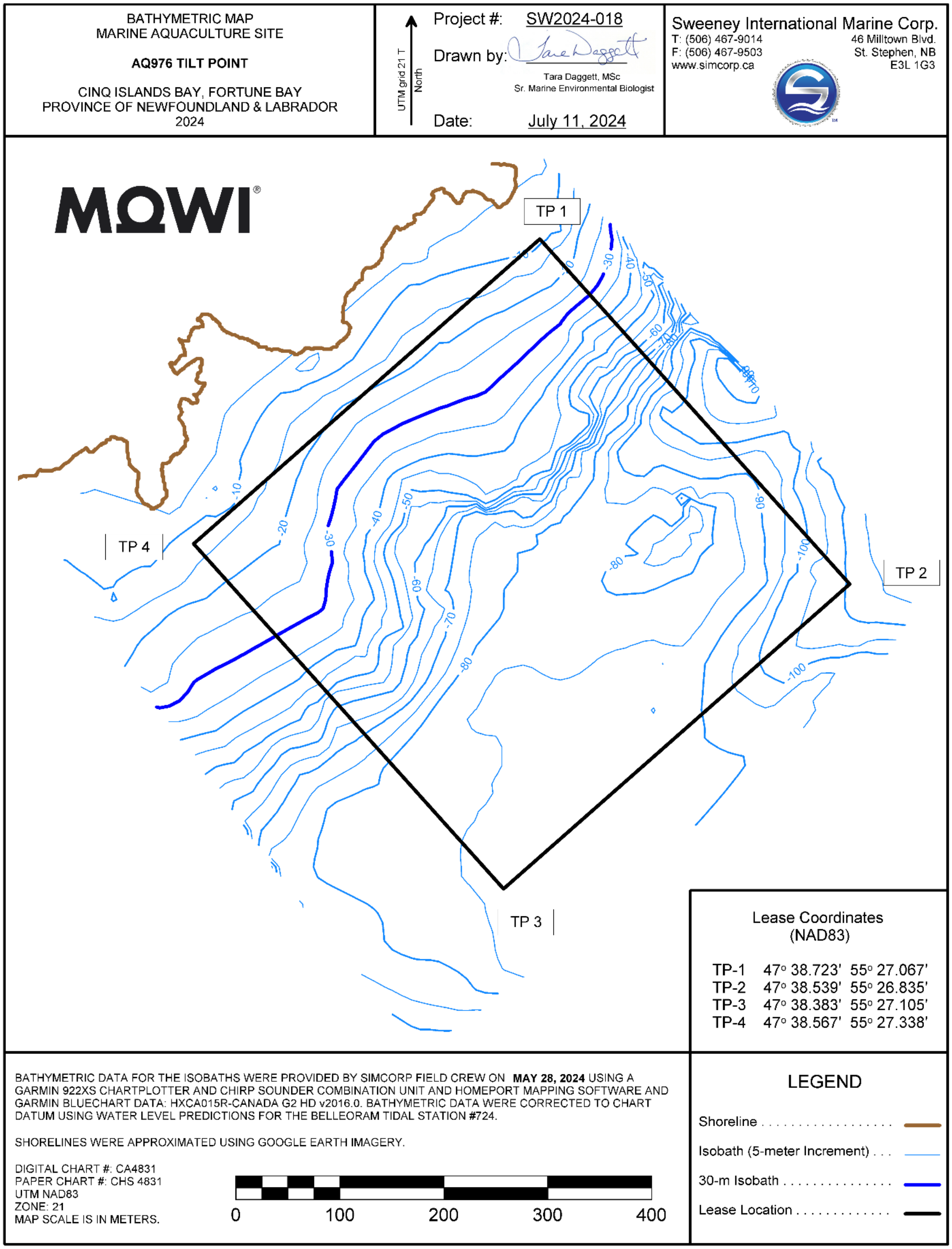


Figure 6.33. Bathymetric map of the Tilt Point sea farm lease area (May 2024).

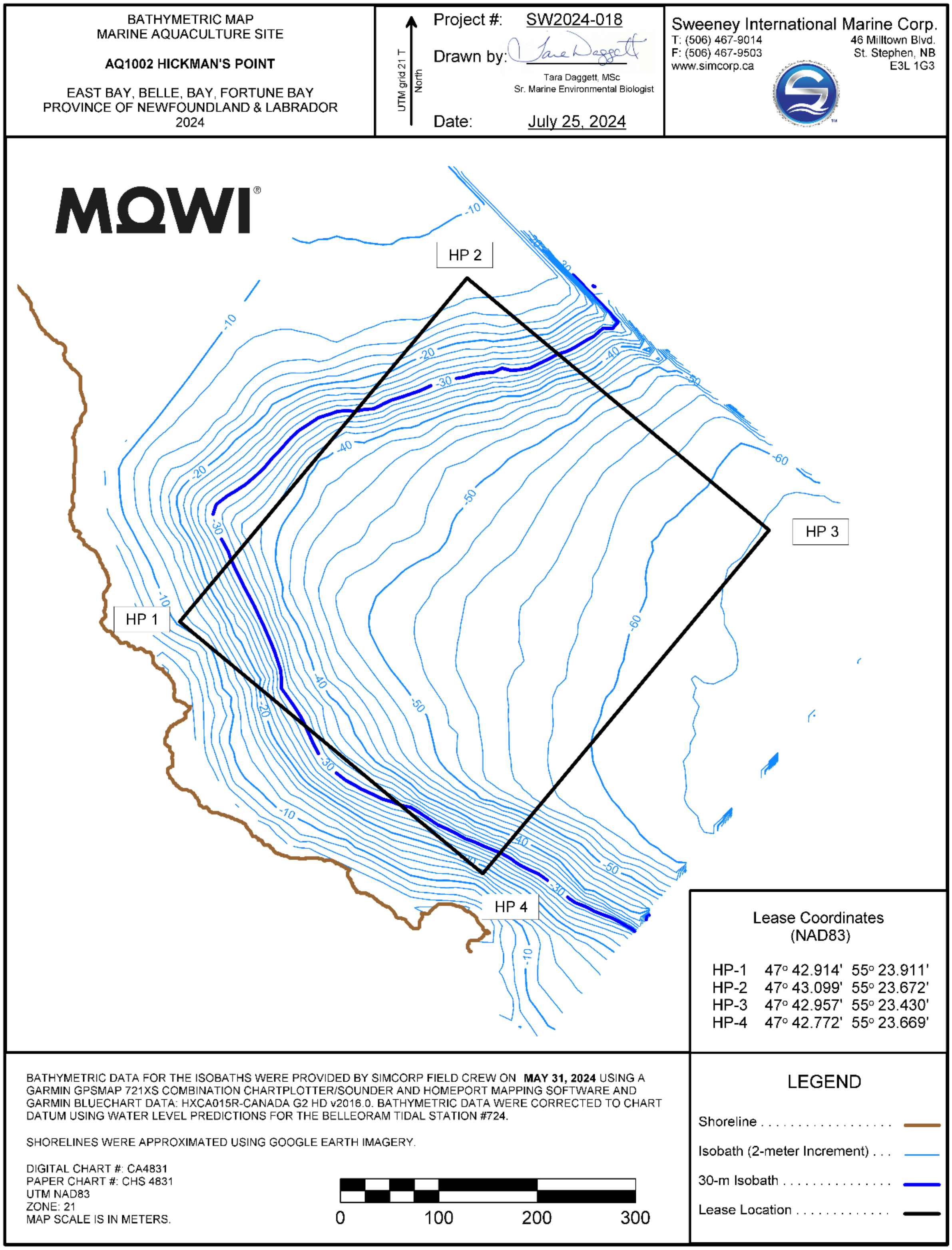


Figure 6.34. Bathymetric map of the Hickman's Point sea farm lease area (May 2024).

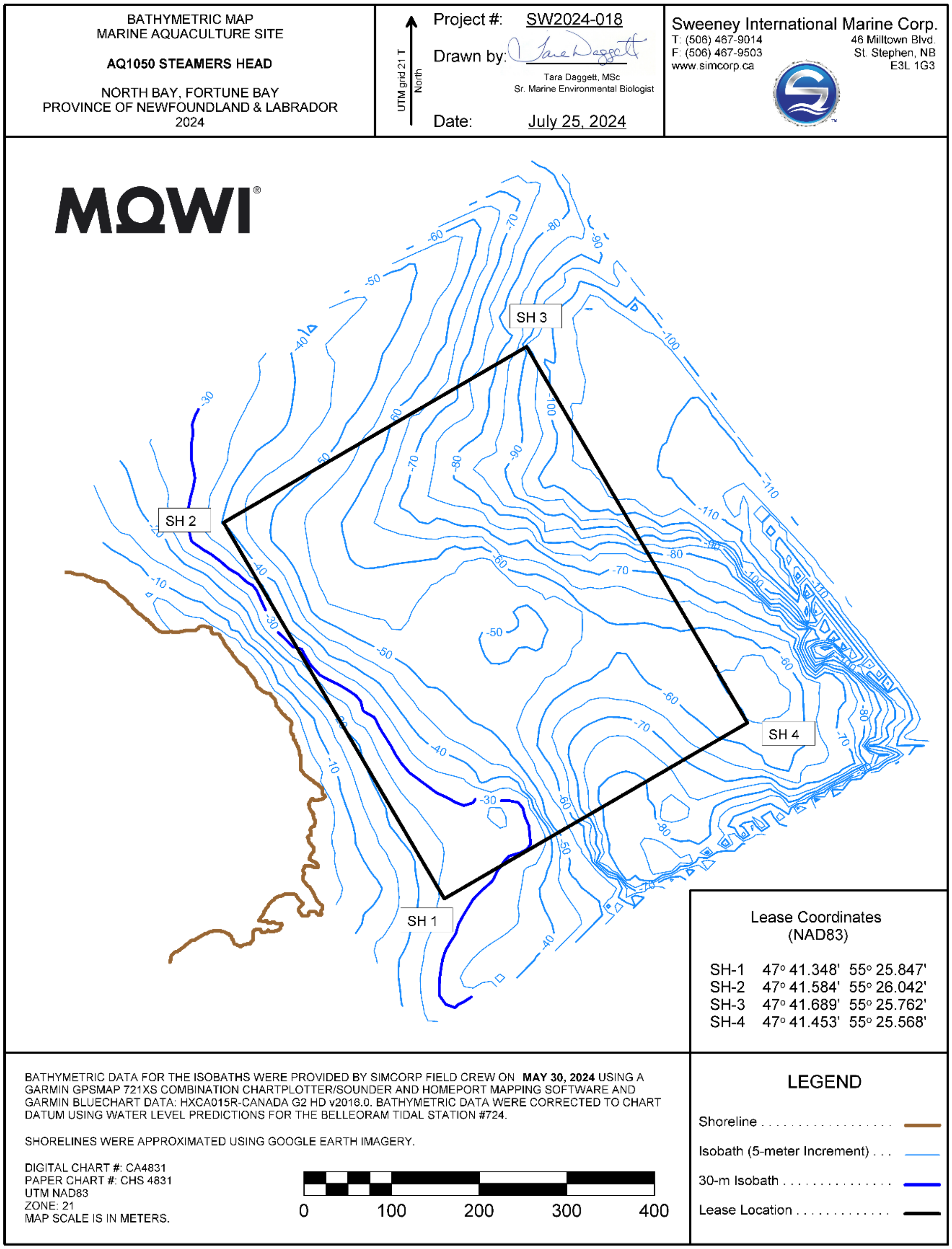


Figure 6.35. Bathymetric map of the Steamers Head sea farm lease area (May 2024).

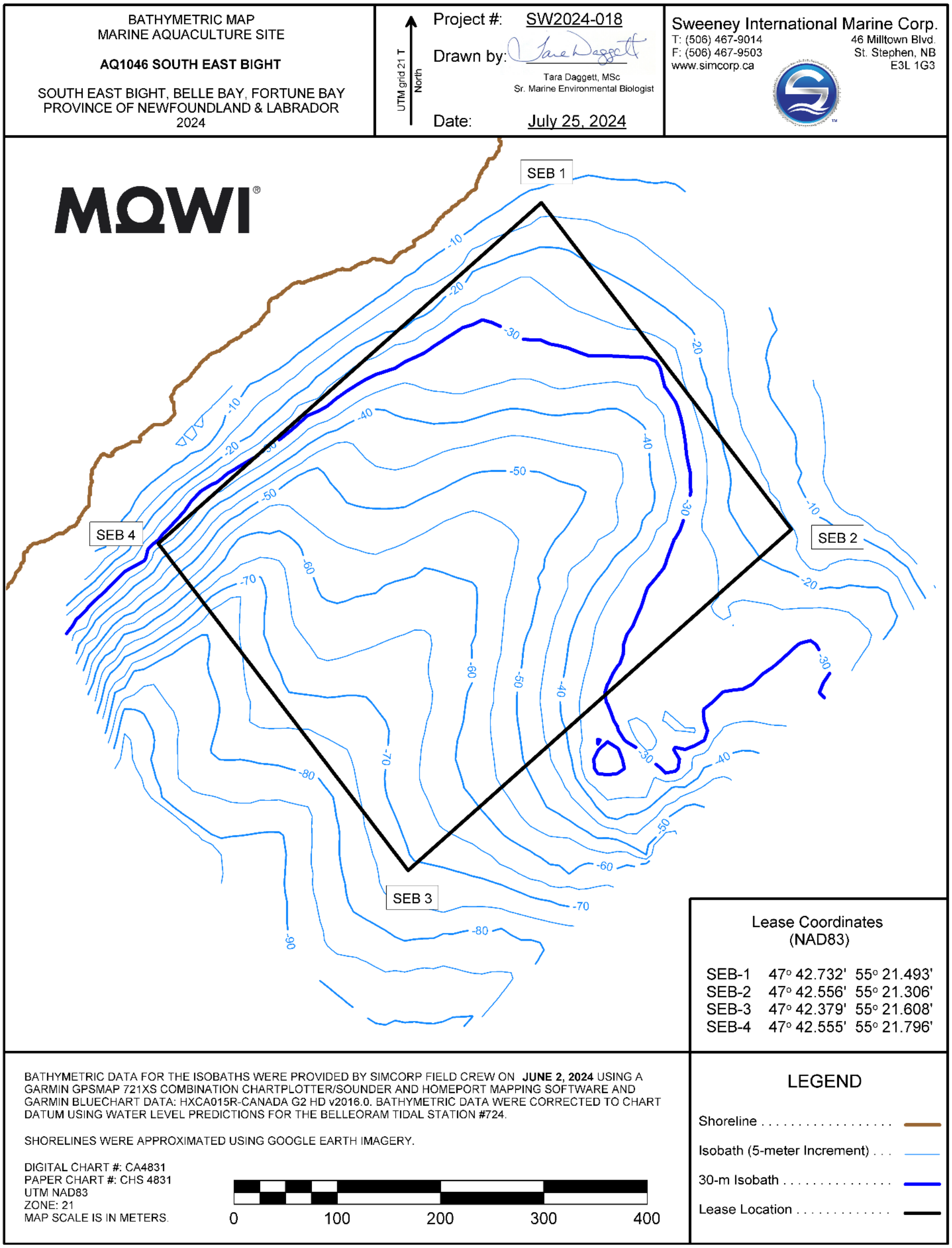


Figure 6.36. Bathymetric map of the South East Bight sea farm lease area (June 2024).

6.4.2 Currents

Current data were acquired at the Ironskull Point, Cinq Island Cove, McGrath Cove North, and Belle Island sea farms in November 2022-February 2023. In the Spyglass Cove, Spoon Cove, McGrath Cove South and Hickman's Point data were acquired for June–July 2024. During July–August 2024 data were collected in the Tilt Point, Steamers Head and South East Bight sea farms.

6.4.2.1 Ironskull Point

During November 2022–February 2023, current measurements were collected at three water depths in the Ironskull Point sea farm (Table 6.19). During this period, mean current speeds ranged from 8.2 cm/s (14.9 m depth) to 10.2 cm/s (5 m depth). Maximum current speeds were recorded within 5 m of the water surface. Currents were generally southwest with the orientation of the inlet (Figure 6.37), 10 m and 15 m were bidirectional with northeast and north-northeast as secondary directions. Vector-average currents travelled southwest at speeds ranging from 1.4–4.4 cm/s.

Table 6.19. Current speeds (mean and maximum values) and vector-averages at the Ironskull Point sea farm (November 2022–February 2023).

Speed (cm/s)			
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	10.2	39.6	4.4 @ 200 °
10.9	9.0	34.6	2.1 @ 231 °
14.9	8.2	33.5	1.4 @ 242 °

Notes:
MWL = mean water level.

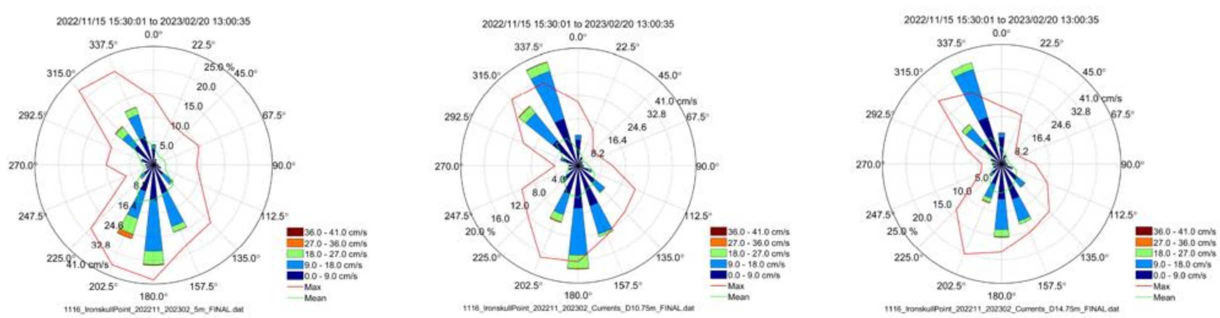


Figure 6.37. Compass rose plots of current speeds at the Ironskull Point sea farm (November 2022–February 2023). Current speeds and directions at 5 m, 10.9 m, and 14.9 m are shown from left to right in the figure.

6.4.2.2 Spyglass Cove

During June–July 2024, current measurements were collected at six depths in the Spyglass Cove sea farm (Table 6.20). During this period, mean current speeds were relatively consistent across water depths ranging from 1.71–1.97 cm/s and 3.02 cm/s at surface (5 m). Maximum current speeds were variable from 6.02 cm/s to 13.51 cm/s. Currents were generally aligned south to southwest near surface, becoming more omnidirectional at mid-depth and bidirectional west-northwest and east-southeast near-bottom (Figure 6.38). The Vector average currents ranged from 0.2–1.1 cm/s predominantly towards the southwest direction, except at 10 m depth where currents flowed towards the northwest.

Table 6.20. Current speed and vector-averages at the Spyglass Cove sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	3.02	13.51	1.1 @ 223 °
10	1.97	9.08	0.2 @ 303 °
15	1.95	7.57	0.4 @ 219 °
20	1.90	8.51	0.7 @ 219 °
24	1.94	8.50	0.8 @ 221 °
43 (6 m above bottom)	1.71	6.02	0.4 @ 198 °

Notes:
MWL = mean water level.

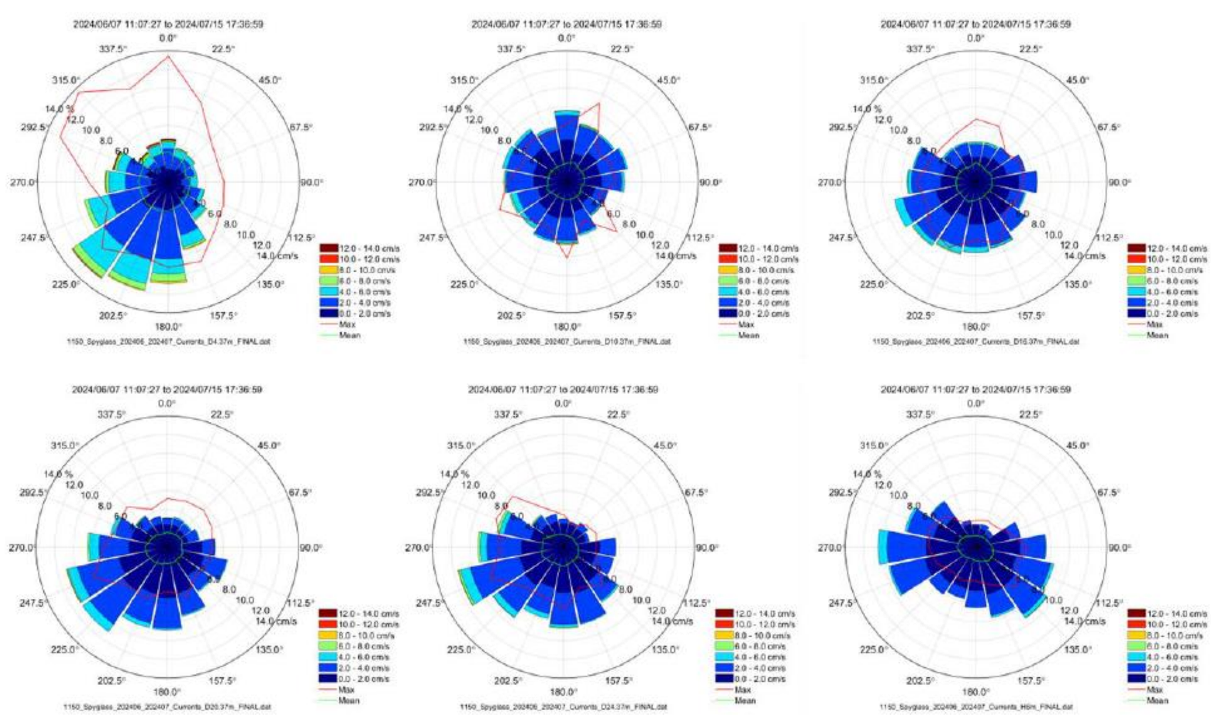


Figure 6.38. Compass rose plots of current speeds at the Spyglass Cove sea farm (June–July 2024). Current speeds and directions at 5 m, 10 m, 15 m, 20 m, 24 m (mid-depth) and near bottom (6 m height) are shown from left to right, top to bottom in the figure.

6.4.2.3 *Spoon Cove*

During June–July 2024, current measurements were collected at five depths at Spoon Cove (Table 6.21). During this period, mean current speeds were relatively consistent ranging from 2.21–2.40 cm/s expect for near-bottom which was 1.32 cm/s. Maximum current speeds were quite variable ranging from 4.39 cm/s near-bottom to 14.65 cm/s near-surface. Currents were generally aligned northwest to south-southeast (Figure 6.39). The vector average currents ranged from 0.8–1.1 cm/s towards the south-southeast except for near-bottom which was 0.3 cm/s towards northwest.

Table 6.21. Current speeds (mean and maximum values) and vector-averages at the Spoon Cove sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
6	2.40	14.65	0.8 @ 193 °
10	2.23	11.28	0.9 @ 169 °
15	2.21	9.56	1.1 @ 164 °
20	2.26	11.11	1.1 @ 162 °
41 (4 m above bottom)	1.32	4.39	0.3 @ 309 °

Notes:
MWL = mean water level.

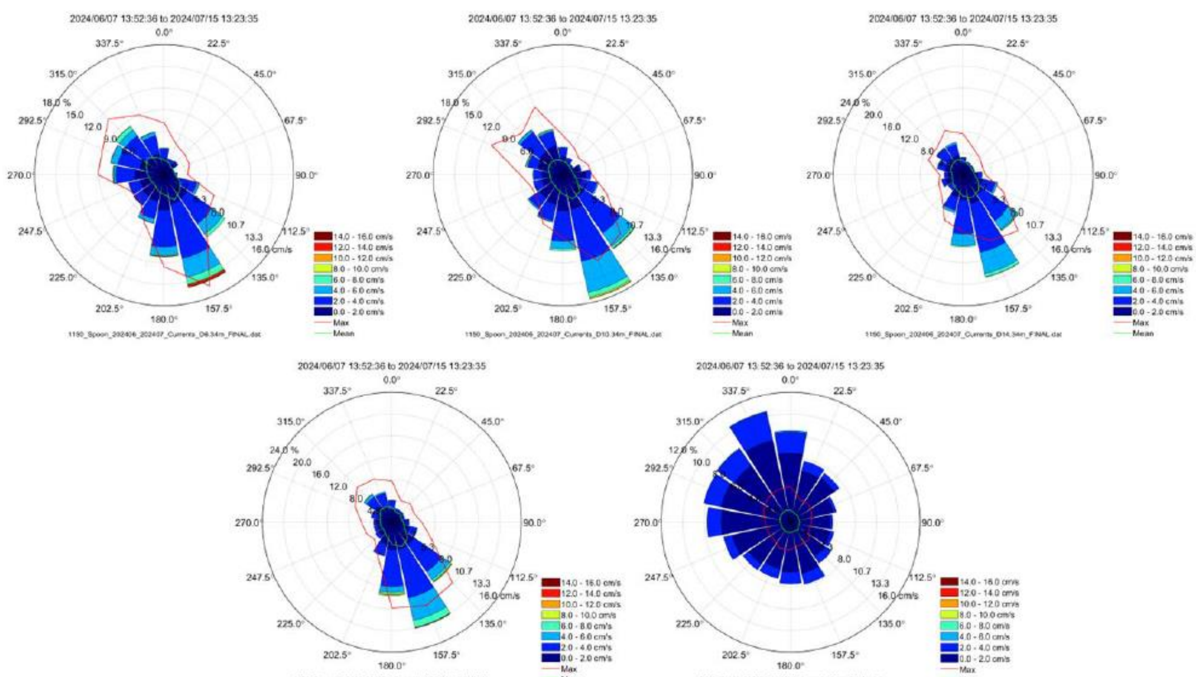


Figure 6.39. Compass rose plots of current speeds at the Spoon Cove sea farm (June–July 2024). Current speeds and directions are shown at 6 m, 10 m, 15 m and 20 m depths and near-bottom (4 m height) from left to right, top to bottom in the figure.

6.4.2.4 *Cinq Island Cove*

During November 2022–February 2023, current measurements at three depths were collected in the Cinq Island Cove sea farm (Table 6.22). During this period, mean current speeds ranged from 2.2 cm/s to 5.7 cm/s at 14.9 m and 5 m below the surface, respectively. Maximum current speeds ranged from 23.7 cm/s to 32.5 cm/s. Current directions were largely northeast-southwest, aligned with the orientation of the bathymetric contours (Figure 6.40). The vector average currents were towards the southwest at 0.8–1.3 cm/s (Table 6.22).

Table 6.22. Current speeds (mean and maximum values) and vector-averages at the Cinq Island Cove sea farm (November 2022–February 2023).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	5.7	32.5	1.1 @ 277 °
10.9	3.7	27.3	1.3 @ 246 °
14.9	2.2	23.7	0.8 @ 222 °

Notes:
MWL = mean water level.

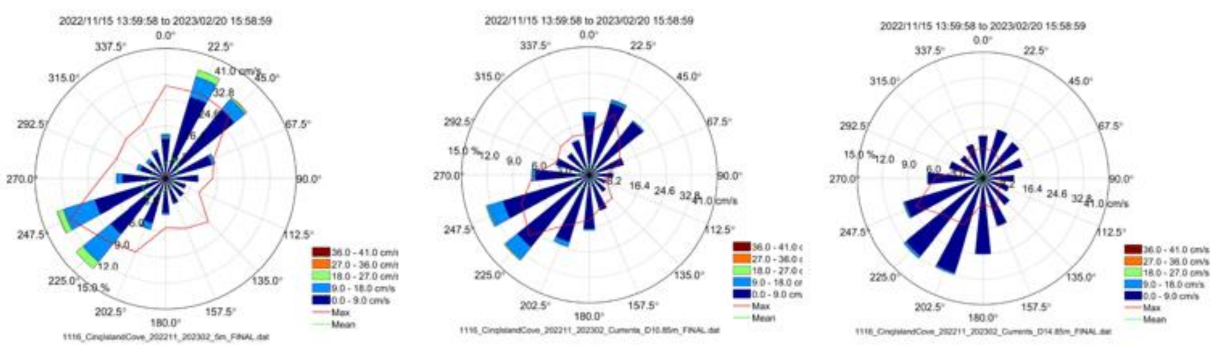


Figure 6.40. Compass rose plots of current speeds at the Cinq Island Cove sea farm (November 2022–February 2023). Current speeds and directions are shown at 5 m, 10 m, and 15 m from left to right in the figure.

6.4.2.5 *McGrath Cove South*

During June–July 2024, current measurements at five depths were collected in the McGrath Cove South sea farm (Table 6.23). During this period, mean current speeds ranged from 1.68–2.56 cm/s except for 5 m depth that were recorded at 5.36 cm/s. Maximum current speeds ranged from 11.75 cm/s to 27.23 cm/s. Current speeds in the McGrath Cove South sea farm at 5 m are much faster than other depths. At 5 m depth currents flow toward the south, 10 m and 20 m are bidirectional towards the west-northwest and east-southeast, 15 m and 28 m flow towards the northwest (Figure 6.41). The vector average currents at 5, 20 and 30 m were towards the south (southwest near bottom) at 0.4 cm/s, while 10 m was towards the northeast at 0.4 cm/s. 5 m depth was east at 3.1 cm/s.

Table 6.23. Current speeds (mean and maximum values) and vector-averages at the McGrath Cove South sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	5.36	27.23	3.1 @ 359 °
10	2.56	16.83	0.4 @ 78 °
15	2.10	13.76	0.4 @ 173 °
20	1.99	11.75	0.4 @ 179 °
28 (5 m above bottom)	1.68	14.27	0.4 @ 211 °

Notes:
MWL = mean water level.

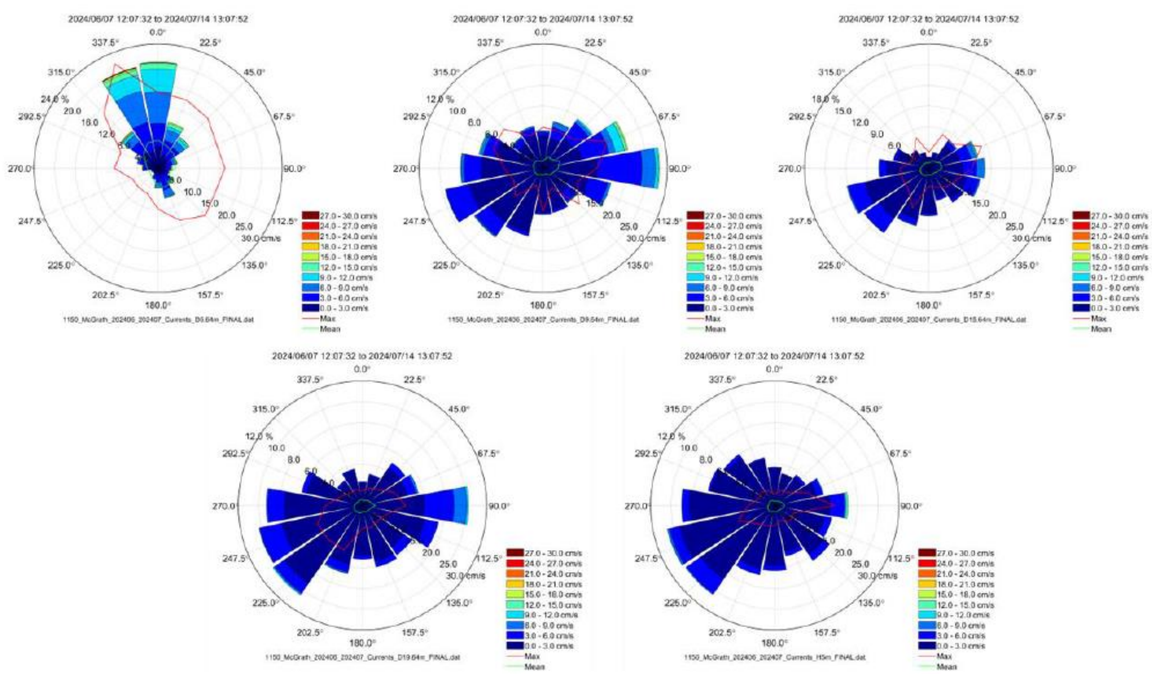


Figure 6.41. Compass rose plots of current speeds at McGrath Cove South sea farm (June–July 2024). Current speeds and directions are shown at 5 m,10 m, 15 m and 20 m and near bottom from left to right, top to bottom in the figure.

6.4.2.6 *McGrath Cove North*

During November 2022–February 2023, current measurements were collected at three depths in the McGrath Cove North sea farm (Table 6.24). During this period, mean current speeds ranged from 3.4 cm/s near-bottom to 4.5 cm/s near-surface. Current directions were aligned with bathymetric features primarily east-west (Figure 6.42). The vector-averaged currents were towards the west northwest and ranged from 0.7 cm/s-1.0 cm/s.

Table 6.24. Current speeds (mean and maximum values) and vector-averages at the McGrath Cove North sea farm (November 2022–February 2023).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	4.5	38.8	0.9 @ 285 °
9.9	3.8	26.6	0.7 @ 299 °
15.9	3.4	25.3	1.0 @ 292 °

Notes:
MWL = mean water level.

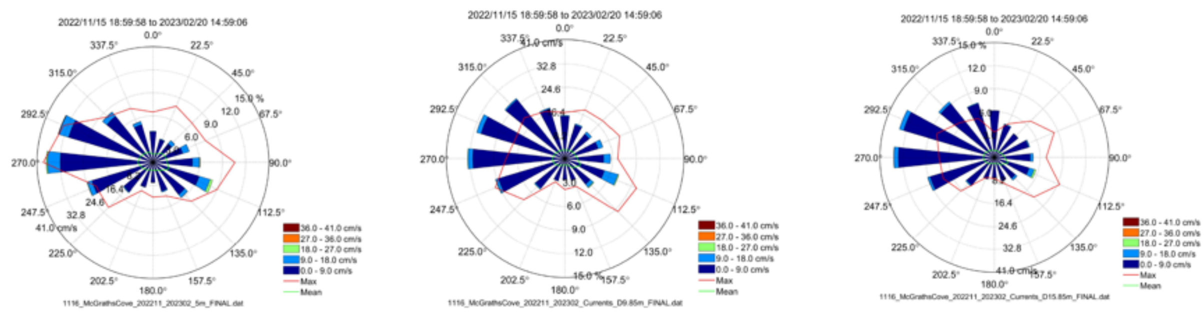


Figure 6.42. Compass rose plots of current speeds at the McGrath Cove North sea farm (November 2022–February 2023). Current speeds and directions at 5 m, 9.9 m and 15.9 m are shown from left to right in the figure.

6.4.2.7 *Belle Island*

During November 2022–February 2023, current measurements were collected at five depths in the Belle Island sea farm (Table 6.25). During this period, mean current speeds ranged from 3.7 cm/s -6.3 cm/s. Maximum current speeds were variable ranging from 37.3 cm/s near-surface to 15.8 cm/s at 36 m depth. Current directions were aligned with the orientation of bathymetric features, primarily north-south (Figure 6.43). The vector average currents ranged from 0.6 cm/s to 1.2 cm/s towards the northeast, while 36 m and below was south-southeast (Table 6.25).

Table 6.25. Current speeds (mean and maximum values) and vector-averages at the Belle Island sea farm (November 2022–February 2023).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	6.3	37.3	1.2 @ 73 °
9.9	5.3	31.6	1.0 @ 51 °
15.9	4.7	32.3	0.8 @ 56 °
36	3.7	15.8	0.9 @ 152 °
61 (9 m above bottom)	3.7	17.5	0.6 @ 164 °

Notes:
MWL = mean water level.

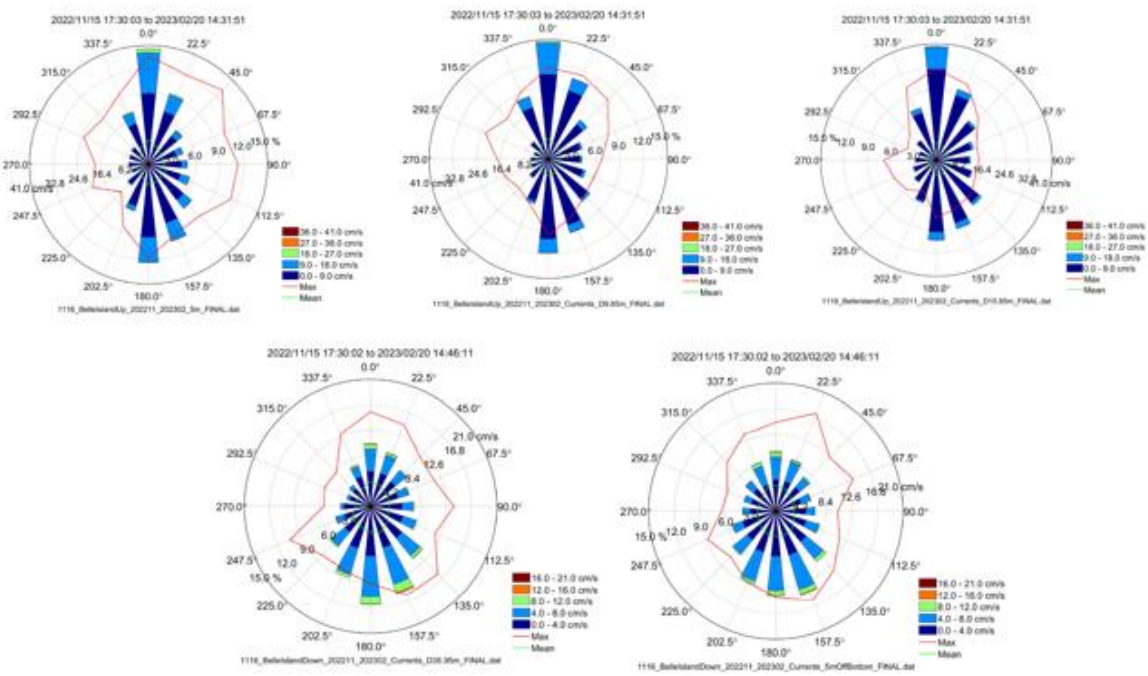


Figure 6.43. Compass rose plots of current speeds at the Belle Island sea farm (November 2022–February 2023). Current speeds and directions at 5 m, 10 m, 15 m, 35 m (mid-depth) and near bottom (9 m height) are shown from left to right, top to bottom in the figure.

6.4.2.8 Tilt Point

During July–August 2024, current measurements were collected at six depths in the Tilt Point sea farm (Table 6.26). During this period, mean current speeds ranged from 1.58 cm/s mid-depth to 6.92 cm/s near-surface. Current directions were aligned northeast to southwest, parallel to the bathymetry (Figure 6.44). The vector average currents, ranged from 0.3 cm/s at 20 m and below, to 3.7 cm/s near-surface, directions were south-southwest 20 m and above, while below 20 m they were towards the north.

Table 6.26. Current speeds (mean and maximum values) and vector-averages at the Tilt Point sea farm (June–August 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	**Mean**	**Maximum**	**Vector-Average**
5	6.92	33.11	3.7 @ 213 °
10	6.76	36.76	2.8 @ 208 °
15	5.24	33.69	0.7 @ 186 °
20	3.71	23.20	0.3 @ 189°
35	1.58	10.94	0.3 @ 13 °
62 (5 m above bottom)	1.73	6.17	0.3 @ 356 °

Notes:
MWL = mean water level.

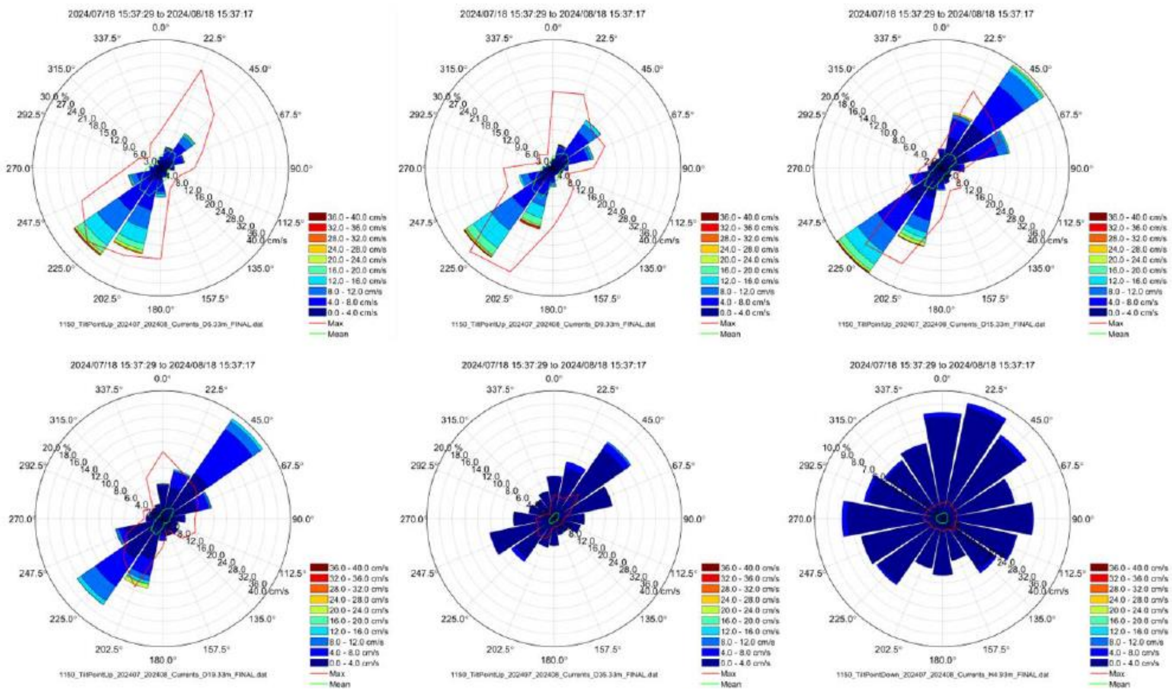


Figure 6.44. Compass rose plots of current speeds at the Tilt Point sea farm (June–August 2024). Current speeds and directions at 5 m,10 m, 15 m, 20 m, 35 (mid-depth) and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

6.4.2.9 Hickman's Point

During June–July 2024, current measurements at five depths were collected in the Hickman's Point sea farm (Table 6.27). During this period, mean current speeds ranged from 1.53 cm/s to 2.78 cm/s at 20 m and near bottom, respectively. Maximum current speeds ranged from 5.24–8.87 cm/s except for near surface at 14.38 cm/s. Current directions were variable, 5 m, 10 m, and near-bottom were south, 15 m was west and 20 m was north-northwest (Figure 6.45). The vector average currents were towards the south-southwest except for near-bottom that is north-northwest, at 0.1–1.4 cm/s (Table 6.27).

Table 6.27. Current speeds (mean and maximum values) and vector-averages at the Hickman's Point sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
6	2.55	14.38	1.4 @ 174 °
10	2.07	7.85	0.8 @ 197 °
15	1.64	6.62	0.2 @ 227 °
20	1.53	5.24	0.1 @ 253 °
45 (5 m above bottom)	2.78	8.87	1.0 @ 346 °

Notes:
MWL = mean water level.

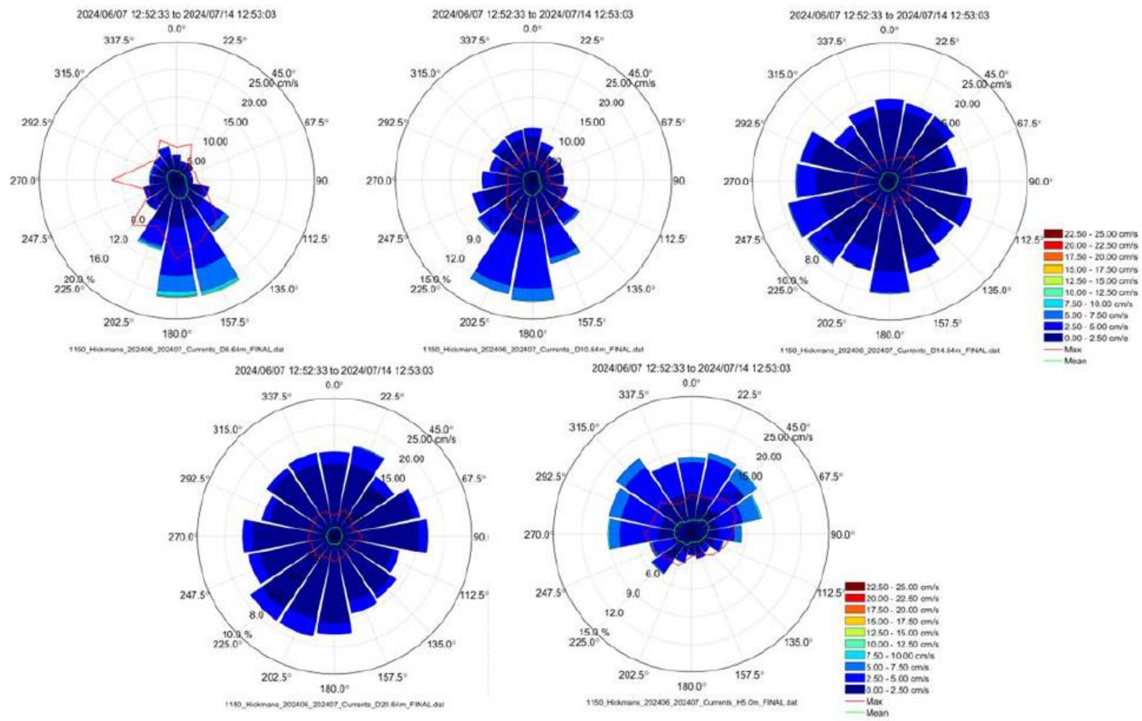


Figure 6.45. Compass rose plots of current speeds at the Hickman's Point sea farm (June–July 2024). Current speeds and directions at 6 m, 10 m, 15 m, 20 m (mid-depth) and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

6.4.2.10 Steamers Head

During July–August 2024, current measurements were collected at five depths in the Steamers Head sea farm (Table 6.28). During this period, mean current speeds ranged from 2.50 cm/s to 3.89 cm/s. Maximum current speeds were quite variable ranging from 9.85 cm/s near-bottom to 25.39 cm/s at the surface (8 m). Current directions were aligned with the bathymetric features, northwest to south-southeast (Figure 6.46). The vector-average currents, were towards the south at 5, 15 and 20 m and towards the east-northeast at 10 m and near-bottom. These vector-averaged speeds ranged from 0.1 cm/s to 0.6 cm/s.

Table 6.28. Current speeds (mean and maximum values) and vector-averages at the Steamers Head sea farm (July–August 2024).

Speed (cm/s)			
Depth (below MWL) (m)	**Mean**	**Maximum**	**Vector-Average**
8	3.89	25.39	0.5 @ 146 °
10	3.71	24.02	0.1 @ 87 °
15	3.60	18.84	0.1 @ 283 °
20	3.00	14.84	0.6 @ 150 °
34 (7 m above bottom)	2.50	9.85	0.3 @ 88 °

Notes:
MWL = mean water level.

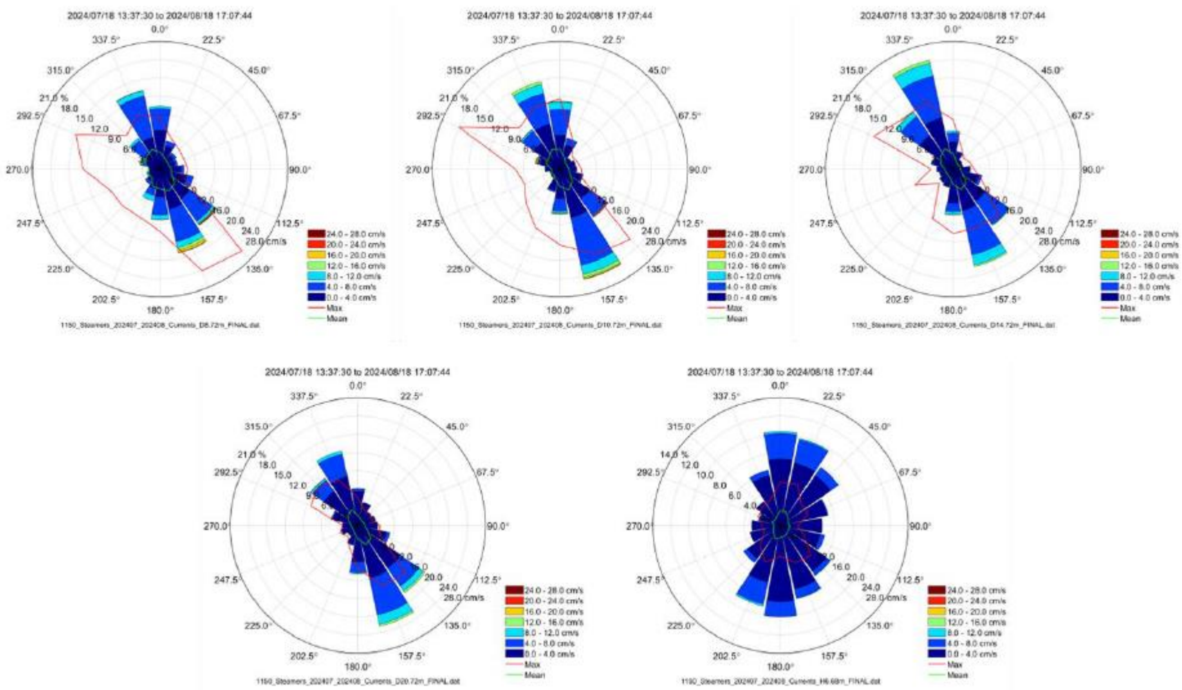


Figure 6.46. Compass rose plots of current speeds at the Steamers Head sea farm (July–August 2024). Current speeds and directions at 8 m, 10 m, 15 m, 20 m (mid-depth) and near bottom (7 m height) are shown from left to right, top to bottom in the figure.

6.4.2.11 *South East Bight*

During July–August 2024, current measurements were collected at six depths in the South East Bight sea farm (Table 6.29). During this period, mean current speeds were relatively consistent across ranging from 1.47 cm/s to 2.38 cm/s. Maximum current speeds were variable ranging from 13.71 cm/s to 15.95 cm/s in the upper 20 m, and 7.68 cm/s to 8.80 cm/s in the 25 m and near-bottom depths, respectively. Currents were bi-directional aligned with bathymetric features flowing northeast- southwest (Figure 6.47). Vector average currents ranged from 0.0–0.8 towards the west quadrant, expect for 25 m where it flowed north-northeast (Table 6.29).

Table 6.29. Current speeds (mean and maximum values) and vector-averages at the South East Bight sea farm (July–August 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	2.38	14.35	0.8 @ 255 °
10	2.05	14.91	0.2 @ 282 °
15	1.98	13.71	0.3 @ 274 °
20	2.01	15.95	0.3 @ 250 °
25	1.46	7.68	0.1@ 31 °
48 (6 m above bottom)	1.47	8.80	0.0 @ 253 °

Notes:
MWL = mean water level.

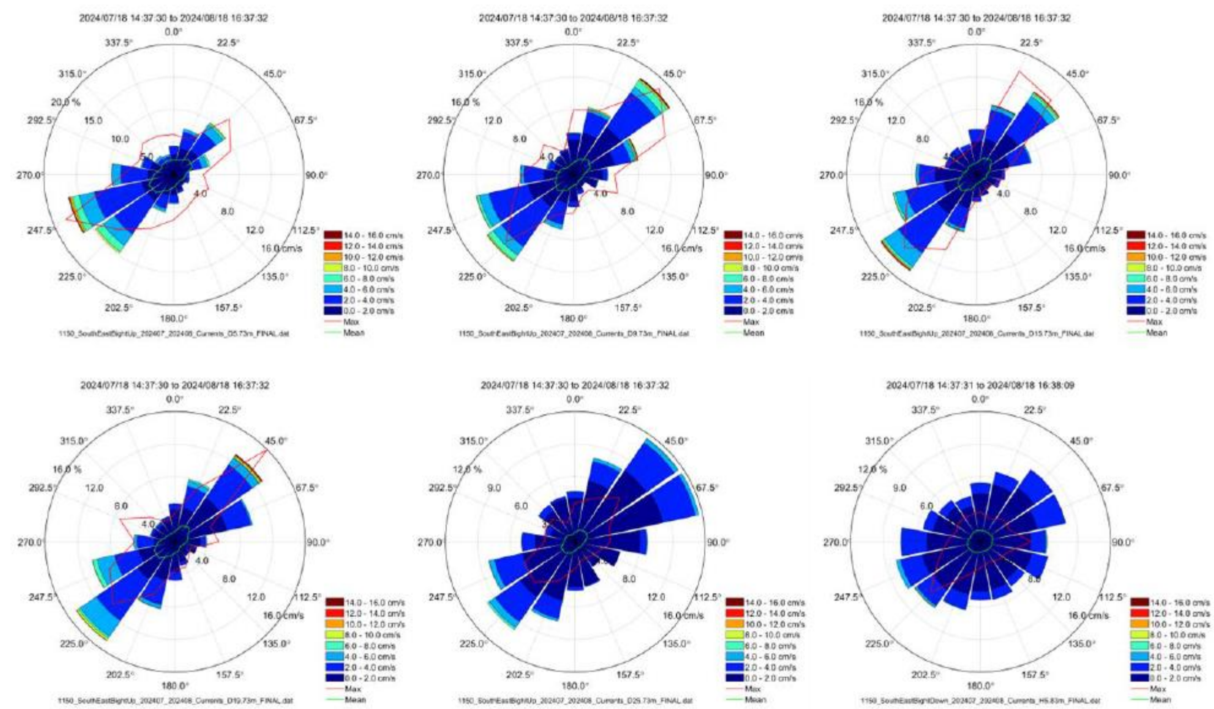


Figure 6.47. Compass rose plots of current speeds at the South East Bight sea farm (July–August 2024). Current speeds and directions at 5 m, 10 m, 15 m, 20 m, 27 m (mid-depth) and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

6.4.3 Wind and Waves

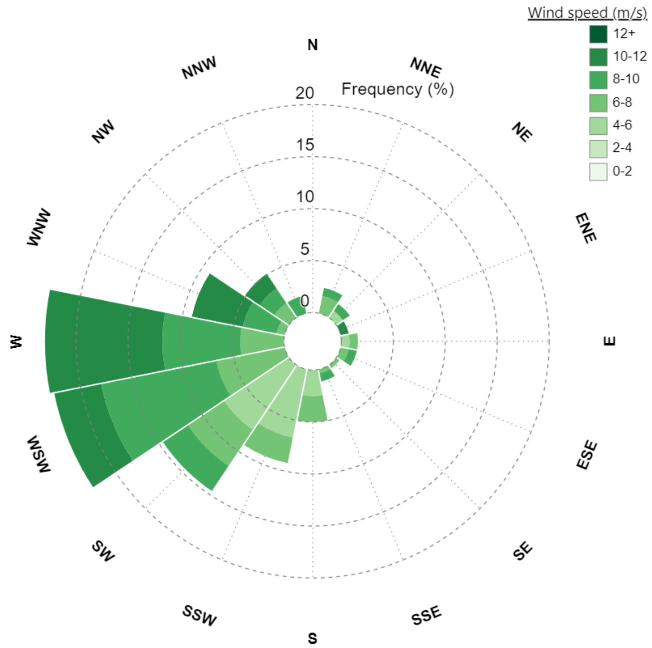
6.4.3.1 Modelling (MSC50 Hindcast Approach) for Atlantic Canada

Mean wind speeds and mean wave heights near the Fortune Bay West BMA were highest in December, January, and February and lowest in June, July, and August based on 10 years of historical data (Tables 6.30 and 6.31). Maximum monthly wind speeds of ~20–21 m/s (~72 -76 km/h) occurred in December, February, and March. Similarly, maximum monthly wave heights of 1.62–1.91 m occurred during winter months. Wind directions were predominantly from the westerly with wind speeds most frequently ranging from ~8–10 m/s (Figure 6.48).

Table 6.30. Monthly wind speeds (mean and maximum) near the Fortune Bay West BMA (at MSC50 grid points M6012546, M6012547 and M6012719 during 2009–2018).

Month	M6012546		M6012547		M6012719	
	Wind Speed Mean (m/s)	Wind Speed Max (m/s)	Wind Speed Mean (m/s)	Wind Speed Max (m/s)	Wind Speed Mean (m/s)	Wind Speed Max (m/s)
January	10.80	19.90	10.79	19.84	10.798	18.706
February	10.44	21.64	10.44	21.57	10.405	21.429
March	9.67	18.67	9.53	20.81	9.488	20.486
April	7.99	18.28	8.00	18.26	7.976	18.092
May	6.54	13.96	6.55	13.95	6.521	13.792

Month	M6012546		M6012547		M6012719	
	Wind Speed Mean (m/s)	Wind Speed Max (m/s)	Wind Speed Mean (m/s)	Wind Speed Max (m/s)	Wind Speed Mean (m/s)	Wind Speed Max (m/s)
June	5.85	12.91	5.87	12.89	5.835	12.678
July	5.48	11.87	5.50	11.90	5.484	11.806
August	6.00	14.05	6.01	14.11	5.997	13.792
September	7.69	16.93	7.69	16.98	7.694	16.814
October	8.85	18.48	8.85	18.49	8.838	18.307
November	9.68	19.32	9.68	19.30	9.684	19.193
December	10.60	20.28	10.60	20.27	10.596	20.187



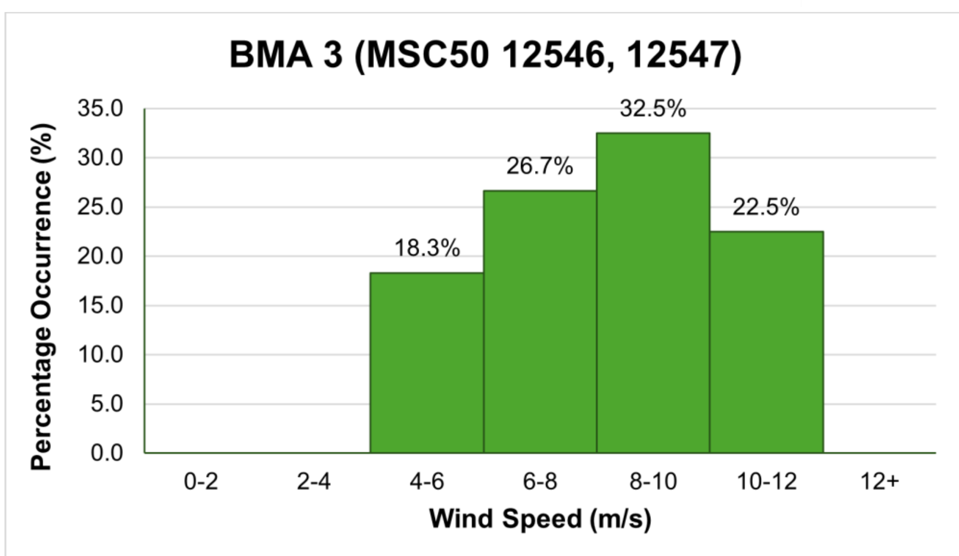


Figure 6.48. Wind rose and wind speed frequency histogram for MSC50 grid points M6012546, M6012547 and M6012719 near the Fortune Bay West BMA (2009–2018).

Table 6.31. Monthly wave heights (m) (mean and maximum) near the Fortune Bay West BMA (at MSC50 grid point M6012546, M6012547 and M6012719 during 2009–2018).

Month	M6012546		M6012547		M6012719	
	Wave Height Mean (m)	Wave Height Max (m)	Wave Height Mean (m)	Wave Height Max (m)	Wave Height Mean (m)	Wave Height Max (m)
January	0.73	1.67	0.87	1.86	0.73	1.82
February	0.73	1.87	0.82	1.91	0.71	1.85
March	0.68	1.49	0.72	1.74	0.63	1.76
April	0.49	1.52	0.54	1.62	0.50	1.39
May	0.37	1.18	0.39	1.22	0.37	1.09
June	0.29	1.05	0.30	1.01	0.30	1.05
July	0.24	0.84	0.27	0.94	0.27	0.95
August	0.30	1.20	0.32	1.15	0.32	1.14
September	0.46	1.39	0.00	0.00	0.47	1.30
October	0.58	1.51	0.66	1.71	0.57	1.44
November	0.65	1.59	0.74	1.76	0.65	1.61
December	0.76	1.62	0.83	1.84	0.73	1.69

6.4.3.2 *Sea Farm Specific Wave Calculation*

In the Fortune Bay West BMA, wind and wave data for the sea farms (Ironskull Point, Cinq Island Cove, McGrath Cove North, and Belle Island) were derived following the Scottish standard (i.e., fetch length method) and the SWAN model (see Section 3.4.3.2).

Ironskull Point

In the Ironskull Point sea farm, maximum wind speeds of 30 m/s (10 yr) and 34 m/s (50 yr) from various directions were predicted (Table 6.32). Maximum wave heights of 3.3 m (10 yr) and 3.8 m (50 yr) were predicted for waves originating from the south. The bathymetric data available for the Ironskull sea farm is not conducive for a full SWAN analysis, though it was applied for winds from the south, predicting relatively lower maximum wave heights of 2.0 m (10 yr) and 2.3 m (50 yr).

Table 6.32. Wind and wave predictions for 10-year and 50-year return periods in the Ironskull Point sea farm using the fetch length method and SWAN model.

Sector		Direction (°)		10 Years				50 Years			
Waves/Wind From	Current Toward	Current Toward	Waves From	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)
N	S	180	0	30	0.66	0.9	2.5	34	0.74	1.0	2.6
NE	SW	205	44	30	0.62	2.1	4.5	34	0.70	2.5	4.7
E	W	279	90	30	0.27	0.5	1.6	34	0.31	0.5	1.7
SE	NW	325	136	30	0.61	0.7	2.2	34	0.68	0.8	2.3
S	N	345	176	30	0.43	3.3	6.0	34	0.49	3.8	6.3
SW	NE	61	224	30	0.28	0.6	1.9	34	0.32	0.7	2.0
W	E	97	270	30	0.25	0.6	2.0	34	0.28	0.7	2.1
NW	SE	155	314	30	0.49	0.7	2.2	34	0.55	0.8	2.3
SWAN Analysis											
S	N	345	167	30	0.43	2.0	7.4	34	0.49	2.3	7.8

Notes:
Vc = current velocity, Hs = significant wave height, Tp = wave peak period.

Cinq Island Cove

In the Cinq Island Cove sea farm maximum wind speeds of 30 m/s (10 yr) and 34 m/s (50 yr) from various directions were predicted (Table 6.33). Maximum wave heights of 2.2 m (10 yr) and 2.5 m (50 yr) were predicted for waves originating from the northeast and east. Bathymetric data available for the Cinq Island Cove sea farm was not conducive for a SWAN analysis; therefore, results are presented based on the fetch method.

Table 6.33. Wind and wave predictions for 10-year and 50-year return periods in the Cinq Island Cove sea farm using the fetch length method.

Sector		Direction (°)		10 Years				50 Years			
Waves/Wind From	Current Toward	Current Toward	Waves From	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)
N	S	202	0	30	0.39	0.7	2.2	34	0.44	0.8	2.3
NE	SW	246	50	30	0.54	2.2	4.6	34	0.61	2.5	4.8
E	W	253	72	30	0.49	2.1	4.5	34	0.55	2.5	4.7
SE	NW	335	150	30	0.31	1.0	2.7	34	0.35	1.2	2.9
S	N	354	202	30	0.49	1.1	2.9	34	0.55	1.3	3.0
SW	NE	43	240	30	0.47	0.7	2.2	34	0.53	0.9	2.4
W	E	70	270	30	0.27	0.6	1.9	34	0.31	0.7	2.0
NW	SE	143	314	30	0.32	0.6	2.0	34	0.35	0.7	2.1

Notes:
Vc = current speed, Hs = significant wave height, Tp = wave peak period.

McGrath Cove North

Within the McGrath Cove North sea farm maximum wind speeds were predicted as 30 m/s (10yr) and 34 m/s (50yr) from all directions (Table 6.34). Maximum wave heights of 2.0 m (10yr) and 2.3 m (50yr) originated from the southwest. Bathymetry in the McGrath Cove North sea farm was not suitable for SWAN analysis therefore results are presented based on the fetch method alone.

Table 6.34. Wave and current predictions for 10-year and 50-year return period in the McGrath Cove North sea farm using the fetch length method.

Sector		Direction (°)		10 Years				50 Years			
Waves/Wind From	Current Toward	Current Toward	Waves From	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)
N	S	176	0	30	0.20	0.5	1.6	34	0.23	0.6	1.7
NE	SW	234	44	30	0.37	0.5	1.8	34	0.42	0.6	1.9
E	W	281	90	30	0.65	0.8	2.4	34	0.73	1.0	2.5
SE	NW	294	126	30	0.51	0.8	2.3	34	0.57	0.9	2.4
S	N	346	202	30	0.30	1.8	4.1	34	0.34	2.1	4.3
SW	NE	32	238	30	0.36	2.0	4.3	34	0.40	2.3	4.5
W	E	93	270	30	0.48	1.6	3.7	34	0.54	1.8	3.9
NW	SE	115	310	30	0.44	1.8	4.0	34	0.50	2.1	4.2

Notes:
Vc = current speed, Hs = significant wave height, Tp = wave peak period.

Belle Island

Within the Belle Island sea farm maximum wind speeds were predicted as 30 m/s (10yr) and 34 m/s (50yr) from all directions (Table 6.35). Maximum wave heights of 3.8 m (10yr) and 4.4 m (50yr) originated from the south. Bathymetry in the Belle Island sea farm was not appropriate for SWAN analysis therefore results are presented based on the fetch method alone.

Table 6.35. Wave and current predictions for 10-year and 50-year return period in the Belle Island sea farm using the fetch length method.

Sector		Direction (°)		10 Years				50 Years			
Waves/Wind From	Current Toward	Current Toward	Waves From	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)	Wind (m/s)	Vc (m/s)	Hs (m)	Tp (s)
N	S	188	0	30	0.54	0.9	2.6	34	0.60	1.1	2.7
NE	SW	236	44	30	0.28	1.5	3.5	34	0.32	1.7	3.7
E	W	285	90	30	0.40	0.4	1.6	34	0.45	0.5	1.6
SE	NW	336	146	30	0.41	3.6	6.4	34	0.46	4.2	6.8
S	N	355	160	30	0.62	3.8	6.6	34	0.70	4.4	7.0
SW	NE	35	218	30	0.60	1.9	4.2	34	0.68	2.2	4.4
W	E	97	280	30	0.52	2.0	4.4	34	0.58	2.4	4.6
NW	SE	113	308	30	0.50	1.0	2.7	34	0.56	1.2	2.9

Notes:
Vc = current speed, Hs = significant wave height, Tp = wave peak period.

6.5 Ice Conditions

Ice conditions for the Study Area including Fortune Bay West (BMA 3) are detailed in Section 4.5.

6.6 Storms

Storm conditions for the Study Area including Fortune Bay West (BMA 3) are detailed in Section 4.6

6.7 Tides and Floods

Tide and flood conditions for the Study Area including Fortune Bay West (BMA 3) are detailed in Section 4.7.

6.8 Performance of Sea Farms with a Previous Production Cycle

The Fortune Bay West BMA has been previously stocked and in production. The summaries below detail the monitoring, reporting and performance associated with MCE farms that were previously active within Fortune Bay West during the period that public reporting has been a requirement (2016–present). Of the 11 sea farms licensed in Fortune Bay West, two have not previously been stocked: Belle Island and South East Bight.

6.8.1 Fallowing Periods

Table 6.36 summarizes the fallow periods for MCE sea farms in the Fortune Bay West BMA since the enactment of the AAR. Belle Island and South East Bight have not been previously stocked. Spyglass Cove and Tilt Point have been fallow since 2019. Spoon Cove, McGrath Cove South, and Hickman's Point have been fallow since 2020. Steamer's Head has been fallow since 2022. Ironskull Point, Cinq Island Cove, and McGrath's Cove North were stocked in June 2023 following a fallowing since 2021.

Table 6.36. Summary of fallow schedule for Fortune Bay West BMA sea farms since 2016. Green indicates production (month stocked), red indicates harvesting/depopulation (month sea cages were empty), and blue is fallow (not stocked).

Sea Farm	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ironskull Point		Jan, Jul		Oct	Jun	Aug		Jun	
Spyglass Cove		Oct	Mar						
Spoon Cove	Jan	Jun		Jul					
Cinq Island Cove	Mar	Jun	Dec		Jun	Mar		Jun	
McGrath's Cove South		Oct		Sep					
McGrath's Cove North	Oct	Jun		Jul	Jun	Jul		Jun	
Belle Island									
Tilt Point	May	Jun	Aug						
Hickman's Point	Aug	Jul		Aug					
Steamer Head	Aug	Jun		Apr	Jun	Jun			
South East Bight									

6.8.2 Benthic Monitoring

For Fortune Bay West BMA, regulatory modelling of deposition (i.e., DEPOMOD) has not been required and not completed to date.

As per the AAR, benthic monitoring of an active sea farm is required during a period of peak salmon feeding. Depending on bottom type (hard or soft), either video monitoring or bottom grabs are collected to determine the amount of BOD matter. During years with active farming, required benthic monitoring at sampling stations in the Fortune Bay West BMA was conducted. All sea farms were within the allowable regulatory threshold based on the BOD indicators (Table 6.37).

Table 6.37. AAR benthic monitoring results for sea farms in the Fortune Bay West BMA (2015–2023). [Green = within allowable regulatory threshold[a]]

AAR Monitoring Year	BOD Indicator	Sea Farm					
		Ironskull Point	Spyglass Cove	Spoon Cove	Cinq Island Cove	McGrath Cove South	McGrath Cove North
2015	Date			20 Oct 15	26 Oct 15		
	%Stations			54 (26/48)	62 (37/60)		
2016	Date	23 Jun 16					21 Jun 16
	%Stations	31 (15/48)					46 (22/48)
2017	Date						
	%Stations						
2018	Date	02 Oct 18		09 Oct 18			03 Oct 18
	%Stations	27 (13/48)		27 (13/48)			52 (25/48)
2019	Date				25 Oct 19	22 Oct 19	
	%Stations				17 (8/48)	43 (20/46)	
2020	Date						
	%Stations						
2021	Date						
	%Stations						
2022	Date	27 Jul 22			26 Jul 22		25 Jul 22
	%Stations	19 (7/36)			19 (7/36)		14 (5/35)
2023	Date						
	%Stations						

AAR Monitoring Year	BOD Indicator	Sea Farm					
		Belle Island	Tilt Point	Hickman's Point	Steamers Head	South East Bight	
2015	Date		24 Oct 15	27 Oct 15	20 Oct 15		
	%Stations		67 (30/45)	35 (17/48)	44 (21/48)		
2016	Date						
	%Stations						
2017	Date						
	%Stations						
2018	Date			04 Oct 18	10,23 Oct 18		
	%Stations			31 (15/48)	40 (19/48)		
2019	Date		23 Oct 19				
	%Stations		17 (8/48)				
2020	Date						
	%Stations						
2021	Date						
	%Stations						
2022	Date						
	%Stations						
2023	Date						
	%Stations						

Source: MCE (2024).

Notes:

[a] If >70% of monitoring stations had the presence of *Beggiatoa* species or similar bacteria, marine worms, or barren substrate (as determined by visual monitoring) and/or if the mean concentration of free sulfide in surficial sediment was >3000 μM (as determined by sediment sampling) this is considered an exceedance (fail) of the allowable threshold.

6.8.3 Publicly Reported Performance

As detailed in Section 3.8.3, sea farm performance reports which include mass mortality, disease, and escape information and sea lice count data are available for recent years. Drugs and pesticide use information at sea farms are available for 2016–2022.

6.8.3.1 *Mortality*

In May 2020, during transport to the Steamers Head farm, rough weather resulted in an abnormal mortality event for lumpfish. Subsequently, 26,000 lumpfish did not survive the handling (Table 6.38). These mortalities were removed and recovered using anaerobic digestion to produce biogas.

6.8.3.2 *Disease*

In 2019, IPN was suspected on a sample collected from McGrath Cove South. When the results were reported to MCE, all fish had been harvested, and the farm was fallowing. Following protocol, a duplicate sample from this fish was sent for confirmation to the CFIA laboratory. The duplicate sample had a negative test result.

During 2020, ISA was suspected at farms in Cinq Island Cove, Ironskull Point, McGrath Cove North and Steamers Head. Duplicate testing did confirm these results. All affected farms were quarantined at the time of suspect detection followed by harvest of all fish within the affected cages following the confirmation results (Table 6.38).

6.8.3.3 *Escapes*

No fish escapes were reported at sea farms in the Fortune Bay West BMA for the years publicly reported on NAIA website and the Aquaculture Portal 2019–2024 (Table 6.38).

6.8.3.4 *Sea Lice*

Sea lice are reported on the NAIA website as an average number per fish. These results are not reported for each sea farm or each BMA but as an average for all active sea farms. Table 4.22 (see Section 4.8.3.4) summarizes the average sea lice/fish for all active sea farms for 2021–2024.

Table 6.38. Summary of reportable incident events at sea farms in the Fortune Bay West BMA.

<table>
<tr><th rowspan="2">Date</th><th rowspan="2">Sea Farm</th><th colspan="4">Incident</th><th rowspan="2">No. Cages Impacted</th><th rowspan="2">No. Fish Affected</th><th rowspan="2">Cause</th><th rowspan="2">Response Measures</th></tr>
<tr><th>Abnormal Mortality</th><th>Fish Health Suspect</th><th>Fish Health Confirmed</th><th>Escape</th></tr>
<tr><td>2020-08-15</td><td rowspan="2">Cinq Island Cove</td><td></td><td>ISAv</td><td></td><td></td><td rowspan="2">1</td><td rowspan="2">200,000</td><td rowspan="2">ISA virus</td><td>Quarantine</td></tr>
<tr><td>2020-08-29</td><td></td><td></td><td>ISAv</td><td></td><td>Quarantine & Harvested</td></tr>
<tr><td>2020-10-09</td><td rowspan="2">Ironskull Point</td><td></td><td>ISAv</td><td></td><td></td><td rowspan="2">1</td><td rowspan="2">225,000</td><td rowspan="2">ISA virus</td><td>Quarantine</td></tr>
<tr><td>2020-10-22</td><td></td><td></td><td>ISAv</td><td></td><td>Quarantine & Harvested</td></tr>
<tr><td>2020-10-09</td><td rowspan="2">McGrath Cove North</td><td></td><td>ISAv</td><td></td><td></td><td rowspan="2">1</td><td rowspan="2">185,000</td><td rowspan="2">ISA virus</td><td>Quarantine</td></tr>
<tr><td>2020-12-19</td><td></td><td></td><td>ISAv</td><td></td><td>Quarantine & Harvested</td></tr>
<tr><td>2019-11-13</td><td>McGrath Cove South</td><td></td><td>IPN</td><td></td><td></td><td></td><td></td><td>IPN virus</td><td>Site fallow when suspect results provided</td></tr>
</table>

Date	Sea Farm	Incident				No. Cages Impacted	No. Fish Affected	Cause	Response Measures
		Abnormal Mortality	Fish Health Suspect	Fish Health Confirmed	Escape				
2019-11-29				No detection					No action required
2020-05-26	Steamers Head	Lumpfish				n/a	26,000	Rough weather during transport	Recovered
2020-06-05									
2020-12-11	Steamers Head		ISAv			2	260,000	ISA virus	Quarantine
2020-12-19				ISAv					Quarantine & Harvested

Source: NAIA website (naia.ca).

6.8.3.5 *Deposits of Drugs and Pesticides*

Between 2016–2020, MCE has used pest management products at its sea farms in BMA 3 including bath treatments (Azamethiphos and Hydrogen Peroxide), and in-feed treatments (Emamectin Benzoate and Ivermectin). In addition, the antibiotic Florfenicol was used in 2017 and 2018 (Table 6.39). These products have all been approved for use in Canada and four are registered with Health Canada (Azamethiphos, Hydrogen Peroxide, Emamectin Benzoate, and Florfenicol) while Ivermectin is available through Health Canada's EDR program. All applications are under the control of the DAV and only applied by individuals that have received training and licensing for the application.

During 2016–2022, fish at all sea farms (in production) received treatment from pesticide (bath) and drugs (in-feed) for sea lice. As per the AAR, the total amounts (kg) of each treatment were reported to DFO (Table 6.39).

Table 6.39. Summary of deposits of pesticides and drugs at sea farms in the Fortune Bay West BMA (2016–2022).

BMA	Sea Farm	Year	Bath Treatment		In-Feed Treatment		
			Azamethiphos (Salmosan) (kg)	Hydrogen Peroxide (kg)	Emamectin benzoate (Slice) (kg)	Florfenicol (Aquaflor) (kg)	Ivermectin (Ivomec)(kg)
3	Cinq Island Cove	2017	6.75				0.64019
3	Cinq Island Cove	2018	55.418		6.39		
3	Hickman's Point	2017	18.99	9330		8.7045	0.26899
3	Hickman's Point	2018	65.887		4.822		
3	Hickman's Point	2019	5.25				
3	Ironskull Point	2016	12.75		3.247		
3	Ironskull Point	2017	13.5	4320			0.40029
3	Ironskull Point	2018	59.614		6.235		
3	Ironskull Point	2019	33.6				
3	Ironskull Point	2020	3.15		0.331		
3	McGrath Cove North	2016	3.75				
3	McGrath Cove North	2017	10.87		0.26787	3.9455	0.49026
3	McGrath Cove Noth	2018	70.058		7.091		
3	McGrath Cove South	2017				18.9045	

BMA	Sea Farm	Year	Bath Treatment		In-Feed Treatment		
			Azamethiphos (Salmosan) (kg)	Hydrogen Peroxide (kg)	Emamectin benzoate (Slice) (kg)	Florfenicol (Aquaflor) (kg)	Ivermectin (Ivomec)(kg)
3	McGrath Cove South	2018	31.007	10560	1.292	40.86	
3	McGrath Cove South	2019	25.2		1.428		
3	Spoon Cove	2017	6.75				0.4286
3	Spoon Cove	2018	39.741	22800	4.73		
3	Spyglass Cove	2017	0.91		0.08407	10.925	
3	Steamers Head	2017	12.6				0.631
3	Steamers Head	2018	56.474	5910	7.144		
3	Tilt Point	2017	13.82				0.51954
3	Tilt Point	2018			2.194		

Source: National Aquaculture Public Reporting Data Website (2024).
Notes:
At the time of writing, 2023 and 2024 data not available.

6.9 Exposure Zone Modelling

6.9.1 PEZ Modelling

DFO has not conducted PEZ modelling for BMA 3 sea farms.

6.9.2 Dispersion Modelling

Dispersion modelling by BMT was undertaken to model exposure zones of Azamethiphos (bath treatment) in a worst-case scenario approach (see Appendix B). The modelling study estimated an exposure profile for the entire BMA assuming sea farms were treated in sequence. Given the number of farms in BMA 3 and their locations, BMA 3 was subdivided into three distinct BMAs (BMA 3i, BMA 3ii, and BMA 3iii). This subdivision was implemented to enhance computational efficiency and provide realistic modelling outcomes. BMA 3i was represented by three sea farms (McGrath Cove South, McGrath Cove North, and Belle Island), and concentrations were modelled from the first treatment at McGrath Cove South cages (7 May 2023 for spring tide; 19 June 2023 for neap tide) through final treatment at Belle Island sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 6.40). BMA 3ii was represented by four sea farms (Hickman's Point, South East Bight, Spoon Cove, and Steamers Head), and concentrations were modelled from the first treatment at Hickman's Point (4 May 2023 for spring tide; 16 June 2023 for neap tide) through final treatment at Steamers Head sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 6.41). Four sea farms represented BMA 3iii (Spyglass Cove, Cinq Island Cove, Tilt Point, and Ironskull Point). Concentrations for BMA 3iii were modelled from the first treatment at Spyglass Cove (4 May 2023 for spring tide; 16 June 2023 for neap tide) through final treatment at Ironskull Point sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 6.42).

Exposure zone modelling of a worst-case scenario for Azamethiphos use in each of the three subdivisions in the Fortune Bay West BMA predicted maximum areas of 4.16 km² and 3.87 km² during neap and spring tides, respectively in BMA 3ii, where Azamethiphos concentrations exceeded 100 ng/L (0.1 µg/L) during the treatment duration (Table 6.43). Maximum areas of Azamethiphos concentration exceedance (area exceeding 100 ng/L) ranged from 1.80 km² in BMA 3i to 4.16 km² in BMA 3ii during neap tides. The maximum Azamethiphos concentration for the Fortune Bay West BMA was 880 ng/L during the simulated neap tide and 670 ng/L during the spring tide in BMA 3iii (Table 6.43). The peak concentration occurred during the treatment of the first farm, McGrath Cove South (BMA 3i), Hickman's Point (BMA 3ii), and treatment of the second farm, Cinq Island Cove (BMAiii), and decreased over time; concentration levels 72 hrs after final treatment were below 100 ng/L (Figures 6.49–6.54).

Table 6.40. Treatment schedule (assumed dates) for sea farms in BMA 3i during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
McGrath Cove South	1	07 May 23	-240	19 Jun 23	-240
	2	08 May 23	-219	20 Jun 23	-219
	3	08 May 23	-216	20 Jun 23	-216
	4	09 May 23	-195	21 Jun 23	-195
	5	09 May 23	-192	21 Jun 23	-192
	6	10 May 23	-171	22 Jun 23	-171
	7	10 May 22	-168	22 Jun 23	-168
McGrath Cove North	1	11 May 23	-147	23 Jun 23	-147
	2	11 May 23	-144	23 Jun 23	-144
	3	12 May 23	-123	24 Jun 23	-123
	4	12 May 23	-120	24 Jun 23	-120
	5	13 May 23	-99	25 Jun 23	-99
	6	13 May 23	-96	25 Jun 23	-96
	7	14 May 23	-75	26 Jun 23	-75
Belle Island	1	14 May 23	-72	26 Jun 23	-72
	2	15 May 23	-51	27 Jun 23	-51
	3	15 May 23	-48	27 Jun 23	-48
	4	16 May 23	-27	28 Jun 23	-27
	5	16 May 23	-24	28 Jun 23	-24
	6	17 May 23	-3	29 Jun 23	-3
	7	17 May 23	0	29 Jun 23	0

Table 6.41. Treatment schedule (assumed dates) for sea farms in BMA 3ii during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
Hickman's Point	1	04 May 23	-315	16 Jun 23	-315
	2	04 May 23	-312	16 Jun 23	-312
	3	05 May 23	-291	17 Jun 23	-291
	4	05 May 23	-288	17 Jun 23	-288
	5	06 May 23	-267	18 Jun 23	-267
	6	06 May 23	-264	18 Jun 23	-264
	7	07 May 23	-243	19 Jun 23	-243
South East Bight	1	07 May 23	-240	19 Jun 23	-240
	2	08 May 23	-219	20 Jun 23	-219
	3	08 May 23	-216	20 Jun 23	-216

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
	4	09 May 23	-195	21 Jun 23	-195
	5	09 May 23	-192	21 Jun 23	-192
	6	10 May 23	-171	22 Jun 23	-171
	7	10 May 23	-168	22 Jun 23	-168
Spoon Cove	1	11 May 23	-147	23 Jun 23	-147
	2	11 May 23	-144	23 Jun 23	-144
	3	12 May 23	-123	24 Jun 23	-123
	4	12 May 23	-120	24 Jun 23	-120
	5	13 May 23	-99	25 Jun 23	-99
	6	13 May 23	-96	25 Jun 23	-96
	7	14 May 23	-75	26 Jun 23	-75
Steamers Head	1	14 May 23	-72	26 Jun 23	-72
	2	15 May 23	-51	27 Jun 23	-51
	3	15 May 23	-48	27 Jun 23	-48
	4	16 May 23	-27	28 Jun 23	-27
	5	16 May 23	-24	28 Jun 23	-24
	6	17 May 23	-3	29 Jun 23	-3
	7	17 May 23	0	29 Jun 23	0

Table 6.42. Treatment schedule (assumed dates) for sea farms in BMA 3iii during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
Spyglass Cove	1	04 May 23	-315	16 Jun 23	-315
	2	04 May 23	-312	16 Jun 23	-312
	3	05 May 23	-291	17 Jun 23	-291
	4	05 May 23	-288	17 Jun 23	-288
	5	06 May 23	-267	18 Jun 23	-267
	6	06 May 23	-264	18 Jun 23	-264
	7	07 May 23	-243	19 Jun 23	-243
Cinq Island Cove	1	07 May 23	-240	19 Jun 23	-240
	2	08 May 23	-219	20 Jun 23	-219
	3	08 May 23	-216	20 Jun 23	-216
	4	09 May 23	-195	21 Jun 23	-195
	5	09 May 23	-192	21 Jun 23	-192
	6	10 May 23	-171	22 Jun 23	-171
	7	10 May 23	-168	22 Jun 23	-168
Tilt Point	1	11 May 23	-147	23 Jun 23	-147
	2	11 May 23	-144	23 Jun 23	-144
	3	12 May 23	-123	24 Jun 23	-123
	4	12 May 23	-120	24 Jun 23	-120
	5	13 May 23	-99	25 Jun 23	-99
	6	13 May 23	-96	25 Jun 23	-96
	7	14 May 23	-75	26 Jun 23	-75
Ironskull Point	1	14 May 23	-72	26 Jun 23	-72
	2	15 May 23	-51	27 Jun 23	-51
	3	15 May 23	-48	27 Jun 23	-48
	4	16 May 23	-27	28 Jun 23	-27
	5	16 May 23	-24	28 Jun 23	-24
	6	17 May 23	-3	29 Jun 23	-3
	7	17 May 23	0	29 Jun 23	0

Table 6.43. Maximum area (km^2) within subdivisions of BMA 3 (BMA 3i, BMA 3ii, BMA 3iii) that exceeded 100 ng/L and maximum concentration (ng/L) of Azamethiphos during a simulated spring and neap tide.

BMA Subdivision No.	Spring Tide		Neap Tide	
	Maximum Area Exceeding 100 ng/L of Azamethiphos (km^2)	Maximum Azamethiphos Concentration (ng/L)	Maximum Area Exceeding 100 ng/L of Azamethiphos (km^2)	Maximum Azamethiphos Concentration (ng/L)
3i	2.11	450	1.80	300
3ii	3.87	660	4.16	490
3iii	3.75	670	3.47	880

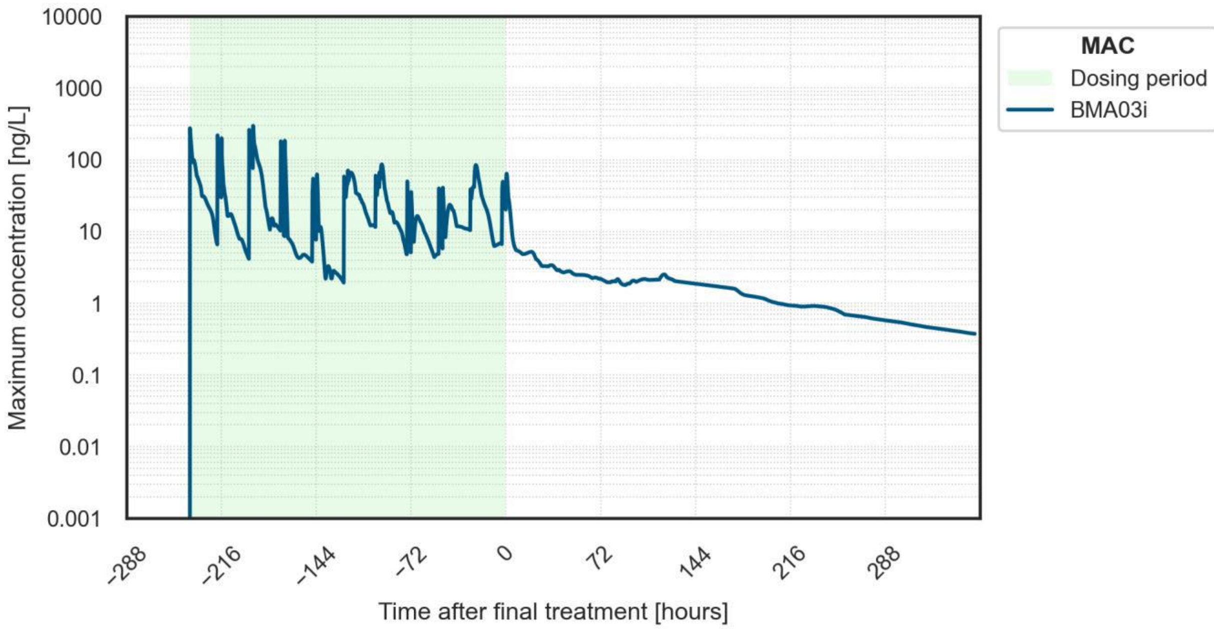


Figure 6.49. Maximum concentrations for Fortune Bay West BMA 3i during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at McGrath Cove South (assumed 19 June 2023) and final treatment was at Belle Island (time=0; assumed 29 June 2023).

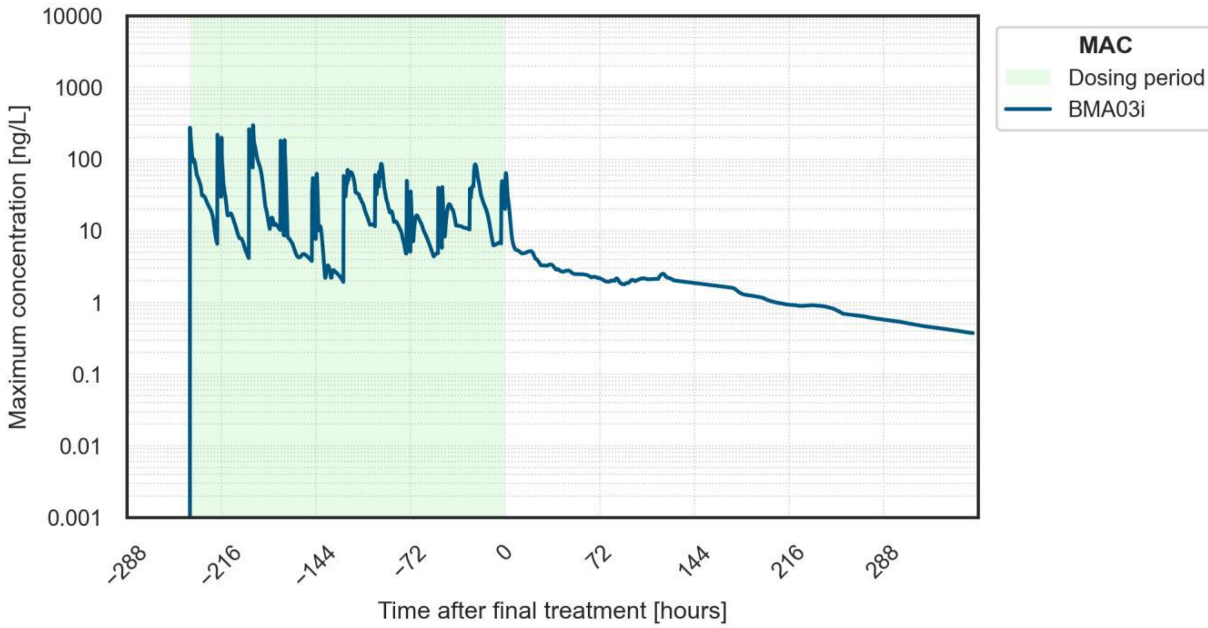


Figure 6.50. Maximum concentrations for Fortune Bay West BMA 3i during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at McGrath Cove South (assumed 7 May 2023) and final treatment was at Belle Island (time=0; assumed 17 May 2023).

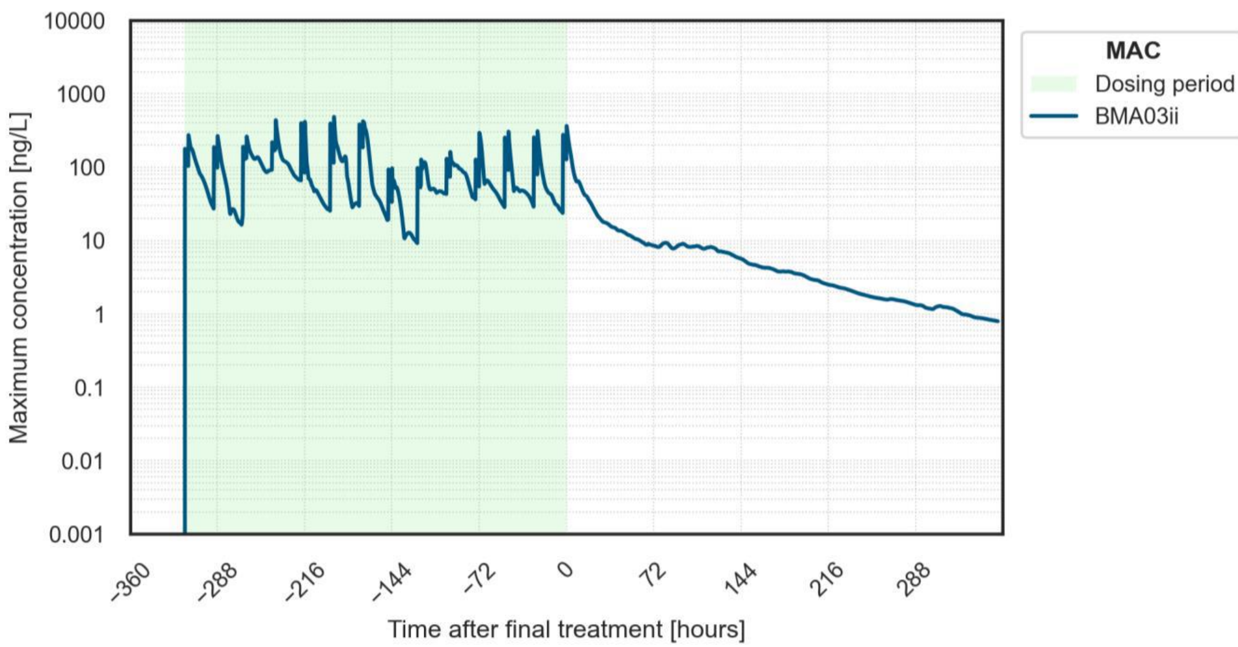


Figure 6.51. Maximum concentrations for Fortune Bay West BMA 3ii during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at Hickman's Point (assumed 16 June 2023) and final treatment was at Steamers Head (time=0; assumed 29 June 2023).

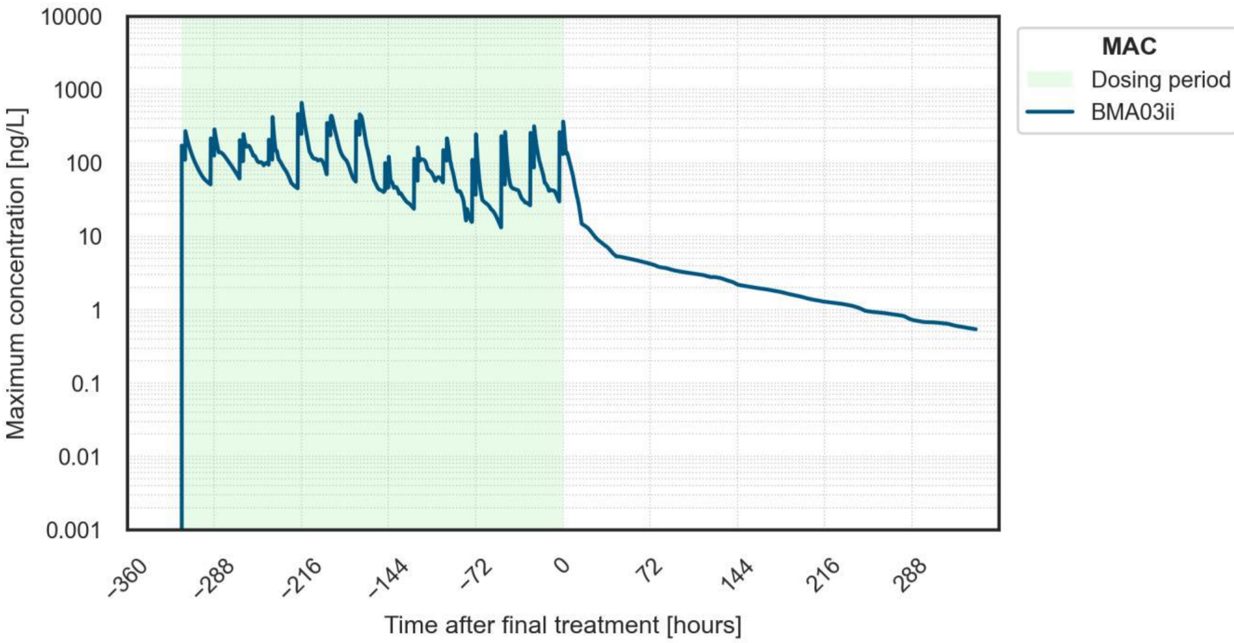


Figure 6.52. Maximum concentrations for Fortune Bay West BMA 3ii during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at Hickman's Point (assumed 4 May 2023) and final treatment was at Steamers Head (time=0; assumed 17 May 2023).

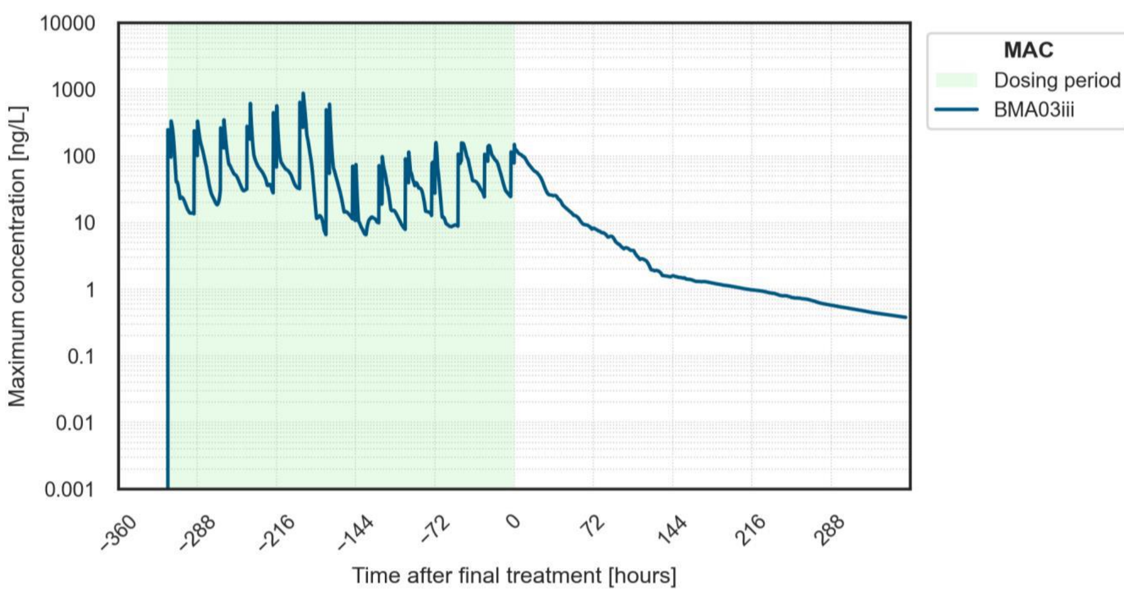


Figure 6.53. Maximum concentrations for Fortune Bay West BMA 3iii during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at Spyglass Cove (assumed 16 June 2023) and final treatment was at Ironskull Point (time=0; assumed 29 June 2023).

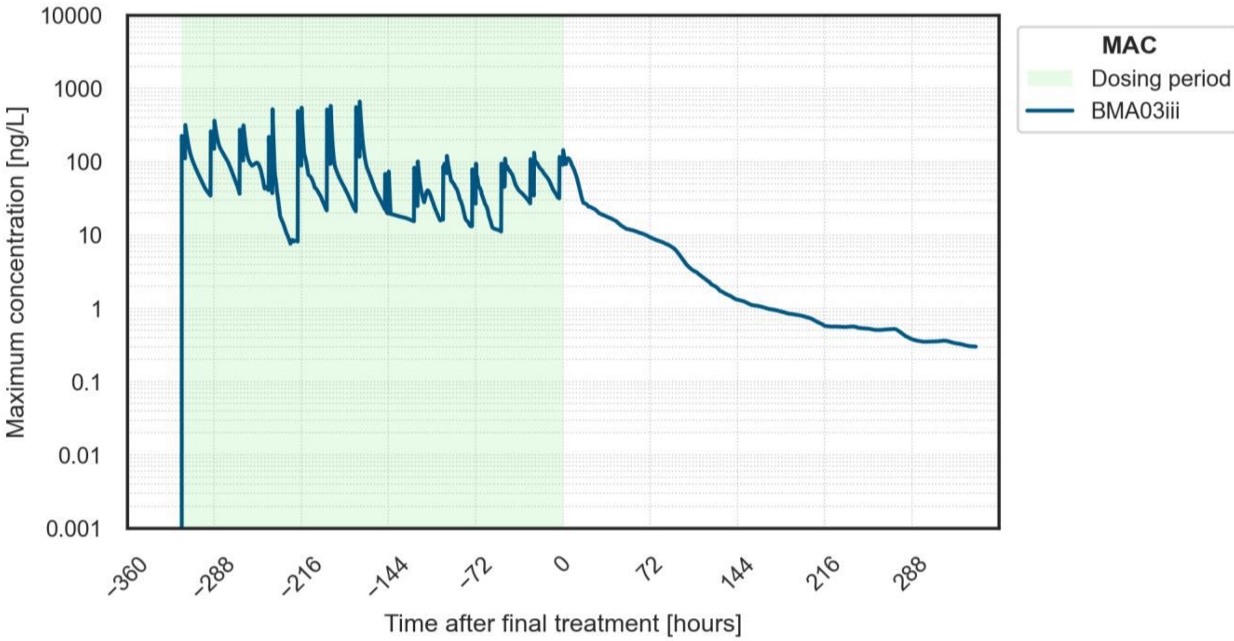


Figure 6.54. Maximum concentrations for Fortune Bay West BMA 3iii during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at Spyglass Cove (assumed 4 May 2023) and final treatment was at Ironskull Point (time=0; assumed 17 May 2023).

7.0 Great Bay de l'Eau (BMA 4)

The BMA of Great Bay de l'Eau (BMA 4) is located in the Bays East Area and includes four licensed sea farms: Salmonier Cove, Dog Cove, Red Cove, and Murphy Point (Table 7.1; Figure 7.1). All sea farms are located in relatively close proximity, though Murphy Point is more towards the western boundary of the BMA than the other sea farms. The closest community to these sea farms is Wreck Cove. The Salmonier Cove, Dog Cove, and Murphy Point sea farms have been previously stocked, while the Red Cove sea farm construction date is yet to be determined.

Table 7.1. Great Bay de l'Eau (BMA 4) sea farm locations and construction status in 2024.

BMA Name	BMA No.	Farm Site Name	AQ Licence No.	Site Coordinates		Construction Status
				Latitude (N)	Longitude (W)	
Great Bay de l'Eau	4	Salmonier Cove	1048	47.51297	-55.59531	Existing
		Dog Cove	1049	47.53619	-55.62581	Existing
		Red Cove	1065	47.52269	-55.61639	TBD
		Murphy Point	1088	47.49800	-55.70411	Existing

The sea farms in Great Bay de l'Eau were originally designed with either a 2x3, 2x6, 3x6 or 2x5 sea cage array with a net circumference of 140 m, 90–100 m or 100 m and a depth of 20 m or 15 m (Table 7.2). Beyond 2025, sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The maximum number of fish per site ranges from 600,000–975,000 with a maximum stocking density of 15 kg/m^3.

The water depths below the leases range from 6–185 m (Table 7.2). The shallowest sea farm is Salmonier Cove where sea cage array depths range from 40–43 m. The sea farms have bottom sediments consisting of mixed substrates. All sites were classified with the majority having hard substrates with some mixed substrates including silt, sand or mud for an overall site classification of hard bottom.

Currents were reported at near surface, upper, mid-water, and near bottom depths. At 15 m water depth, the maximum water current speed at each site was between ~five to ~seven times the mean speed (Table 7.2). There is much vertical variation in the maximum current speed and this variation is larger than the mean current speeds.

Benthic habitat surveys revealed that some of the predominate flora and fauna at the sea farms include anemones, sea star spp. and coralline algae. Soft corals, kelp beds and the invasive green crab were observed.

Where available, seasonal water temperatures at 15 m water depth were relatively similar across sea farms (Table 7.2). Mean water temperatures at 15 m ranged from 1.6°C in winter to 10.9°C in the summer. Dissolved oxygen levels were consistently lower in the summer and fall than winter and spring.

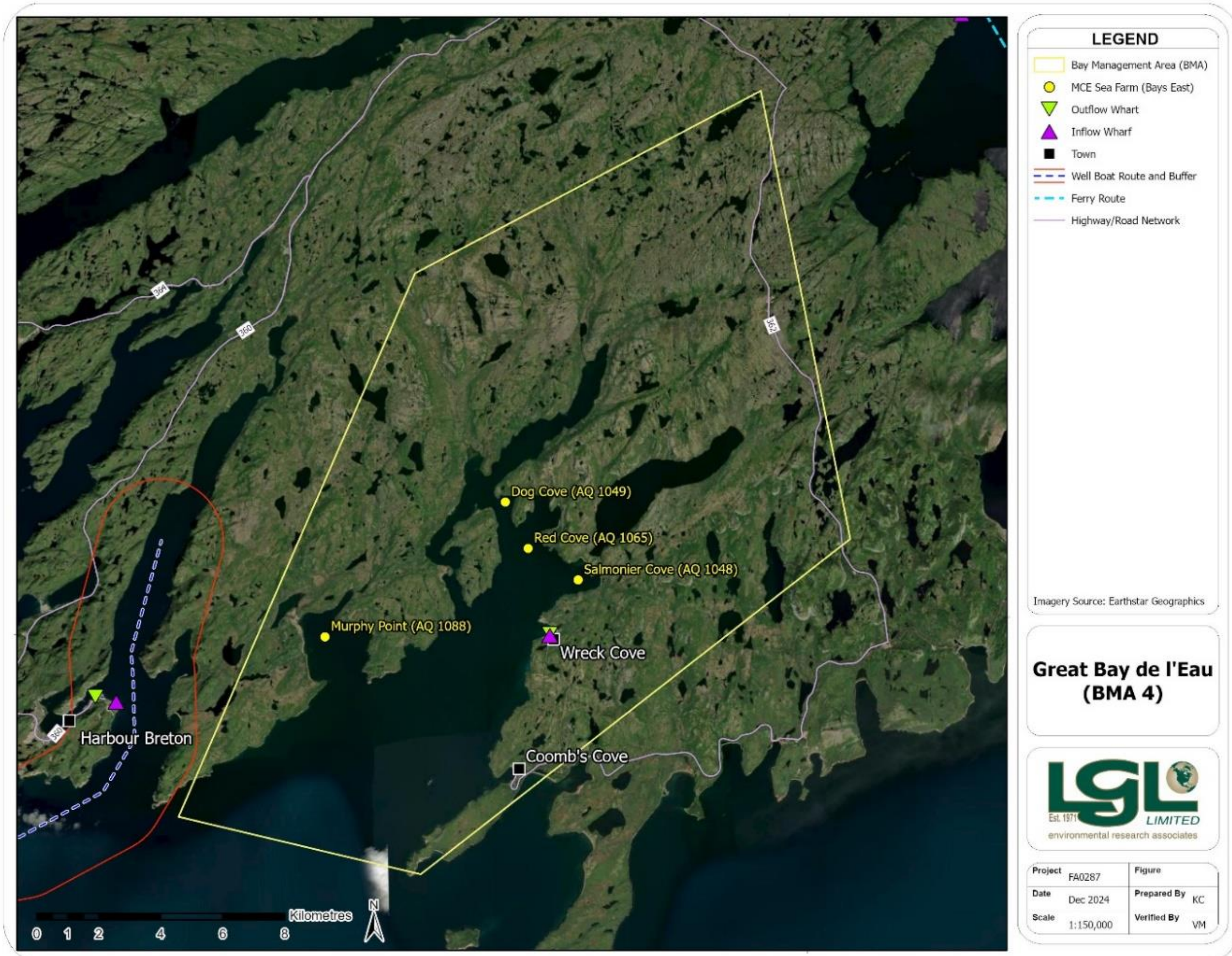


Figure 7.1. Locations of sea farms in the Great Bay de l'Eau BMA.

Table 7.2. Summary of historic site-specific sea farm characteristics in Great Bay de l'Eau (BMA 4).

Characteristic	Sea Farm			
	Salmonier Cove	Dog Cove	Red Cove	Murphy Point
Lease area (ha)	48	30	53	40
Water depth under lease (m)	6–61	15–105	10–185	16–62
Water depth under sea cages (m)	40–43	58–82	n/a	34–47
Predominant Bottom Type	Hard	Hard	Hard	Hard
Water Temperature (Mean °C at 15 m)				
Winter [a]	1.80	n/a	n/a	1.64
Spring [a]	3.61	n/a	n/a	3.83
Summer [a]	10.85	n/a	n/a	10.79
Fall [a]	8.36	n/a	n/a	7.03
Dissolved Oxygen (Mean mg/L at 15 m)				
Winter [a]	10.37	n/a	n/a	12.04
Spring [a]	10.69	n/a	n/a	11.45
Summer [a]	8.35	n/a	n/a	9.27
Fall [a]	9.12	n/a	n/a	10.28
Currents (cm/s at 15 m)				
Mean	2.7	2.69	4.4	n/a
Maximum	19.6	16.02	22.4	n/a

Notes:
[a] Winter includes January, February and March; Spring includes April, May June; Summer includes July, August, September; and Fall includes October, November and December.
Water depth values may vary by approximately ± 2 m depending on tidal influence

During 2009–2018, average monthly wind speeds ranged from 5.42 m/s in July to 10.8 m/s in January. The maximum wind speed during this period was 21.99 m/s in February. Wind direction in the Great Bay de l'Eau was predominately westerly. Mean wave height from 2009–2018 ranged from 0.65 m in June to 1.73 m in January. The maximum wave height was 4.59 m in December.

7.1 Sea Farm Site Maps

Past designs of sea farms in the Great Bay de l'Eau BMA include 2x3, 2x6, 3x6 or 2x5 sea cage array with a net circumference of 140 m, 90–100 m or 100 m and a depth of 20 m or 15 m. Beyond 2025, all sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The sea farms in the Great Bay de l'Eau BMA are third-party certified or will be prior to stocking [as per FFA policy (FFA, 2019)]. Any new designs will be supported by updated sea cage layouts.

7.1.1 Salmonier Cove

The Salmonier Cove sea farm has a 2x3 sea cage array with a net circumference of 140 m and a depth of 20 m (Figure 7.2).

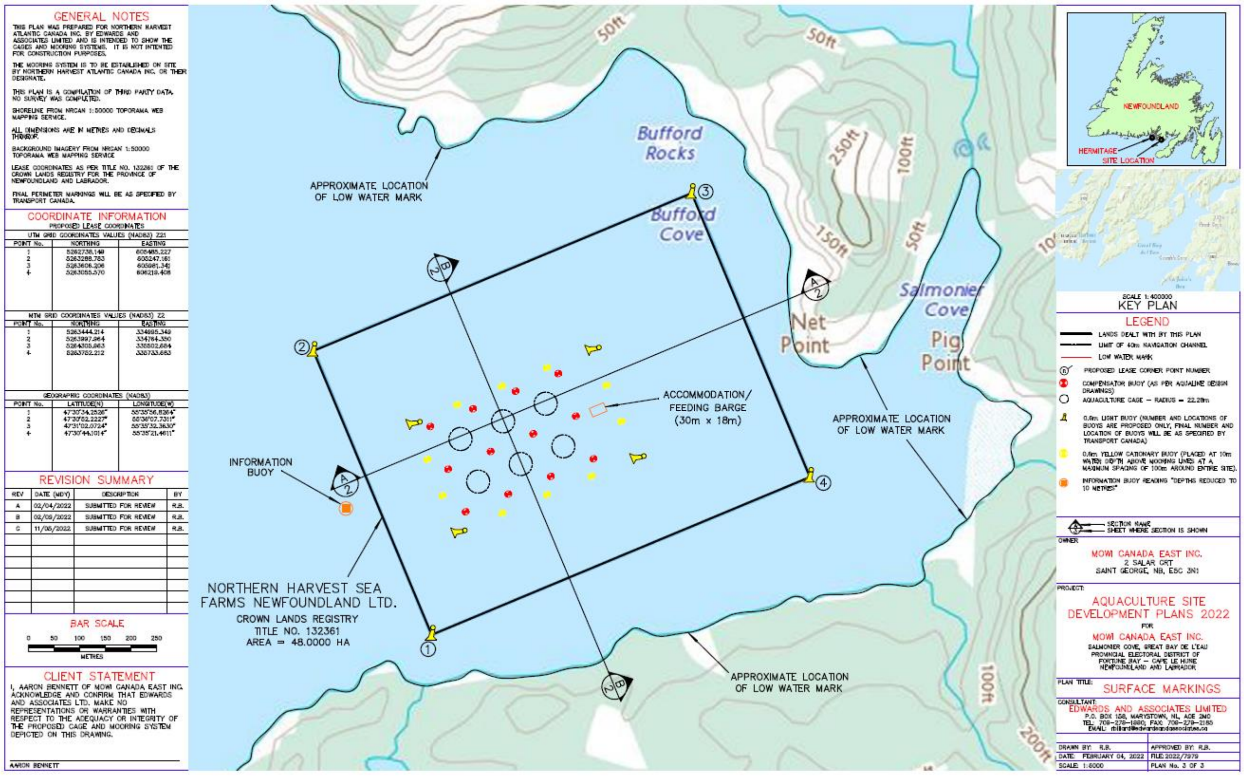


Figure 7.2. Salmonier Cove sea farm map and sea cage layout.

7.1.2 Dog Cove

As originally designed, the Dog Cove sea farm has a 2x6 sea cage array with a net circumference of 100 m and a depth of 15 m (Figure 7.3).

7.1.3 Red Cove

Red Cove has never been in production. Prior to MCE acquisition of Red Cove license, a farm design and sea cage layout was provided to regulators (Figure 7.4). The original design of the sea farm design has a 3x6 sea cage array with a net circumference of 90–100 m and depth of 15 m. A production schedule for Red Cove has not been determined and thus the 2010 design does not reflect MCE plans for the sea farm. Once a production schedule has been defined, a sea farm map and third-party certified sea cage layout will be developed.

7.1.4 Murphy Point

The Murphy Point sea farm has a 2x5 sea cage array with a net circumference of 140 m and a depth of 20 m (Figure 7.5).

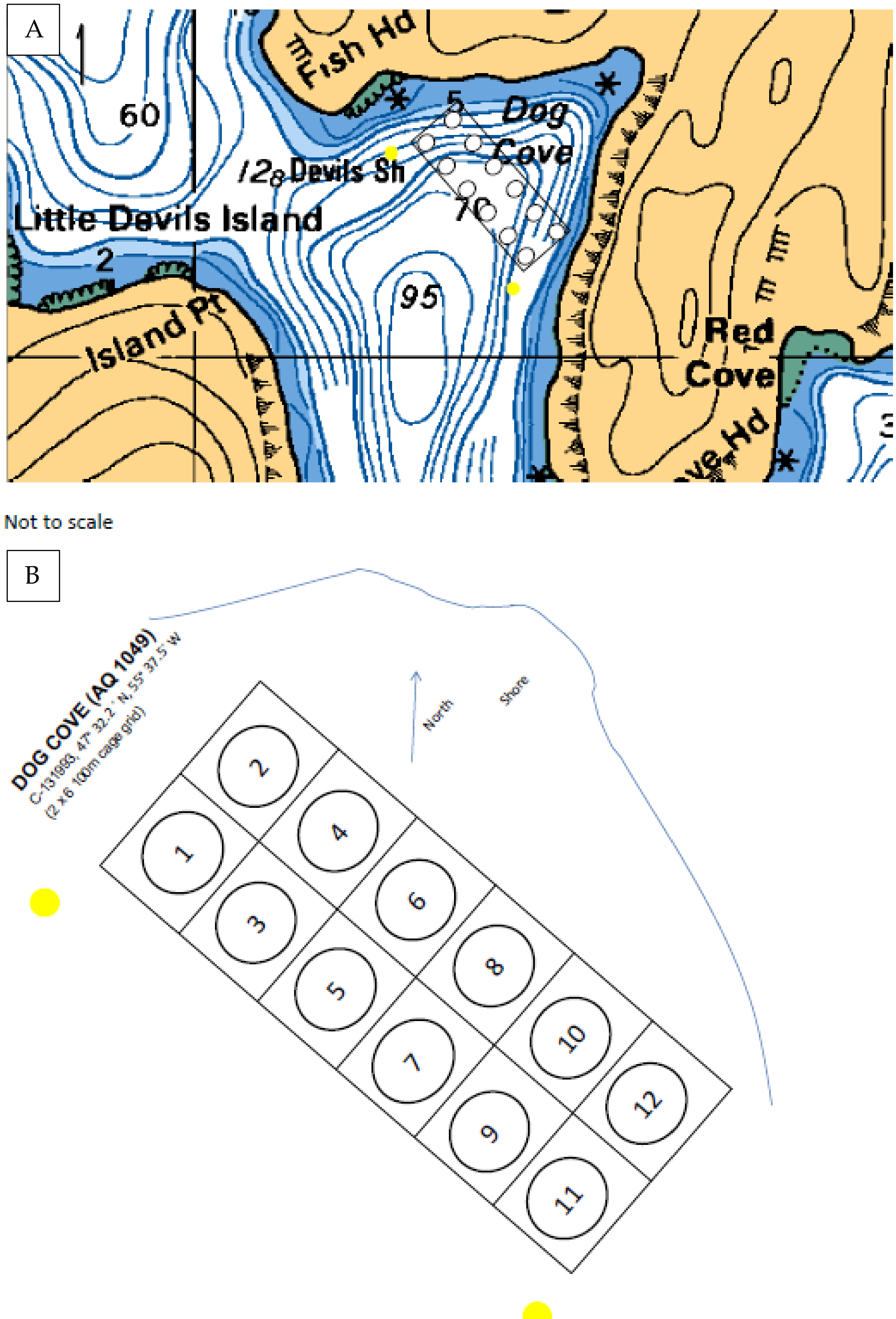


Figure 7.3. Dog Cove (A) sea farm map and (B) sea cage layout.

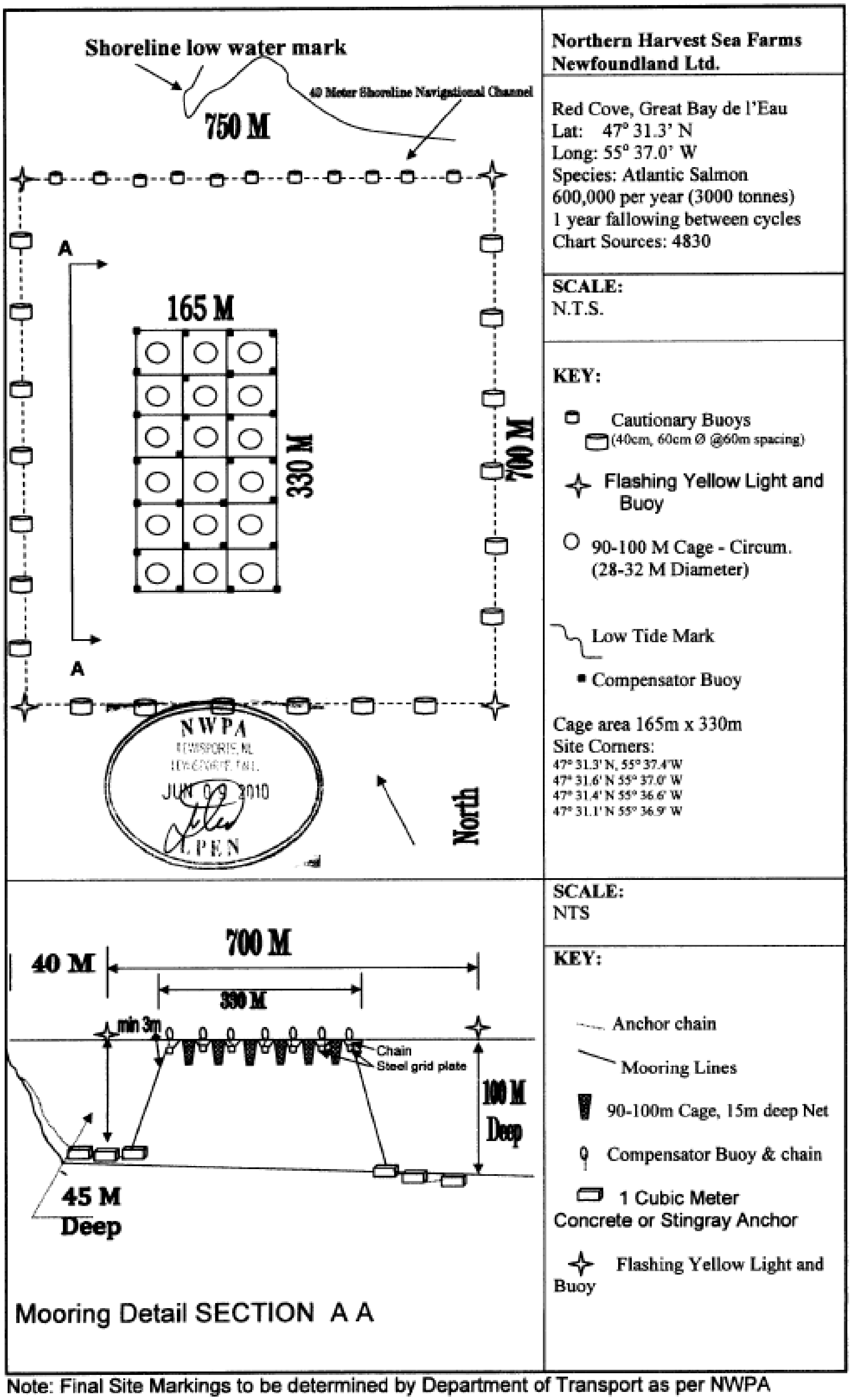


Figure 7.4. Red Cove sea farm map and sea cage layout.

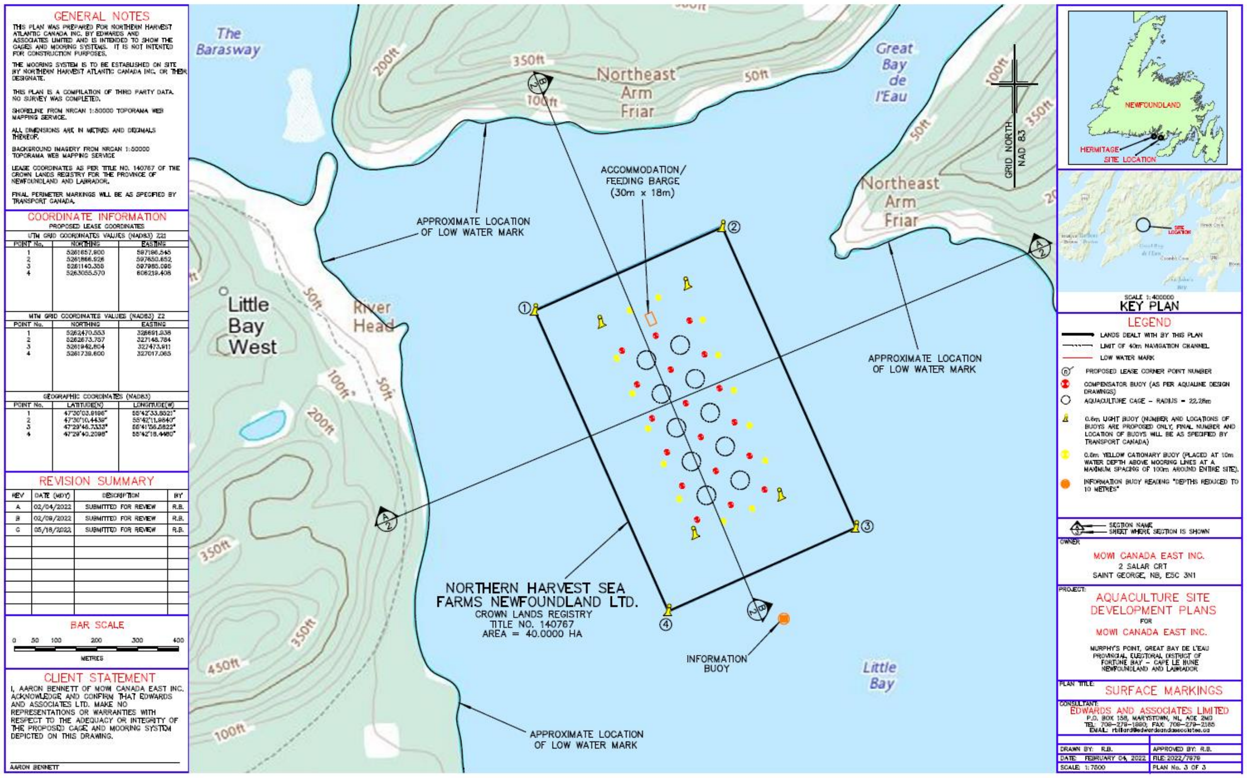


Figure 7.5. Murphy Point sea farm map and sea cage layout.

7.2 Benthic Surveys

Benthic surveys at sea farms in the Great Bay de l'Eau BMA were conducted in May 2010 for Murphy Point, prior to enactment of the AAR and June–July 2024 for Salmonier Cove, Dog Cove and Red Cove. Stations categorized as hard bottom appeared hard visually or did not produce acceptable grab samples.

7.2.1 Salmonier Cove

Based on surveys at 89 of the 98 sampling stations (~9% (n=9) were not accessible due to being too shallow, or algal bed obstruction), the composition of the seafloor in the Salmonier Cove sea farm is primarily mixed gravel and sand (Figure 7.6; Table 7.3). The majority of stations (69 of 89 stations with data) were considered hard bottom. The predominant species observed included sea star spp., encrusting coralline, and anemones (Table 7.3). Three stations were typified as beds of *Desmarestia* sp., four were considered kelp beds, and fourteen stations were considered beds of mixed macroalgae. One invasive species (green crab) was noted at station 79.

7.2.2 Dog Cove

Based on surveys at 56 of the 61 sampling stations (~8% (n=5) were obstructed by land or sea cages), the composition of the seafloor in the Dog Cove sea farm is primarily cobble, gravel and sand (Figure 7.7; Table 7.4). The majority of stations (54 of 56 stations with data) were considered hard bottom. The predominant species observed included encrusting algae, anemones, geodiidae sponges and sand shrimp (Table 7.4). Soft corals were observed across 4 stations. Seven stations were considered kelp beds.

7.2.3 Red Cove

Based on surveys at 90 sampling stations the composition of the seafloor in the Red Cove sea farm is primarily cobble, gravel and sand (Figure 7.8; Table 7.5). The majority of stations (76 of 90) were considered hard bottom. The predominant species observed included anemones, encrusting coralline algae, feather stars, and geodiid sponges (Table 7.5). Eleven *Gersemia* sp. soft corals were observed across 6 stations. Five stations were considered kelp beds. Two stations displayed beds of mixed macroalgae. One winter skate was observed, which is listed as endangered by COSEWIC.

7.2.4 Murphy Point

Based on surveys at 78 sampling stations the composition of the seafloor in the Murphy Point sea farm is primarily easily disturbed mud, silt and scattered patches of cobble (Figure 7.9; Table 7.6). The majority of stations (72 of 78 with data) were considered hard bottom. The predominant species observed included encrusting coralline algae, kelp and anemones.

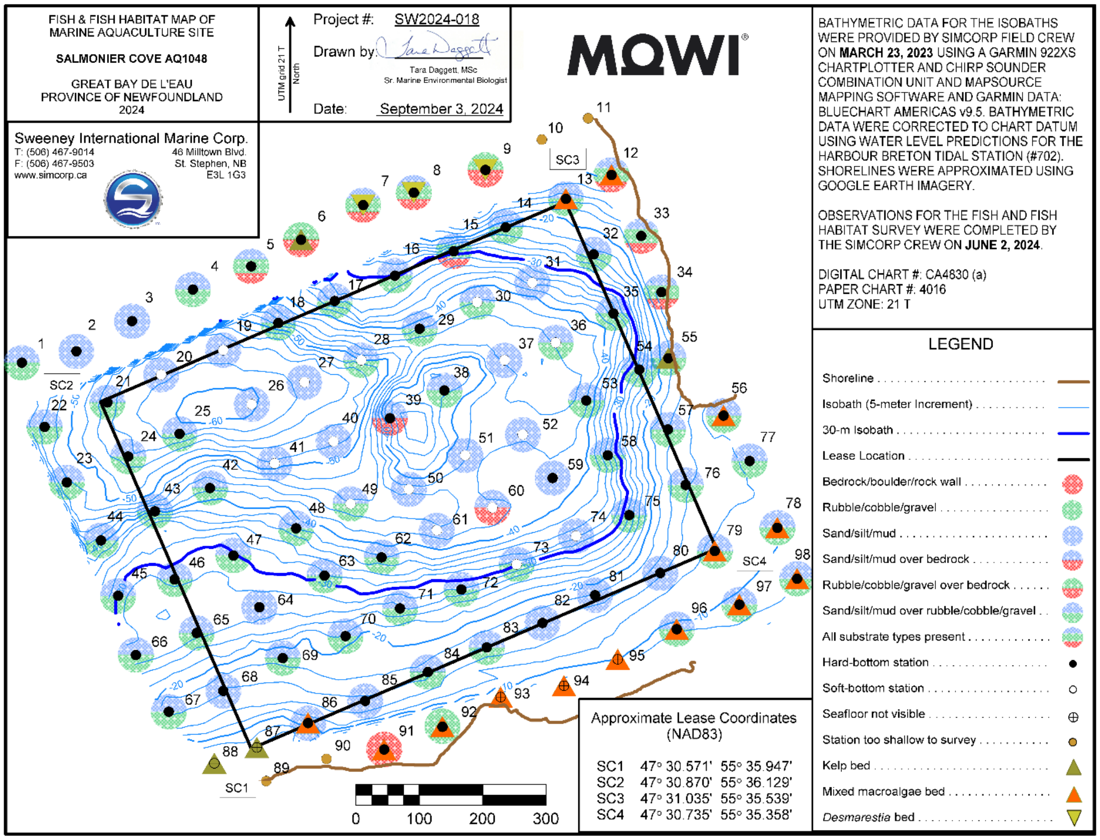


Figure 7.6. Habitat observations at sampling stations in the Salmonier Cove sea farm (June 2024).

Table 7.3. Summary of bottom type and observed flora and fauna at the Salmonier Cove sea farm (June 2024).

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
SAC	1	47 30.905	55 36.227	42	Hard					30%	30%	35%	5%			brittle star (>20), stalked jellyfish (3), *Hormathia* anemone (3), *Lithothamnion* (15%), *Desmarestia* (5%)
SAC	2	47 30.914	55 36.158	50	Hard					5%		95%				sand dollar (>20), *Hormathia* anemone (>20), spiny sun star (1), *Asterias* sea star (1), green sea urchin (1), unidentified flounder (1), infaunal burrow (7), *Lithothamnion* (<5%), *Desmarestia* (<5%)
SAC	3	47 30.939	55 36.087	52	Hard					<5%		100%				*Hormathia* anemone (>20), sand dollar (>20), green sea urchin (16), toad crab (1), unidentified tube worm (6), infaunal burrow (>20), *Lithothamnion* (<5%)
SAC	4	47 30.965	55 36.010	42	Hard					5%	30%	65%				*Hormathia* anemone (1), green sea urchin (8), Atlantic scallop (1), hermit crab (1), infaunal burrows (>20), *Lithothamnion* (<5%), dulse (<5%)
SAC	5	47 30.984	55 35.936	26	Hard	80%		<5%			5%	15%				Atlantic scallop (1), sand dollar (2), *Asterias* sea star (1), *Lithothamnion* (45%), sea colander (5%), *Desmarestia* (5%), dulse (10%)
SAC	6	47 31.006	55 35.873	16	Hard			5%	10%	75%	10%					green sea urchin (1), *Lithothamnion* (15%), sea colander (85%)
SAC	7	47 31.035	55 35.794	9	Hard			85%			5%	10%				*Lithothamnion* (15%), *Desmarestia* (65%)
SAC	8	47 31.045	55 35.730	7	Hard			35%	15%	20%	15%	15%				green sea urchin (5), *Metridium* anemone (1), *Lithothamnion* (10%), *Desmarestia* (80%), sea colander (5%)
SAC	9	47 31.063	55 35.639	3	Hard		70%	5%	10%		15%					green sea urchin (>20), *Lithothamnion* (5%),

Salmonier Cove																
Station		**Coordinates (NAD83)**		**Depth (m)**	**Bottom Type**	**Bottom Type and Condition**										**Description, Comments and Observations [a]**
		Latitude	**Longitude**			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Desmarestia (75%)
SAC	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Too shallow to sample
SAC	11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Too shallow to sample
SAC	12	47 31.057	55 35.481	9	Hard			10%	15%	10%	25%	40%				*Asterias* sea star (1), *Saccharina* (45%), *Desmarestia* (10%), sea colander (30%)
SAC	13	47 31.037	55 35.539	15	Hard				10%	35%	30%	25%				*Asterias* sea star (1), ctenophore (1), sand dollar (>20), *Ulva* (45%), *Desmarestia* (10%), *Fucus* (<5%)
SAC	14	47 31.014	55 35.615	20	Hard					5%	15%	80%				sand dollar (>20), *Cerianthus* anemone (>20), *Metridium* anemone (4), Atlantic scallop (4), green sea urchin (19) *Desmarestia* (<5%), *Lithothamnion* (15%), *Hildenbrandia* (<5%)
SAC	15	47 30.994	55 35.681	27	Hard			5%	10%	35%	25%	25%				*Asterias* sea star (3), *Hormathia* anemone (2), sand dollar (2), *Cerianthus* anemone (1), green sea urchin (8), Atlantic scallop (1) *Melonanchora* sponge (<5%), *Lithothamnion* (45%), *Desmarestia* (<5%)
SAC	16	47 30.974	55 35.756	28	Hard					5%	35%	60%				sand dollar (>20), *Asterias* sea star (3), green sea urchin (2), Atlantic scallop (4), infaunal burrow (>20), *Lithothamnion* (<5%), *Desmarestia* (5%)
SAC	17	47 30.953	55 35.832	32	Hard				<5%	15%	25%	55%	5%			*Asterias* sea star (2), sand dollar (>20), infaunal burrow (>20), *Lithothamnion* (5%), *Desmarestia* (5%)
SAC	18	47 30.935	55 35.903	46	Hard					15%	35%	45%	5%			sand dollar (>20), green sea urchin (>20), *Hormathia* anemone (5), infaunal burrow (>20), unidentified

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																tube worm (1), *Lithothamnion* (5%), dulse (<5%), *Desmarestia* (5%)
SAC	19	47 30.913	55 35.973	56	Soft						<5%	35%	65%			green sea urchin (>20), *Hormathia* anemone (4), stalked jellyfish (2), infaunal burrow (14)
SAC	20	47 30.893	55 36.052	56	Soft							15%	85%			green sea urchin (9), dulse (<5%)
SAC	21	47 30.870	55 36.120	54	Hard					20%	35%	35%	10%			brittle star (5), *Hormathia* anemone (>20), sand dollar (>20), stalked jellyfish (2), toad crab (2), spiny sun star (1), unidentified tube worm (1)
SAC	22	47 30.850	55 36.200	45	Hard					5%	45%	50%				brittle star (>20), *Asterias* sea star (3), green sea urchin (1), *Lithothamnion* (25%)
SAC	23	47 30.802	55 36.173	46	Hard					5%	30%	65%				*Asterias* sea star (1), brittle star (>20), sand dollar (>20), Geodiidae sponge (1), *Hormathia* anemone (6), green sea urchin (1), infaunal burrow (>20), *Lithothamnion* (10%)
SAC	24	47 30.823	55 36.095	53	Hard					5%	10%	85%				*Hormathia* anemone (>20), sand dollar (7), *Crangon* shrimp (1), toad crab (1), infaunal burrows (>20), *Lithothamnion* (<5%)
SAC	25	47 30.842	55 36.030	59	Hard						5%	95%	<5%			*Hormathia* anemone (>20), sand dollar (12), green sea urchin (2), snow crab (1), infaunal burrow (>20)
SAC	26	47 30.866	55 35.939	60	Soft							5%	95%			*Asterias* sea star (1), green sea urchin (10), sand dollar (9), *Hormathia* anemone (2), infaunal burrow (12)
SAC	27	47 30.884	55 35.872	56	Soft					<5%	<5%	15%	85%			green sea urchin (>20), snow crab (1), *Hormathia*

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																anemone (3), *Metridium* anemone (1), hermit crab (1), infaunal burrow (>20), *Lithothamnion* (<5%)
SAC	28	47 30.902	55 35.800	47	Soft						10%	15%	75%			brittle star (>20), green sea urchin (3), sand dollar (>20), *Hormathia* anemone (>20), infaunal burrow (>20)
SAC	29	47 30.928	55 35.726	40	Hard				<5%	10%	25%	55%	10%			*Asterias* sea star (1), green sea urchin (1), sand dollar (8), *Cerianthus* anemone (1), *Stomphia* anemone (1), *Hormathia* anemone (3), infaunal burrow (>20), *Lithothamnion* (<5%), *Hildenbrandia* (<5%), *Desmarestia* (5%)
SAC	30	47 30.950	55 35.653	40	Soft						15%	50%	35%			*Asterias* sea star (1), sand dollar (7), *Cerianthus* anemone (1), green sea urchin (2), hermit crab (1), infaunal burrow (>20)
SAC	31	47 30.966	55 35.583	34	Soft						<5%	15%	85%			sand dollar (1), *Asterias* sea star (8), green sea urchin (>20), rock crab (1), Atlantic scallop (2)
SAC	32	47 30.989	55 35.505	22	Hard						15%	85%				sand dollar (>20), green sea urchin (>20), Atlantic scallop (1), ctenophore (1), infaunal burrow (17), *Desmarestia* (30%), *Ulva* (<5%)
SAC	33	47 31.004	55 35.445	13	Hard			10%		5%	30%	55%				sand dollar (3), *Cerianthus* anemone (2), *Asterias* sea star (2), rock crab (1), *Metridium* anemone (>20), green sea urchin (>20), *Lithothamnion* (10%), *Desmarestia* (10%), *Ulva* (<5%)
SAC	34	47 30.956	55 35.421	5	Hard			60%	10%		15%	15%				green sea urchin (>20), *Asterias* sea star (3), ctenophore (1), *Lithothamnion* (45%),

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Desmarestia (15%), *Ulva* (5%), *Saccharina* (<5%)
SAC	35	47 30.938	55 35.482	33	Hard					30%	15%	50%	5%			sand dollar (7), rock crab (3), Atlantic scallop (3), American plaice (1), *Lithothamnion* (35%), *Desmarestia* (<5%)
SAC	36	47 30.914	55 35.555	42	Soft						20%	65%	15%			sand dollar (>20), hermit crab (1), *Asterias* sea star (5), green sea urchin (2), *Desmarestia* (10%), *Ulva* (<5%)
SAC	37	47 30.900	55 35.620	43	Soft							55%	45%			sand dollar (>20), *Asterias* sea star (3), green sea urchin (3), sculpin (1), American plaice (1), infaunal burrow (>20)
SAC	38	47 30.875	55 35.696	37	Hard				5%	15%	35%	45%				brittle star (>20), *Asterias* sea star (3), sand dollar (3), green sea urchin (3), whelk (>20), infaunal burrow (>20), *Desmarestia* (10%)
SAC	39	47 30.852	55 35.765	34	Hard		65%					25%	10%			*Asterias* sea star (2), brittle star (>20), hermit crab (1), sand dollar (>20), *Lithothamnion* (30%), *Hildenbrandia* (5%)
SAC	40	47 30.833	55 35.837	52	Soft							5%	95%			green sea urchin (>20), sand dollar (3), snow crab (1), infaunal burrow (>20)
SAC	41	47 30.815	55 35.911	50	Soft							15%	85%			sand dollar (>20), green sea urchin (9), hermit crab (1), *Hormathia* anemone (1), infaunal burrow (>20)
SAC	42	47 30.795	55 35.993	41	Hard					25%	30%	40%	5%			*Hormathia* anemone (7), green sea urchin (14), *Cerianthus* anemone (3), *Asterias* sea star (1), infaunal burrow (>20), *Lithothamnion* (15%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)
SAC	43	47 30.776	55 36.063	45	Hard			<5%	10%	15%	25%	50%				*Asterias* sea star (1), *Cerianthus* anemone (3), green sea urchin (4),

Salmonier Cove															
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition									Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Hormathia anemone (1), *Melonanchora* sponge (<5%), American plaice (1), *Lithothamnion* (10%), *Hildenbrandia* (<5%), *Desmarestia* (5%)
SAC	44	47 30.752	55 36.131	40	Hard					25%	30%	45%				green sea urchin (3), *Asterias* sea star (2), blood star (2), sand dollar (1), *Hormathia* anemone (2), unidentified tube worm (1), infaunal burrow (6), *Lithothamnion* (10%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)
SAC	45	47 30.704	55 36.111	29	Hard				5%	40%	25%	30%				stalked jellyfish (1), green sea urchin (2), *Asterias* sea star (3), sand dollar (3), Icelandic scallop (1), *Lithothamnion* (25%), *Hildenbrandia* (<5%), *Desmarestia* (10%), dulse (5%)
SAC	46	47 30.717	55 36.040	25	Hard				5%	25%	30%	40%				stalked jellyfish (2), *Melonanchora* sponge (<5%), blood star (2), *Asterias* sea star (4), green sea urchin (9), *Cerianthus* anemone (2), *Lithothamnion* (25%), dulse (5%), sea colander (<5%), *Desmarestia* (<5%)
SAC	47	47 30.737	55 35.965	28	Hard			<5%	5%	40%	35%	20%				green sea urchin (15), blood star (4), *Asterias* sea star (4), *Metridium* anemone (2), *Cerianthus* anemone (2), *Lithothamnion* (30%), *Hildenbrandia* (<5%), dulse (<5%)
SAC	48	47 30.759	55 35.886	36	Hard				<5%	10%	20%	70%		<5%		green sea urchin (>20), blood star (1), *Asterias*sea star (3), *Cerianthus* anemone (2), infaunal burrow (>20),

Salmonier Cove																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Lithothamnion (<5%)
SAC	49	47 30.779	55 35.817	44	Soft						5%	95%				sand dollar (1), green sea urchin (6), *Cerianthus* anemone (1), blood star (1)
SAC	50	47 30.791	55 35.743	42	Soft				<5%	<5%			55%	15%	30%	*Metridium* anemone (1)
SAC	51	47 30.819	55 35.671	40	Soft							45%	55%	<5%		ocean pout (1)
SAC	52	47 30.836	55 35.598	41	Soft							85%	15%			*Metridium* anemone (1), *Asterias* sea star (3)
SAC	53	47 30.864	55 35.518	42	Hard						45%	35%	20%			*Asterias* sea star (1), green sea urchin (1), *Cerianthus* anemone (1), unidentified tube worm (1), *Lithothamnion* (<5%), *Hildenbrandia* (<5%)
SAC	54	47 30.890	55 35.450	27	Hard						45%	55%				*Cerianthus* anemone (4)
SAC	55	47 30.899	55 35.413	12	Hard				25%	10%	25%	40%				cunner (3), *Asterias* sea star (5), *Lithothamnion* (<5%) *Saccharina* (75%), sea colander (15%)
SAC	56	47 30.849	55 35.345	7	Hard			<5%		20%	60%	20%				green sea urchin (3), *Asterias* sea star (2), *Desmarestia* (65%), *Saccharina* (10%)
SAC	57	47 30.838	55 35.416	15	Hard					10%	75%	15%				blood star (1), green sea urchin (4), *Asterias* sea star (1), *Lithothamnion* (65%), sea colander (5%)
SAC	58	47 30.817	55 35.492	32	Hard					10%	65%	25%				*Asterias* sea star (5), blood star (1), Atlantic scallop (1), *Lithothamnion* (5%), *Hildenbrandia* (<5%)
SAC	59	47 30.798	55 35.562	40	Soft							20%	70%	5%	5%	*Desmarestia* (5%)
SAC	60	47 30.774	55 35.638	41	Soft	30%	10%	5%					40%	5%	10%	green sea urchin (>20), *Lithothamnion* (10%)
SAC	61	47 30.755	55 35.709	43	Soft								85%	15%		
SAC	62	47 30.733	55 35.779	38	Hard						25%	30%	45%			green sea urchin (4), *Asterias* sea star (5), *Hormathia* anemone (1), sculpin (1), infaunal burrow (>20)
SAC	63	47 30.718	55 35.851	31	Hard					10%	35%	30%	25%			*Asterias* sea star (9), green sea urchin (19), *Hormathia* anemone

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(13), *Lithothamnion* (10%)
SAC	64	47 30.692	55 35.934	26	Hard							90%	10%			green sea urchin (3), *Asterias* sea star (8), sand dollar (>20), infaunal burrow (>20)
SAC	65	47 30.671	55 36.013	26	Hard					5%	20%	75%				sand dollar (>20), *Asterias* sea star (5), green sea urchin (>20), Atlantic scallop (1), infaunal burrow (>20), *Lithothamnion* (<5%)
SAC	66	47 30.653	55 36.090	27	Hard					<5%	15%	85%				green sea urchin (8), *Asterias* sea star (4), Atlantic scallop (1), sand dollar (>20), infaunal burrow (>20), *Lithothamnion* (<5%), *Desmarestia* (<5%)
SAC	67	47 30.604	55 36.050	16	Hard					5%	15%	80%				*Asterias* sea star (2), green sea urchin (>20), sand dollar (>20), infaunal burrow (>20), *Lithothamnion* (<5%), *Desmarestia* (15%), sea colander (<5%)
SAC	68	47 30.621	55 35.981	17	Hard							100%				green sea urchin (1), sand dollar (>20), infaunal burrow (>20), *Desmarestia* (5%), *Ulva* (<5%)
SAC	69	47 30.648	55 35.905	19	Hard					<5%	10%	90%				*Asterias* sea star (13), green sea urchin (11), blood star (3), sand dollar (>20), infaunal burrow (>20), *Desmarestia* (<5%), *Ulva* (<5%)
SAC	70	47 30.666	55 35.826	22	Hard				<5%	10%	25%	65%				green sea urchin (14), *Asterias* sea star (>20), sand dollar (>20), infaunal burrow (>20), *Lithothamnion* (<5%), *Desmarestia* (5%)
SAC	71	47 30.689	55 35.757	26	Hard				<5%	10%	30%	60%				*Asterias* sea star (>20), green sea urchin (>20), blood star (7), infaunal

Salmonier Cove															
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition									Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
															burrow (>20), *Lithothamnion* (<5%), *Desmarestia* (<5%)
SAC	72	47 30.704	55 35.679	29	Hard						15%	85%				*Asterias* sea star (14), green sea urchin (3), sand dollar (>20), infaunal burrow (>20), *Desmarestia* (<5%)
SAC	73	47 30.725	55 35.609	32	Soft						5%	70%	20%	5%		*Asterias* sea star (4), sand dollar (8), American plaice (1), infaunal burrow (11), *Desmarestia* (<5%)
SAC	74	47 30.748	55 35.534	35	Soft							55%	45%			*Asterias* sea star (5), green sea urchin (3), infaunal burrow (>20)
SAC	75	47 30.765	55 35.466	30	Hard					10%	65%	25%				*Asterias* sea star (2), Atlantic scallop (2), green sea urchin (1), *Lithothamnion* (5%), *Hildenbrandia* (<5%)
SAC	76	47 30.790	55 35.395	14	Hard				<5%	10%	45%	45%				green sea urchin (9), *Asterias* sea star (8), *Lithothamnion* (15%), sea colander (10%)
SAC	77	47 30.810	55 35.314	12	Hard					10%	15%	75%				*Asterias* sea star (9), green sea urchin (1), Atlantic scallop (1), *Lithothamnion* (25%), *Hildenbrandia* (<5%), sea colander (10%)
SAC	78	47 30.752	55 35.280	10	Hard						35%	65%				*Asterias* sea star (6), sand dollar (3), infaunal burrow (>20), *Saccharina* (70%), sea colander (20%), *Desmarestia* (5%)
SAC	79	47 30.733	55 35.360	12	Hard						30%	70%				*Asterias* sea star (11), green crab (1), *Saccharina* (70%), sea colander (5%), *Desmarestia* (<5%)
SAC	80	47 30.715	55 35.429	15	Hard						<5%	100%				sand dollar (>20), *Asterias* sea star (2), Atlantic scallop (1), infaunal burrow (>20), *Desmarestia* (5%), sea colander (<5%), *Saccharina* (<5%)
SAC	81	47 30.697	55 35.511	17	Hard							100%				*Asterias* sea star (9),

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																sand dollar (>20), green sea urchin (1), *Desmarestia* (10%)
SAC	82	47 30.674	55 35.578	16	Hard							100%				*Asterias* sea star (3), sand dollar (>20), infaunal burrow (>20), *Desmarestia* (15%)
SAC	83	47 30.654	55 35.649	16	Hard					10%	15%	75%				*Asterias* sea star (17), sand dollar (>20), *Desmarestia* (25%),
SAC	84	47 30.634	55 35.723	17	Hard	<5%				10%	50%	40%				*Asterias* sea star (>20), green sea urchin (7), *Lithothamnion* (25%), *Desmarestia* (15%), sea colander (5%), *Saccharina* (<5%)
SAC	85	47 30.610	55 35.803	16	Hard							100%				*Asterias* sea star (2), sand dollar (>20), infaunal burrow (>20), *Desmarestia* (15%), *Ulva* (<5%), *Saccharina* (<5%)
SAC	86	47 30.592	55 35.875	11	Hard						<5%	100%				*Asterias* sea star (1), sand dollar (9), infaunal burrow (>20), *Ulva* (<5%), *Desmarestia* (30%), *Saccharina* (20%), sea colander (<5%)
SAC	87	47 30.572	55 35.940	7	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Asterias* sea star (18), cunner (1), *Saccharina* (100%), *Desmarestia* (<5%)
SAC	88	47 30.559	55 35.994	4	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Asterias* sea star (6), *Saccharina* (100%)
SAC	89	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station too shallow to sample
SAC	90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station too shallow to sample
SAC	91	47 30.568	55 35.780	5	Hard		100%									*Asterias* sea star (8), *Saccharina* (50%), sea colander (25%), *Desmarestia* (25%)
SAC	92	47 30.587	55 35.706	5	Hard					100%						*Chorda* (40%), *Desmarestia* (40%), *Saccharina* (15%)
SAC	93	47 30.611	55 35.632	4	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Asterias* sea star (5), cunner (1), *Saccharina* (95%), *Desmarestia* (<5%)
SAC	94	47 30.620	55 35.552	7	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Asterias* sea star (5),

Salmonier Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																sand dollar (>20), American plaice (1), *Desmarestia* (15%), *Saccharina* (70%), *Ulva* (<5%)
SAC	95	47 30.642	55 35.484	10	Hard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	*Asterias* sea star (18), *Saccharina* (35%), *Desmarestia* (55%), sea colander (10%)
SAC	96	47 30.667	55 35.409	10	Hard				10%	25%	20%	45%				*Asterias* sea star (3), rock crab (1) sand dollar (10), *Saccharina* (20%), *Desmarestia* (35%), sea colander (25%)
SAC	97	47 30.687	55 35.330	9	Hard						5%	95%				*Asterias* sea star (3), infaunal burrow (2), *Saccharina* (80%), *Desmarestia* (10%), sea colander (<5%)
SAC	98	47 30.708	55 35.257	8	Hard					10%	25%	65%				sand dollar (6), *Asterias* sea star (2), *Saccharina* (10%), *Desmarestia* (55%)

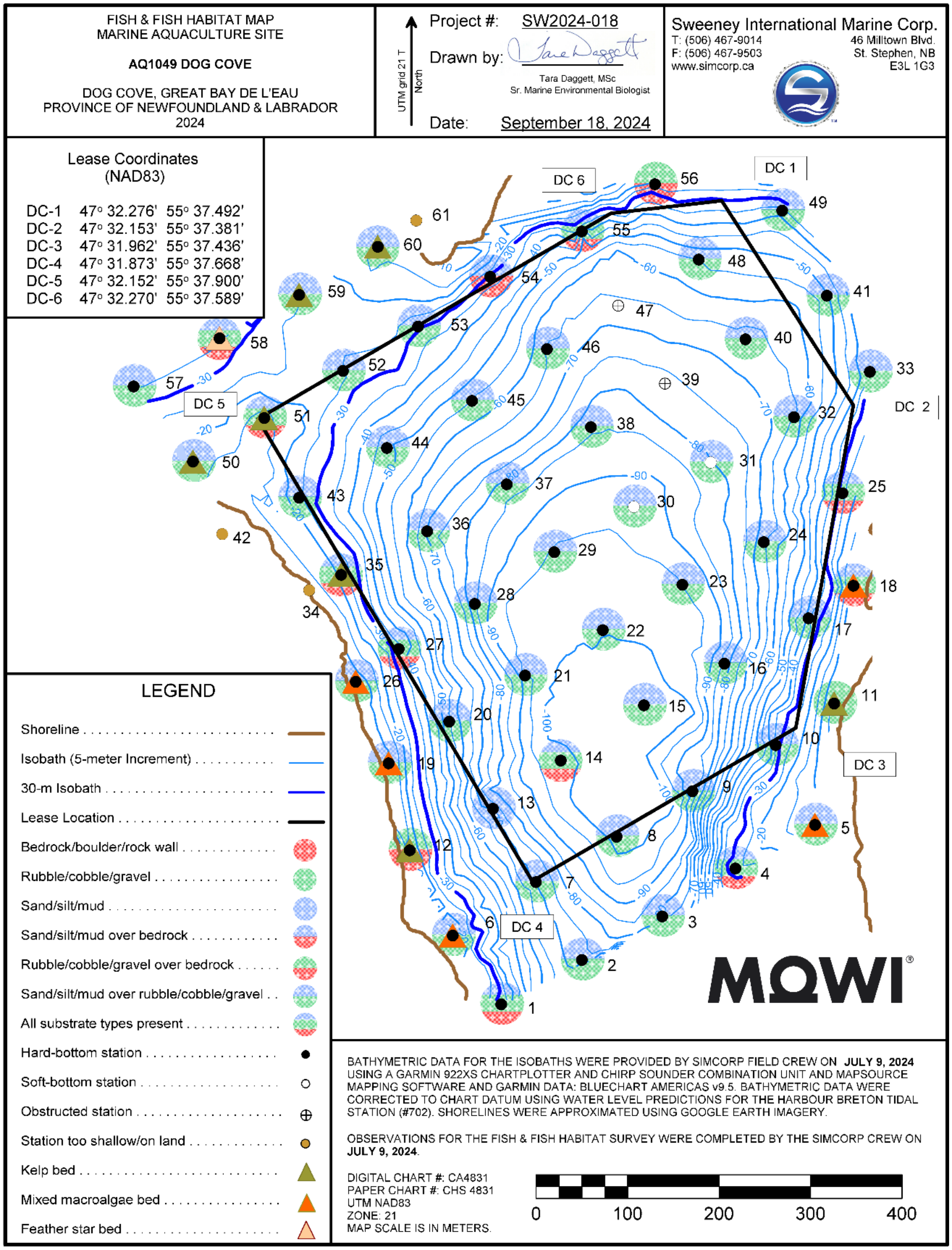


Figure 7.7. Habitat observations at sampling stations in the Dog Cove sea farm (July 2024).

Table 7.4. Summary of bottom type and observed flora and fauna at the Dog Cove sea farm (July 2024).

Dog Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
DOG	1	47 31.800	55 37.697	31	Hard	15%		35%	15%			35%				encrusting sponge (<5%), *Asterias* sea star (2), *Lithothamnion* (25%), *Hildenbrandia* (<5%), unidentified Rhodophyta (15%), dulse (<5%), *Saccharina* (5%), sea colander (<5%), *Ulva* (<5%)
DOG	2	47 31.826	55 37.626	74	Hard					5%	75%	5%	15%			*Hormathia* anemone (2), feather star (16), infaunal burrow (1)
DOG	3	47 31.851	55 37.555	78	Hard					10%	40%	45%	5%			brittle star (3), arrow worm (2), Geodiiae sponge (1)
DOG	4	47 31.879	55 37.491	26	Hard		20%	5%	15%	20%	5%	35%				*Asterias* sea star (1), Icelandic scallop (2), ctenophore (1), *Lithothamnion* (15%), *Hildenbrandia* (<5%), *Desmarestia* (25%), unidentified Rhodophyta (10%), dulse (<5%)
DOG	5	47 31.904	55 37.421	12	Hard					10%	15%	75%				*Asterias* sea star (1) *Lithothamnion* (<5%), *Desmarestia* (10%), *Saccharina* (80%), sea colander (5%)
DOG	6	47 31.842	55 37.738	16	Hard			<5%	15%	25%	15%	45%				*Asterias* sea star (1), cunner (1), *Lithothamnion* (10%), *Saccharina* (15%), sea colander (65%)
DOG	7	47 31.873	55 37.665	73	Hard						25%	65%	10%			feather star (1), *Hormathia* anemone (8), *Melonanchora* sponge (<5%), ctenophore (2)
DOG	8	47 31.899	55 37.594	101	Hard					55%	25%	10%	10%			brittle star (>20), arrow worm (2), *Asterias* sea star (3), *Hormathia* anemone (1), *Stomphia* anemone (3), *Cerianthus* anemone (1)
DOG	9	47 31.925	55 37.527	95	Hard						25%	45%	30%			*Hormathia* anemone (>20), *Pandalus* shrimp (2), brittle star (3), arrow worm (1)
DOG	10	47 31.952	55 37.454	35	Hard			<5%	<5%	25%	30%	45%				*Hormathia* anemone (2), encrusting sponge (<5%), *Lithothamnion* (<5%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)
DOG	11	47 31.976	55 37.402	3	Hard					50%	50%					cunner (14), *Saccharina* (80%), *Desmarestia* (<5%), sea colander (<5%)
DOG	12	47 31.893	55 37.774	15	Hard			25%	15%	60%						cunner (6), *Lithothamnion* (15%), sea colander (55%), Saccharina (5%), *Desmarestia* (<5%)
DOG	13	47 31.917	55 37.701	75	Hard					<5%	<5%	75%	25%			*Hormathia* anemone (>20)
DOG	14	47 31.945	55 37.641	99	Hard			25%		15%	<5%	45%	15%			*Hormathia* anemone (>20), brittle star (1), *Pandalus* shrimp (3),

Dog Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Geodiiae sponge (>20)
DOG	15	47 31.977	55 37.568	103	Hard					10%	75%	5%	10%			*Hormathia* anemone (>20), *Asterias* sea star (3), brittle star (>20), arrow worm (3), *Crangon* shrimp (6)
DOG	16	47 32.001	55 37.497	82	Hard					10%	50%	15%	25%			*Hormathia* anemone (>20), brittle star (2), *Crangon* shrimp (9), *Pandalus* shrimp (4), *Cerianthus* anemone (1), eelpout (1)
DOG	17	47 32.027	55 37.423	40	Hard					40%	50%	10%	<5%			*Asterias* sea star (1), Ctenophore (1), *Lithothamnion* (<5%), *Desmarestia* (<5%)
DOG	18	47 32.046	55 37.384	10	Hard			35%	15%	10%		40%				*Asterias* sea star (2), unidentified flatfish (1), *Stomphia* anemone (1), *Lithothamnion* (30%), *Hildenbrandia* (<5%), *Desmarestia* (10%), sea colander (20%), *Saccharina* (45%)
DOG	19	47 31.945	55 37.791	10	Hard				40%	20%	10%	30%				cunner (7), *Asterias* sea star (5), *Metridium* anemone (2), *Lithothamnion* (5%), *Saccharina* (75%), sea colander (10%), *Desmarestia* (10%)
DOG	20	47 31.969	55 37.738	54	Hard				<5%	10%	45%	35%	10%			*Asterias* sea star (1), *Gersemia* soft coral (2), eelpout (1), *Lithothamnion* (<5%)
DOG	21	47 31.996	55 37.671	90	Hard					5%	40%	35%	20%			*Hormathia* anemone (>20), *Crangon* shrimp (>20), *Pandalus* shrimp (2)
DOG	22	47 32.022	55 37.603	101	Hard						30%	40%	30%			*Hormathia* anemone (>20), brittle star (11), polar star (1), *Pandalus* shrimp (1)
DOG	23	47 32.048	55 37.533	98	Hard					5%	40%	20%	35%			brittle star (16), *Hormathia* anemone (>20), *Asterias* sea star (2), *Pandalus* shrimp (8), arrow worm (1), *Desmarestia* (<5%)
DOG	24	47 32.073	55 37.461	67	Hard					25%	55%	15%	5%			*Asterias* sea star (4), *Pandalus* shrimp (2), *Hormathia* anemone (2), *Desmarestia* (<5%)
DOG	25	47 32.101	55 37.392	29	Hard	10%	35%			15%	15%	20%	5%			Atlantic scallop (1), *Hormathia* anemone (3), ctenophore (2), feather star (1), *Lithothamnion* (<5%), *Hildenbrandia* (5%), *Desmarestia* (<5%)
DOG	26	47 31.994	55 37.819	8	Hard					10%	65%	25%				cunner (5), sea colander (<5%), *Saccharina* (75%), *Desmarestia* (10%)
DOG	27	47 32.013	55 37.781	33	Hard		15%		10%	25%	35%	15%	<5%			*Melonanchora* sponge (<5%), Atlantic scallop (4), ctenophore

Dog Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(1), polar star (2), *Lithothamnion* (10%), *Hildenbrandia* (<5%), unidentified Rhodophyta (10%), dulse (<5%)
DOG	28	47 32.039	55 37.714	84	Hard				<5%	35%	30%	15%	20%			*Hormathia* anemone (>20), *Cerianthus* anemone (1), *Gersemia* soft coral (1), *Crangon* shrimp (1), arrow worm (7)
DOG	29	47 32.069	55 37.644	97	Hard						15%	75%	10%			eelpout (1), brittle star (2), *Crangon* shrimp (14), *Pandalus* shrimp (4), *Hormathia* anemone (2)
DOG	30	47 32.095	55 37.574	94	Soft						5%	85%	10%			*Hormathia* anemone (>20), *Crangon* shrimp (>20), *Pandalus* shrimp (5)
DOG	31	47 32.121	55 37.506	83	Soft					<5%	25%	30%	45%			*Pandalus* shrimp (2), *Crangon* shrimp (1)
DOG	32	47 32.147	55 37.433	65	Hard					35%	35%	20%	10%			rock crab (1), arrow worm (2)
DOG	33	47 32.173	55 37.366	36	Hard				10%	40%	25%	20%	5%			unidentified sponge (1), eelpout (1), Atlantic scallop (2), ctenophore (2), *Lithothamnion* (20%), *Hildenbrandia* (<5%)
DOG	34	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station Located on Land
DOG	35	47 32.058	55 37.830	20	Hard			20%	20%	15%	20%	25%				blood star (1), *Asterias* sea star (3), *Melonanchora* sponge (<5%), *Lithothamnion* (35%), sea colander (35%), *Saccharina* (25%), unidentified Rhodophyta (5%)
DOG	36	47 32.083	55 37.754	74	Hard					25%	45%	20%	10%			*Asterias* sea star (2), brittle star (2), *Hormathia* anemone (>20), *Crangon* shrimp (3), *Melonanchora* sponge (<5%), Atlantic scallop (1), *Cerianthus* anemone (1)
DOG	37	47 32.110	55 37.684	83	Hard					50%	40%	10%				brittle star (4), *Crangon* shrimp (>20), Atlantic scallop (1), blood star (1), *Hormathia* anemone (15), *Cerianthus* anemone (5), arrow worm (5)
DOG	38	47 32.143	55 37.610	85	Hard					<5%	20%	65%	15%			*Hormathia* anemone (5), *Crangon* shrimp (>20), arrow worm (>20), *Pandalus* shrimp (1)
DOG	39	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Cage Obstruction
DOG	40	47 32.194	55 37.474	68	Hard					5%	20%	50%	25%			*Hormathia* anemone (7), arrow worm (1), *Crangon* shrimp (>20), *Pandalus* shrimp (2)
DOG	41	47 32.219	55 37.402	53	Hard					45%	35%	15%	5%			*ormathia* anemone (2), *Cerianthus* anemone (1), *Asterias* sea star (1), *Crangon* shrimp (>20), ctenophore (1), *Lithothamnion* (15%)

Dog Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
DOG	42	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station located on land
DOG	43	47 32.104	55 37.865	25	Hard				5%	15%	25%	55%				*Hormathia* anemone (2), *Cerianthus* anemone (1), *Asterias* sea star (1), *Crangon* shrimp (>20), ctenophore (1), *Lithothamnion* (15%)
DOG	44	47 32.133	55 37.788	49	Hard					5%	75%	20%				
DOG	45	47 32.160	55 37.713	55	Hard						75%	25%				
DOG	46	47 32.190	55 37.647	65	Hard						40%	55%	5%			
DOG	47	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Cage Obstruction
DOG	48	47 32.242	55 37.513	57	Hard				<5%	15%	25%	60%				*Hormathia* anemone (5), Icelandic scallop (1), *Lithothamnion* (<5%), *Desmarestia* (<5%)
DOG	49	47 32.270	55 37.440	39	Hard			<5%	5%	15%	20%	55%	5%			*Gersemia* soft coral (2), *Metridium* anemone (2), ctenophore (2), *Lithothamnion* (5%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)
DOG	50	47 32.127	55 37.957	16	Hard				<5%	45%	45%	10%				ctenophore (1), Atlantic scallop (1), *Lithothamnion* (20%), *Hildenbrandia* (<5%), *Saccharina* (35%), sea colander (45%), *Desmarestia* (<5%)
DOG	51	47 32.152	55 37.894	14	Hard		<5%	5%	5%	25%	30%	35%				*Asterias* sea star (1), orange encrusting sponge (<5%), *Lithothamnion* (25%), *Hildenbrandia* (<5%), sea colander (65%), *Saccharina* (25%), unidentified Rhodophyta (<5%)
DOG	52	47 32.179	55 37.825	27	Hard				5%	15%	45%	35%				Atlantic scallop (6), Icelandic scallop (1), unidentified yellow encrusting sponge (<5%), unidentified sponge (1), *Lithothamnion* (30%), *Hildenbrandia* (5%), unidentified Rhodophyta (30%), sea colander (<5%), *Saccharina* (<5%)
DOG	53	47 32.205	55 37.759	29	Hard				5%	25%	30%	40%				Atlantic scallop (1), Icelandic scallop (3), ctenophore (1), *Lithothamnion* (20%), *Hildenbrandia* (<5%), unidentified Rhodophyta (15%), sea colander (5%), *Saccharina* (<5%), dulse (<5%)
DOG	54	47 32.234	55 37.695	31	Hard		65%					25%	10%			*Melonanchora* sponge (<5%), *Hormathia* anemone (2), ctenophore (1), *Lithothamnion* (35%), *Hildenbrandia* (5%), unidentified Rhodophyta (15%), sea colander (<5%)

Dog Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
DOG	55	47 32.260	55 37.615	41	Hard	35%				5%	25%	35%				Atlantic scallop (2), ctenophore (1), *Hormathia* anemone (8), sun star (1), *Gersemia* soft coral (5), *Melonanchora* sponge (<5%), *Lithothamnion* (10%), *Hildenbrandia* (<5%)
DOG	56	47 32.287	55 37.550	30	Hard	20%	20%	25%	25%	10%		<5%				Asterias sea star (1), *Melonanchora* sponge (<5%), *Lithothamnion* (55%), *Hildenbrandia* (<5%), sea colander (20%), unidentified Rhodophyta (20%), dulse (5%)
DOG	57	47 32.172	55 38.008	36	Hard					25%	45%	30%				brittle star (5), feather star (4), *Asterias* sea star (1), *Crangon* shrimp (2), ctenophore (1), *Lithothamnion* (15%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)
DOG	58	47 32.200	55 37.932	36	Hard		<5%	10%	25%	30%	20%	15%				feather star (>20), *Pandalus* shrimp (1), Atlantic scallop (3), green sea urchin (1), *Lithothamnion* (30%), *Hildenbrandia* (<5%), unidentified Rhodophyta (5%)
DOG	59	47 32.225	55 37.862	26	Hard				<5%	55%	35%	10%				Atlantic scallop (1), Icelandic scallop (4), *Melonanchora* sponge (<5%), *Lithothamnion* (40%), *Hildenbrandia* (<5%), sea colander (65%), unidentified Rhodophyta (<5%)
DOG	60	47 32.253	55 37.793	13	Hard					10%	15%	75%				*Asterias* sea star (1), *Lithothamnion* (<5%), sea colander (45%), *Saccharina* (10%), *Desmarestia* (5%)
DOG	61	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Station located on land

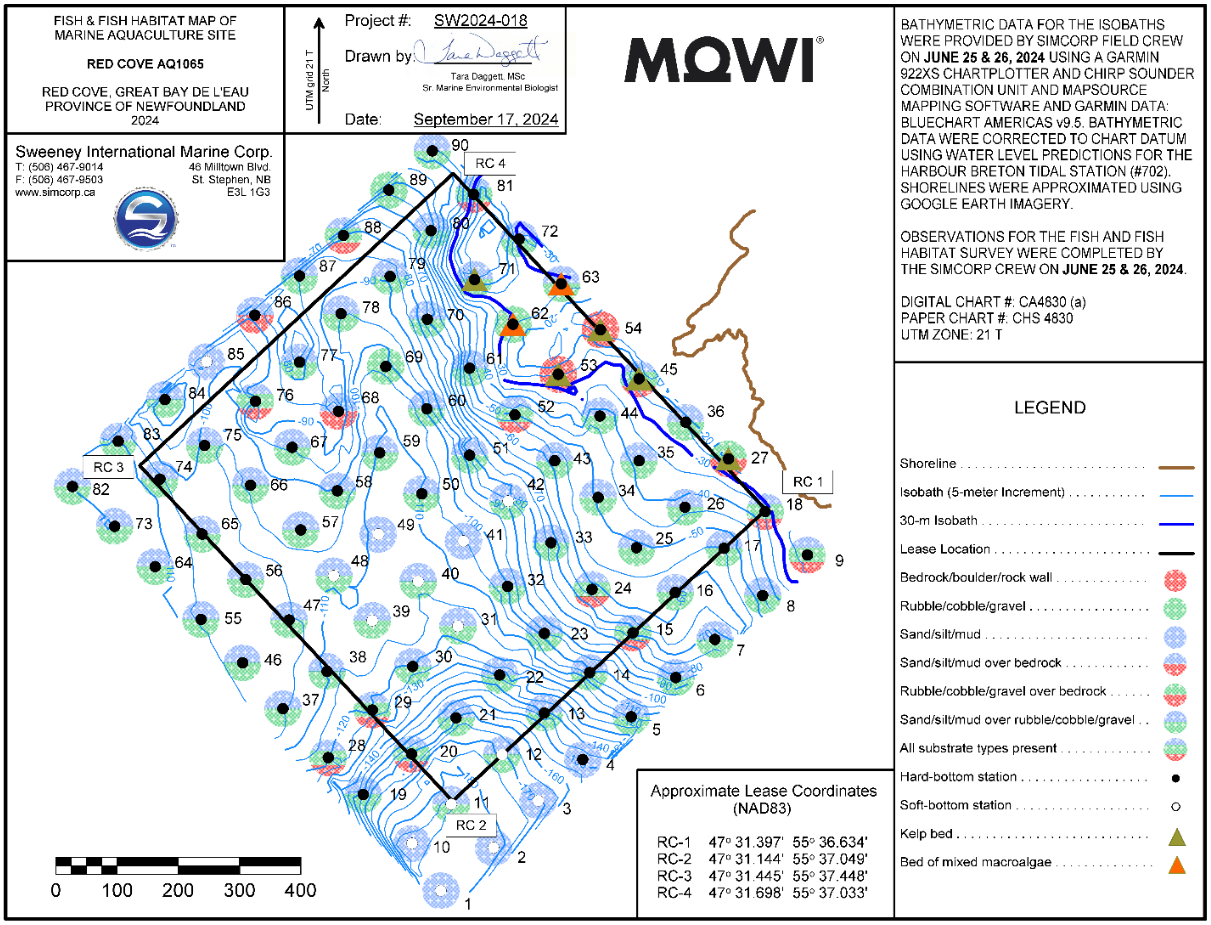


Figure 7.8. Habitat observations at sampling stations in the Red Cove sea farm (June 2024).

Table 7.5. Summary of bottom type and observed flora and fauna at the Red Cove sea farm (June 2024).

Red Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
RED	1	47 31.066	55 37.066	184	Soft							30%	70%			arrow worm (6), *Asterias* sea star (1), krill (>20), *Pandalus* shrimp (1)
RED	2	47 31.103	55 36.996	182	Soft							30%	70%			arrow worm (4), krill (>20), *Pandalus* shrimp (2), snow crab (1)
RED	3	47 31.144	55 36.937	170	Soft							40%	60%			arrow worm (2), krill (>20), *Pandalus* shrimp (6)
RED	4	47 31.179	55 36.878	149	Hard							60%	40%			arrow worm (12), Geodiidae sponge (10), *Hormathia* anemone (>20), *Pandalus* shrimp (4)
RED	5	47 31.216	55 36.814	114	Hard				5%	10%	20%	40%	25%			arrow worm (1), Geodiidae sponge (>20), *Hormathia* anemone (>20)
RED	6	47 31.250	55 36.755	84	Hard					10%	25%	50%	15%			arrow worm (3), feather star (2), Geodiidae sponge (>20), *Hormathia* anemone (>20), krill (2)
RED	7	47 31.283	55 36.703	74	Hard				5%	30%	20%	35%	10%			Geodiidae sponge (>20), *Hormathia* anemone (16), Atlantic scallop (1), whelk (1), *Desmarestia* (<5%), *Lithothamnion* (<5%)
RED	8	47 31.321	55 36.640	45	Hard				15%	45%	20%	15%	5%			ctenophore (7), Geodiidae sponge (>20), *Hormathia* anemone (2), yellow encrusting sponge (<5%), *Hildenbrandia* (5%), *Lithothamnion* (25%)
RED	9	47 31.356	55 36.581	22	Hard		45%		5%	10%	15%	25%				ctenophore (1), *Lithothamnion* (75%), *Hildenbrandia* (<5%), sea colander (30%), *Desmarestia* (<5%)
RED	10	47 31.108	55 37.102	189	Soft							30%	70%			Atlantic cod (1), arrow worm (12), *Hormathia* anemone (1), krill (>20), *Pandalus* shrimp (1)
RED	11	47 31.142	55 37.050	185	Soft						10%	50%	40%			arrow worm (2), krill (>20), *Pandalus* shrimp (5), unidentified fish (1), *Desmarestia* (<5%), *Saccharina* (<5%), sea colander (10%)
RED	12	47 31.185	55 36.983	168	Soft						5%	50%	45%			arrow worm (3), krill (>20), *Pandalus* shrimp (2)
RED	13	47 31.221	55 36.927	141	Hard					5%	5%	55%	35%			arrow worm (3), Geodiidae sponge (>20), *Hormathia* anemone (>20), krill (2)
RED	14	47 31.256	55 36.867	101	Hard					10%	10%	50%	30%			arrow worm (3), *Asterias* sea star (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), krill (6), yellow encrusting sponge (<5%)
RED	15	47 31.290	55 36.810	73	Hard			5%	10%	15%	30%	30%	10%			feather star (>20), Geodiidae sponge (>20), *Hormathia* anemone (>20), Acadian redfish (1), yellow encrusting sponge (<5%), *Lithothamnion* (5%)
RED	16	47 31.325	55 36.754	60	Hard				5%	15%	40%	30%	10%			ctenophore (3), Geodiidae sponge (>20), *Hormathia* anemone (>20), whelk (4), *Lithothamnion* (5%)
RED	17	47 31.363	55 36.689	56	Hard				5%	10%	45%	40%				ctenophore (2), *Cerianthus* anemone (3), *Melonanchora* sponge (3)
RED	18	47 31.395	55 36.635	36	Hard			15%	10%	5%	30%	40%				ctenophore (1), cunner (1), *Hildenbrandia* (5%), *Lithothamnion* (20%), Rhodophyta (<5%), *Saccharina* (<5%), sea colander (5%)

Red Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
RED	19	47 31.152	55 37.165	152	Hard					15%	25%	35%	25%			*Hormathia* anemone (>20), Geodiidae sponge (>20), *Melonanchora* sponge (1), *Pandalus* shrimp (4), unidentified flatfish (2)
RED	20	47 31.187	55 37.101	156	Hard			15%		10%	10%	35%	30%			*Hormathia* anemone (>20), Geodiidae sponge (>20), *Pandalus* shrimp (5), krill (10)
RED	21	47 31.218	55 37.042	159	Hard					20%	5%	45%	30%			*Hormathia* anemone (>20), Geodiidae sponge (>20), krill (16), squid (1)
RED	22	47 31.255	55 36.984	133	Hard				10%	35%	10%	25%	20%			*Hormathia* anemone (>20), Geodiidae sponge (>20), arrow worm (1), krill (2), *Melonanchora* sponge (1), ctenophore (1)
RED	23	47 31.291	55 36.925	94	Hard					5%	25%	50%	20%			feather star (9), *Hormathia* anemone (>20), Geodiidae sponge (>20)
RED	24	47 31.329	55 36.862	61	Hard			20%	20%	20%	15%	20%	5%			feather star (>20), ctenophore (2), *Hormathia* anemone (7), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Lithothamnion* (40%)
RED	25	47 31.365	55 36.803	52	Hard				10%	30%	35%	25%				ctenophore (2), whelk (2), orange encrusting sponge (<5%), Geodiidae sponge (>20), *Lithothamnion* (30%), *Hildenbrandia* (<5%)
RED	26	47 31.400	55 36.739	48	Hard				35%	25%	25%	15%				ctenophore (2), Geodiidae sponge (>20), cunner (1), *Lithothamnion* (40%), *Hildenbrandia* (10%), sea colander (<5%), *Desmarestia* (15%)
RED	27	47 31.442	55 36.681	20	Hard			75%	25%							ctenophore (4), sea colander (95%), *Desmarestia* (<5%)
RED	28	47 31.185	55 37.209	121	Hard			5%	35%	35%	10%	10%	5%			*Hormathia* anemone (13), feather star (1), Geodiidae sponge (>20), *Asterias* sea star (1), *Melonanchora* sponge (4), *Cerianthus* anemone (1), yellow encrusting sponge (<5%)
RED	29	47 31.226	55 37.151	120	Hard			5%	35%	20%	20%	15%	5%			*Pandalus* shrimp (4), Geodiidae sponge (>20), ctenophore (1), white encrusting sponge (<5%), blood star (1), feather star (4), *Melonanchora* sponge (6), *Hormathia* anemone (11)
RED	30	47 31.264	55 37.097	122	Hard					10%	30%	40%	20%			*Hormathia* anemone (>20), cushion star (1), feather star (5), Geodiidae sponge (>20), yellow encrusting sponge (<5%), *Asterias* sea star (3), *Gersemia* soft coral (1)
RED	31	47 31.299	55 37.037	119	Soft					<5%	15%	60%	25%			*Hormathia* anemone (>20), Geodiidae sponge (3), *Melonanchora* sponge (1), infaunal burrow (>20), *Gersemia* soft coral (2), unidentified flatfish (1)
RED	32	47 31.333	55 36.972	102	Hard					10%	35%	45%	10%			*Hormathia* anemone (>20), feather star (5), yellow encrusting sponge (<5%), *Melonanchora* sponge (2), *Crangon* shrimp (5)
RED	33	47 31.371	55 36.914	75	Hard					10%	45%	35%	10%			*Hormathia* anemone (>20), *Asterias* sea star (1), feather star (2), *Crangon* shrimp (3), yellow encrusting sponge (<5%)
RED	34	47 31.410	55 36.852	51	Hard					25%	40%	35%	<5%			*Asterias* sea star (1), eelpout (1),

Red Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Lithothamnion (20%), *Hildenbrandia* (<5%)
RED	35	47 31.442	55 36.798	39	Hard				<5%	20%	55%	25%	<5%			Atlantic scallop (3), Icelandic scallop (1), *Cerianthus* anemone (1), *Asterias* sea star (1), American plaice (1), *Lithothamnion* (40%), *Hildenbrandia* (<5%), *Desmarestia* (5%)
RED	36	47 31.475	55 36.736	26	Hard					45%	40%	15%				Icelandic scallop (1), Atlantic scallop (1), *Lithothamnion* (45%), *Desmarestia* (5%), sea colander (30%)
RED	37	47 31.229	55 37.267	105	Hard				<5%	15%	40%	40%	5%			feather star (>20), brittle star (1), *Asterias* sea star (2), Geodiidae sponge (1), *ora* sponge (1), *Stomphia* anemone (1), breadcrumb sponge (<5%), yellow encrusting sponge (<5%)
RED	38	47 31.261	55 37.209	112	Hard					5%	20%	65%	10%			feather star (>20), *Cerianthus* anemone (1), *Asterias* sea star (1), spiny sun star (1), orange encrusting sponge (<5%), breadcrumb sponge (<5%), *Melonanchora* sponge (3)
RED	39	47 31.305	55 37.149	112	Soft					5%	15%	55%	25%			feather star (6), *Hormathia* anemone (>20), brittle star (1), Geodiidae sponge (6), *Gersemia* soft coral (2), *Cerianthus* anemone (1)
RED	40	47 31.339	55 37.088	114	Soft				<5%	<5%	5%	65%	30%			*Hormathia* anemone (>20), *Melonanchora* sponge (1), infaunal burrow (>20), breadcrumb sponge (<5%), *Gersemia* soft coral (2)
RED	41	47 31.374	55 37.028	104	Soft							55%	45%			infaunal burrow (>20), *Hormathia* anemone (>20), arrow worm (4), *Crangon* shrimp (3), *Melonanchora* sponge (1)
RED	42	47 31.408	55 36.969	87	Soft				<5%	10%	25%	40%	25%			infaunal burrow (>20), arrow worm (3), *Hormathia* anemone (>20), *Cerianthus* *ora* sponge (3), *Pandalus* shrimp (3), *Asterias* sea star (1)
RED	43	47 31.443	55 36.908	57	Hard				5%	15%	25%	45%	10%			*Hormathia* anemone (>20), infaunal burrow (>20), Icelandic scallop (1), spiny sun star (2), breadcrumb sponge (<5%), *Melonanchora* sponge (4), *Asterias* sea star (1), feather star (2), *Cerianthus* anemone (1), *Lithothamnion* (15%)
RED	44	47 31.482	55 36.848	42	Hard	<5%				15%	55%	25%	5%			moon jelly (2), lions mane jellyfish (1), Atlantic scallop (>20), Icelandic scallop (3), *Crangon* shrimp (1), yellow encrusting sponge (<5%), *Lithothamnion* (15%), *Hildenbrandia* (<5%), *Desmarestia* (5%), dulse (<5%)
RED	45	47 31.514	55 36.796	16	Hard	10%	65%			5%	10%	10%				moon jelly (>20), cunner (3), *Asterias* sea star (1), *Lithothamnion* (45%), sea colander (45%), *Desmarestia* (5%), *Saccharina* (5%)
RED	46	47 31.270	55 37.319	101	Hard				<5%	10%	25%	60%	5%			feather star (15), *Hormathia* anemone (2), *Melonanchora* sponge (3), infaunal burrow (4), arrow worm (1), yellow encrusting sponge (<5%)
RED	47	47 31.307	55 37.257	105	Hard					5%	15%	55%	25%			feather star (4), Geodiidae sponge (3), *Melonanchora* sponge (3), brittle star (4)

Red Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
RED	48	47 31.345	55 37.198	109	Soft						10%	55%	35%			*Hormathia* anemone (>20), *Gersemia* soft coral (1), Geodiidae sponge (>20), feather star (4), brittle star (5), infaunal burrow (1)
RED	49	47 31.381	55 37.139	112	Soft							45%	55%			moon jelly (>20), *Hormathia* anemone (>20), *Gersemia* soft coral (3), American plaice (1), *Crangon* shrimp (2), Geodiidae sponge (1), infaunal burrow (>20)
RED	50	47 31.416	55 37.081	109	Hard						10%	30%	60%			moon jelly (>20), *Hormathia* anemone (>20), arrow worm (3), infaunal burrow (>20), *Crangon* shrimp (6)
RED	51	47 31.449	55 37.018	80	Hard					15%	50%	15%	20%			moon jelly (10), *Hormathia* anemone (>20), feather star (>20), breadcrumb sponge (<5%), yellow encrusting sponge (<5%)
RED	52	47 31.484	55 36.958	48	Hard			5%	10%	30%	30%	15%	10%			moon jelly (6), breadcrumb sponge (<5%), orange encrusting sponge (<5%), yellow encrusting sponge (<5%), *Lithothamnion* (40%), *Hildenbrandia* (20%)
RED	53	47 31.519	55 36.901	23	Hard		100%									cunner (6), sea colander (80%), *Saccharina* (10%), *Lithothamnion* (<5%)
RED	54	47 31.558	55 36.845	15	Hard		100%									blue mussel (>20), cunner (7), sea colander (90%), *Lithothamnion* (<5%), *Saccharina* (<5%)
RED	55	47 31.309	55 37.372	105	Hard					20%	10%	35%	35%			ctenophore (11), Geodiidae sponge (5), feather star (>20), blood star (1), yellow encrusting sponge (<5%)
RED	56	47 31.343	55 37.313	104	Hard						20%	30%	50%			moon jelly (5), feather star (>20), Geodiidae sponge (4), yellow encrusting sponge (<5%)
RED	57	47 31.386	55 37.240	103	Hard				5%	15%	20%	20%	40%			moon jelly (>20), feather star (>20), Geodiidae sponge (5), breadcrumb sponge (<5%), blood star (1)
RED	58	47 31.420	55 37.191	100	Hard					20%	10%	30%	40%			moon jelly (8), feather star (>20), *Hormathia* anemone (3), *Asterias* sea star (1), breadcrumb sponge (<5%), Geodiidae sponge (6), yellow encrusting sponge (<5%)
RED	59	47 31.453	55 37.135	112	Hard						20%	30%	50%			moon jelly (>20), *Hormathia* anemone (>20), Geodiidae sponge (15), unidentified flatfish (2), blood star (1)
RED	60	47 31.491	55 37.073	96	Hard					5%	25%	40%	30%			Arrow worm (4), *Hormathia* anemone (>20), winter skate (1)
RED	61	47 31.526	55 37.016	49	Hard				10%	20%	55%	15%				moon jelly (4), feather star (>20), breadcrumb sponge (<5%), *Hormathia* anemone (6), Geodiidae sponge (3), orange encrusting sponge (<5%), *Lithothamnion* (45%), *Hildenbrandia* (10%), *Desmarestia* (<5%)
RED	62	47 31.564	55 36.959	22	Hard				15%	20%	65%					*Saccharina* (<5%), sea colander (35%), *Chondrus* crispus (30%)
RED	63	47 31.599	55 36.895	28	Hard				10%	20%	60%	10%				moon jelly (3), yellow encrusting sponge (<5%), *Lithothamnion* (60%), *Chondrus* crispus (35%), sea colander (20%)

Red Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
RED	64	47 31.356	55 37.430	114	Hard					35%		50%	15%			moon jelly (3), feather star (7), *Hormathia* anemone (2), Geodiidae sponge (3)
RED	65	47 31.384	55 37.368	103	Hard				10%	20%		50%	20%			moon jelly (>20), feather star (>20), arrow worm (1), breadcrumb sponge (<5%), yellow encrusting sponge (<5%)
RED	66	47 31.426	55 37.304	105	Hard					20%	<5%	20%	60%			moon jelly (4), arrow worm (1), *Hormathia* anemone (>20), feather star (17), Geodiidae sponge (11)
RED	67	47 31.459	55 37.249	98	Hard					10%	30%	20%	40%			moon jelly (>20), breadcrumb sponge (<5%), feather star (>20), Geodiidae sponge (10), *Hormathia* anemone (1)
RED	68	47 31.490	55 37.188	85	Hard		50%					25%	25%			moon jelly (>20), feather star (>20), Geodiidae sponge (>20), breadcrumb sponge (<5%), *Hormathia* anemone (5), *Asterias* sea star (1), yellow encrusting sponge (<5%), orange encrusting sponge (<5%)
RED	69	47 31.529	55 37.125	102	Hard					50%	50%					moon jelly (8), feather star (4), sculpin (1)
RED	70	47 31.570	55 37.070	64	Hard						40%	20%	40%			moon jelly (>20), feather star (>20), *Hormathia* anemone (>20), Geodiidae sponge (13), breadcrumb sponge (<5%), yellow encrusting sponge (<5%)
RED	71	47 31.604	55 37.008	21	Hard					60%	20%	20%				moon jelly (>20), blue mussel (4), ctenophore (3), sea colander (85%), *Lithothamnion* (<5%)
RED	72	47 31.639	55 36.949	35	Hard				30%	10%	20%	30%	10%			*Saccharina* (<5%), unidentified Rhodophyta (20%), sea colander (<5%), *Lithothamnion* (15%), *Hildenbrandia* (15%)
RED	73	47 31.392	55 37.482	113	Hard					30%	10%	50%	10%			moon jelly (9), blood star (1), feather star (15), arrow worm (1)
RED	74	47 31.433	55 37.422	107	Hard						30%	60%	10%			moon jelly (>20), feather star (13), *Hormathia* anemone (1)
RED	75	47 31.462	55 37.363	103	Hard					20%	<5%	60%	20%			*Hormathia* anemone (>20), feather star (>20), Geodiidae sponge (8), arrow worm (1), moon jelly (7), yellow encrusting sponge (<5%)
RED	76	47 31.500	55 37.296	85	Hard		60%		20%	5%	5%	10%				feather star (>20), *Hormathia* anemone (3), yellow encrusting sponge (<5%), *Asterias* sea star (2), cunner (7), breadcrumb sponge (<5%)
RED	77	47 31.534	55 37.238	77	Hard			10%	40%		15%	20%	15%			moon jelly (3), feather star (>20), cunner (1), Geodiidae sponge (>20), breadcrumb sponge (<5%), yellow encrusting sponge (<5%), *Melonanchora* sponge (5) *Lithothamnion* (10%)
RED	78	47 31.576	55 37.182	96	Hard				<5%	40%	<5%	40%	20%			feather star (>20), arrow worm (1), *Hormathia* anemone (1), *Saccharina* (<5%)
RED	79	47 31.608	55 37.118	90	Hard					20%	<5%	40%	40%			*Hormathia* anemone (>20), feather star (4), *Asterias* sea star (1)
RED	80	47 31.648	55 37.063	64	Hard				50%	10%	10%	30%				feather star (7), yellow encrusting sponge (<5%), green sea urchin (1), *Lithothamnion* (30%)
RED	81	47 31.679	55 37.007	31	Hard	30%		<5%	20%	20%	10%	20%				moon jelly (10), *Lithothamnion* (40%), *Hildenbrandia* (20%), sea colander (15%), unidentified Rhodophyta (15%)

Red Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
RED	82	47 31.428	55 37.536	113	Hard					30%	20%	50%	<5%			feather star (1), arrow worm (1), moon jelly (>20), yellow encrusting sponge (<5%)
RED	83	47 31.467	55 37.475	113	Hard				20%	30%		30%	20%			feather star (6), *Hormathia* anemone (3), *Asterias* sea star (1), arrow worm (1), breadcrumb sponge (<5%)
RED	84	47 31.503	55 37.414	86	Hard			<5%		10%	10%	80%				feather star (>20), *Hormathia* anemone (2), unidentified flatfish (1), *Asterias* sea star (1), yellow encrusting sponge (<5%), white encrusting sponge (<5%)
RED	85	47 31.536	55 37.359	98	Soft						<5%	90%	10%			feather star (11), *Hormathia* anemone (>20), breadcrumb sponge (<5%), blood star (1), *Chondrus* crispus (<5%)
RED	86	47 31.576	55 37.295	91	Hard		90%		<5%			10%	<5%			ctenophore (3), feather star (>20), blood star (1), Geodiidae sponge (>20), *Hormathia* anemone (>20), *Desmarestia* (<5%)
RED	87	47 31.610	55 37.236	86	Hard			<5%	<5%	20%	20%	60%				feather star (17), *Saccharina* (<5%)
RED	88	47 31.645	55 37.177	82	Hard			10%	50%	20%	10%	10%				feather star (>20), cunner (2), *Hormathia* anemone (2), yellow encrusting sponge (<5%), *Lithothamnion* (5%), *Chondrus* crispus (<5%), sea colander (<5%)
RED	89	47 31.684	55 37.117	66	Hard				55%	45%						moon jelly (2), feather star (13), *Saccharina* (<5%), *Lithothamnion* (50%)
RED	90	47 31.718	55 37.060	50	Hard					85%	10%	5%				*Lithothamnion* (10%), *Hildenbrandia* (<5%), *Desmarestia* (<5%)

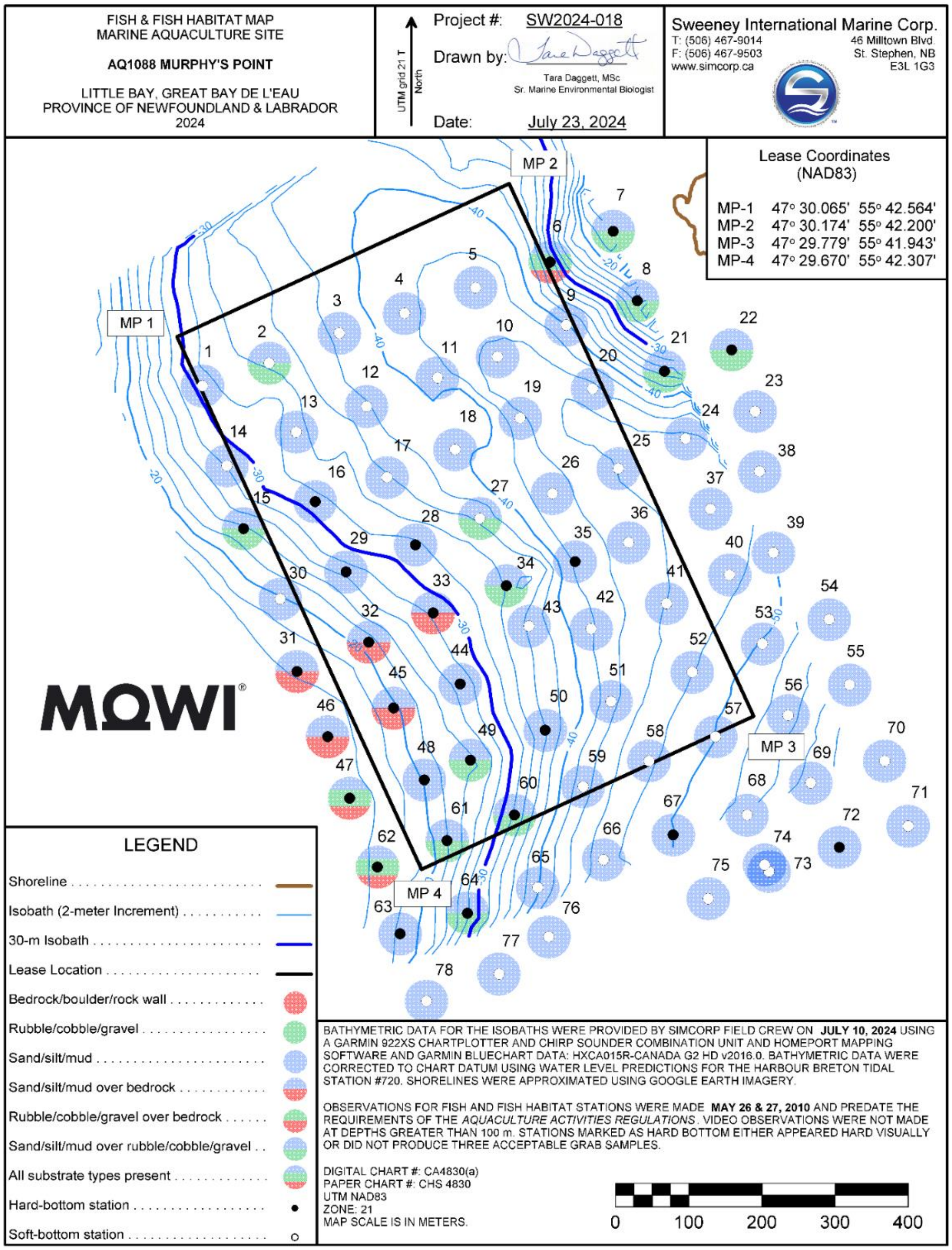


Figure 7.9. Habitat observations at sampling stations in the Murphy Point sea farm (May 2010).

Table 7.6. Summary of bottom type and observed flora and fauna at the Murphy Point sea farm (May 2010).

Murphy Point																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
MPT	1	47 30.029	55 42.537	31	Medium								x	x		kelp (drifting) (f), seaweed (r)	Y
MPT	2	47 30.045	55 42.464	36	Hard					10%			90%			kelp (drifting) (f), seaweed (r)	Y
MPT	3	47 30.066	55 42.387	39	Medium								x	x		worm casings (f), seaweed (r)	Y
MPT	4	47 30.080	55 42.316	42	Medium								x	x		flag kelp (drifting) (r), seaweed (r)	Y
MPT	5	47 30.098	55 42.238	44	Hard								x	x		worm casings (f), flag kelp (drifting) (r), ctenophore (f), anemone (r)	Y
MPT	6	47 30.116	55 42.156	28	Hard		60%	10%		10%			20%			coralline algae (s), seaweed (f), anemone (r)	N
MPT	7	47 30.138	55 42.087	16	Hard						10%	90%				shell debris (f), kelp (s), scallop (f), seaweed (f)	N
MPT	8	47 30.086	55 42.062	26	Hard					20%	20%	60%				coralline algae (f), kelp (p), shell debris (s), scallop (f)	Y
MPT	9	47 30.069	55 42.140	41	Medium								x	x		kelp (drifting) (f), anemone (f)	Y
MPT	10	47 30.047	55 42.215	45	Hard								x	x		anemone (r), scallop (r), seaweed (r)	Y
MPT	11	47 30.032	55 42.281	42	Hard								x	x		worm casings (f), anemone (r), starfish (r)	Y
MPT	12	47 30.012	55 42.359	38	Hard								x	x		brittle star (p), worm casings (f), coral (r)	Y
MPT	13	47 29.994	55 42.436	34	Hard								x	x		worm casings (f), starfish (r)	Y
MPT	14	47 29.970	55 42.512	29	Hard								x	x		kelp (f), star fish (r)	Y
MPT	15	47 29.923	55 42.495	24	Hard						10%	60%	30%			kelp (drifting) (s), shell debris (f), starfish (r), seaweed (r)	N
MPT	16	47 29.942	55 42.416	32	Hard								x	x		ctenophore (r), seaweed (r), starfish (r), shell debris (r), kelp (drifting) (f)	Y
MPT	17	47 29.959	55 42.338	36	Hard								x	x		brittle star (p), anemone (r), kelp (drifting (f), starfish (r)	Y
MPT	18	47 29.979	55 42.263	40	Medium								x	x		anemone (f), seaweed (r), worm casings (f)	Y
MPT	19	47 30.001	55 42.192	45	Medium								x	x		anemone (f), worm casings (f), shell debris (r)	Y
MPT	20	47 30.022	55 42.012	45	Hard								x	x		anemone (r), worm casings (f), kelp (drifting) (r)	Y

Murphy Point																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
MPT	21	47 30.034	55 42.034	35	Hard					10%	30%	60%				shell debris (f), worm casings (r)	N
MPT	22	47 30.049	55 41.960	35	Hard					20%	20%		60%			brittle star (p), shell debris (f), scallop (r), kelp (drifting (r)	N
MPT	23	47 30.003	55 41.936	46	Hard								x	x		anemone (r), worm casings (r), kelp (drifting) (r)	Y
MPT	24	47 29.984	55 42.012	47	Hard								x	x		worm casings (r), shell debris (r)	Y
MPT	25	47 29.963	55 42.086	47	Hard								x	x		worm casings (f), shell debris (r)	Y
MPT	26	47 29.945	55 42.158	44	Hard								x			ctenophore (r), worm casings (r)	Y
MPT	27	47 29.928	55 42.237	37	Hard					10%			90%			brittle star (s), worm casings (f), coralline algae (r), sponge (r), anemone (r)	Y
MPT	28	47 29.909	55 42.308	33	Hard								x	x		brittle star (s), kelp (drifting) (r), starfish (r)	Y
MPT	29	47 29.890	55 42.384	28	Hard								x	x		shell debris (f), kelp (s), seaweed (f), starfish (r), ctenophore (r)	Y
MPT	30	47 29.871	55 42.456	21	Hard								x	x		kelp (drifting) (f), starfish (f), shell debris (f), coralline algae (r)	Y
MPT	31	47 29.817	55 42.439	17	Hard								x			seaweed (f), shell debris (r), scallop (r), starfish (f), kelp (drifting) (r), sand dollar (r)	Y
MPT	32	47 29.838	55 42.361	22	Hard								x			shell debris (f), ctenophore (r), kelp (drifting) (f), star fish (r)	Y
MPT	33	47 29.859	55 42.290	30	Hard								x			worm casings (r), shell debris (f), kelp (drifting) (f), star fish (r)	Y
MPT	34	47 29.878	55 42.210	35	Hard					x			x			brittle star (f), shell debris (f), coralline algae (r), seaweed (r)	N
MPT	35	47 29.895	55 42.135	44	Hard								x			worm casings (s), seaweed (r), anemone (r)	Y
MPT	36	47 29.908	55 42.076	46	Hard								x			worm casings (f), shell debris (r), seaweed (r)	Y
MPT	37	47 29.932	55 41.986	48	Hard								x			worm casings (r)	Y
MPT	38	47 29.959	55 41.932	48	Hard								x			worm casings (r), shell debris (r)	Y

Murphy Point																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
MPT	39	47 29.899	55 41.919	50	Hard								x			worm casings (r), shell debris (r)	Y
MPT	40	47 29.883	55 41.967	50	Hard								x			worm casings (r), shell debris (r)	Y
MPT	41	47 29.863	55 42.036	49	Hard								x			worm casings (f), anemone (r)	Y
MPT	42	47 29.845	55 42.118	43	Hard								x			kelp (drifting) (f), shrimp (r), worm casings (r)	Y
MPT	43	47 29.848	55 42.186	37	Hard								x			worm casings (r), kelp (drifting) (f), brittle star (r), scallop (r)	Y
MPT	44	47 29.806	55 42.262	28	Hard								x			worm casings (r), shell debris (f), kelp (drifting) (f)	N
MPT	45	47 29.789	55 42.335	20	Hard							x	x			shell debris (f), kelp (s), sand dollar (r), star fish (r)	N
MPT	46	47 29.769	55 42.407	16	Hard							x	x			kelp (f), star fish (r), sand dollar (f)	N
MPT	47	47 29.723	55 42.384	16	Hard					10%		90%	x			kelp (p), star fish (r), shell debris (f)	N
MPT	48	47 29.736	55 42.303	22	Hard							x	x			shell debris (f), star fish (f), kelp (drifting (s)	N
MPT	49	47 29.750	55 42.252	24	Hard					10%		90%	x			kelp (p), coralline algae (f), star fish (r), ctenophore (r)	N
MPT	50	47 29.771	55 42.170	37	Hard								x			shell debris (r), worm casings (f), anemone (f), kelp (drifting) (f), ctenophore (r)	Y
MPT	51	47 29.791	55 42.098	49	Hard								x			crab (f), sculpin (r), worm casings (r), anemone (r)	Y
MPT	52	47 29.812	55 42.009	49	Hard								x			worm casings (f), star fish (r), anemone (r)	Y
MPT	53	47 29.832	55 41.932	51	Hard								x			worm casings (f), anemone (r)	Y
MPT	54	47 29.849	55 41.859	55	Hard								x	x		worm casings (r), seaweed (r)	Y
MPT	55	47 29.801	55 41.838	58	Hard								x			seaweed (r), crab (r)	Y
MPT	56	47 29.779	55 41.906	54	Hard								x	x		anemone (r), seaweed (r), worm casings (r)	Y
MPT	57	47 29.764	55 41.985	50	Hard								x	x		worm casings (f)	Y
MPT	58	47 29.747	55 42.058	48	Hard								x			anemone (r), shell debris (r)	Y
MPT	59	47 29.729	55 42.130	44	Hard								x			anemone (f), shell debris (r)	Y
MPT	60	47 29.709	55 42.205	33	Hard					10%			90%			shell debris (f), seaweed (f), kelp (drifting) (s), star fish	Y

Murphy Point																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
																(r)	
MPT	61	47 29.691	55 42.279	21	Hard					20%		80%				kelp (p), coralline algae (f), shell debris (f), star fish (r)	N
MPT	62	47 29.672	55 42.355	10	Hard			25%		25%		50%				kelp (p), coralline algae (f), shell debris (f)	N
MPT	63	47 29.623	55 42.332	9	Hard							x				shell debris (f), sand dollar (s), scallop (f), seaweed (s)	N
MPT	64	47 29.637	55 42.258	28	Hard					20%		40%	60%			seaweed (p), shell debris (f), kelp (f), coralline algae (r)	N
MPT	65	47 29.655	55 42.181	41	Hard								x	x		kelp (drifting) (r), urchin (r), worm casings (r), anemone (r)	Y
MPT	66	47 29.675	55 42.109	47	Hard								x			star fish (r), anemone (r), kelp (drifting) (r)	Y
MPT	67	47 29.692	55 42.033	51	Hard								x			scallop (r), crab (r)	Y
MPT	68	47 29.706	55 41.952	54	Hard								x	x		worm casings (f), anemone (r)	Y
MPT	69	47 29.729	55 41.882	57	Hard								x			ctenophore (r), worm casings (r), crab (r)	Y
MPT	70	47 29.744	55 41.801	61	Hard								x			kelp (drifting) (r)	Y
MPT	71	47 29.696	55 41.777	62	Hard								x	x		anemone (r), seaweed (r)	Y
MPT	72	47 29.681	55 41.852	59	Hard								x	x		crab (r), seaweed (r)	Y
MPT	73	47 29.664	55 41.929	55	Hard								x			crab (r), anemone (r), seaweed (f), worm casings (r)	Y
MPT	74	47 29.669	55 41.934	53	Hard								x			worm casings (r), anemone (r)	Y
MPT	75	47 29.645	55 41.996	50	Hard								x			worm casings (r), anemone (r)	Y
MPT	76	47 29.619	55 42.170	46	Hard								x			seaweed (r), star fish (r), crab (r)	Y
MPT	77	47 29.592	55 42.225	38	Hard								x			seaweed (f), shell debris (r), star fish (r)	Y
MPT	78	47 29.573	55 42.304	26	Hard								x			scallop (f), star fish (r), kelp (s), shell debris (f)	Y

Notes:

x = observed substrate.

7.3 Water Quality

The amount and temporal coverage of water quality data collected within the Great Bay de l'Eau BMA are variable; Table 7.7 identifies available data. Seasonal water quality measurements at sea farms (Salmonier Cove and Murphy Point) in the Great Bay de l'Eau BMA are summarized in Tables 7.8–7.10, for water temperature, dissolved oxygen, and salinity, respectively. Minimum and maximum values are provided for temperature (°C) and dissolved oxygen (mg/L) as significant fluctuations in these parameters can affect farmed salmon health. There are no available data for the Dog Cove and Red Cove sea farms.

Table 7.7. Available water quality data for the Great Bay de l'Eau BMA (2019–2024).

Available Data			
Year	**Measurement**	**Depth(s) (m)**	**Month(s)**
Murphy Point			
2019	Temperature (°C)	0.5	16 Jul–31 Dec
		1	3 Sep–31 Dec
		5	16 Jul–31 Dec
		10	3 Sep–31 Dec
		15	16 Jul–1 Dec
		20	3 Sep–31 Dec
		30	n/a
	Dissolved Oxygen (mg/L)	0.5	6 Aug–31 Dec
		1	3 Sep–31 Dec
		5	6 Aug–31 Dec
		10	3 Sep–31 Dec
		15	6 Aug–31 Dec
		20	3 Sep–31 Dec
		30	n/a
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	0.5–20	2 Jan–31 Dec
		30	4 May–31 Dec
	Oxygen (mg/L)	0.5–20	2 Jan–31 Dec
		30	4 May–31 Dec
	Salinity (‰)	all	4 May–31 Dec
2021	Temperature (°C)	all	2 Jan–13 Aug
	Oxygen (mg/L)	all	2 Jan–13 Aug
	Salinity (‰)	all	2 Jan–13 Aug
2022–2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
Salmonier Cove			
2019–2021	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2022	Temperature (°C)	all	22 Apr–31 Dec
	Oxygen (mg/L)	all	22 Apr–31 Dec
	Salinity (‰)	all	22 Apr–31 Dec
2023	Temperature (°C)	all	2 Jan–31 Dec
	Oxygen (mg/L)	all	2 Jan–31 Dec
	Salinity (‰)	all	2 Jan–31 Dec
2024	Temperature (°C)	all	2 Jan–11 May
	Oxygen (mg/L)	all	2 Jan–11 May
	Salinity (‰)	all	2 Jan–11 May

Notes:
n/a = not available.

7.3.1 Water Temperature

Seasonal water temperatures were generally consistent across sea farms with available data (Table 7.8). Temperature trends are typical of those observed by MCE in coastal Newfoundland waters. A thermocline develops in spring as surface waters warm. This thermocline becomes more pronounced and deeper in summer until it breaks down in the fall as air temperature decreases. During winter, temperatures throughout the water column tend to be more uniform until spring, when the seasonal water temperature pattern repeats. At depths 10 m and below, water temperatures were slightly warmer in winter but cooler during other seasons. In contrast, at depths above 10 m water temperatures are higher in spring, summer and fall.

Table 7.8. Average, maximum, and minimum water temperatures (°C) at the sea farms in the Great Bay de l'Eau BMA (2019–2024).

Water Depth	Sampling Period	Water Temperature Parameter	Winter	Spring	Summer	Fall
			Temperature (°C)			
Murphy Point						
0.5 m	16 Jul 2019–13 Aug 2021	Average	1.53	6.53	15.52	7.29
		Maximum	3.90	15.35	20.05	14.70
		Minimum	-0.20	0.80	9.50	1.95
1 m	3 Sep 2019–13 Aug 2021	Average	1.54	6.32	15.07	7.22
		Maximum	3.80	15.25	19.45	14.55
		Minimum	-0.20	0.80	9.50	2.15
5 m	16 Jul 2019–13 Aug 2021	Average	1.59	5.37	14.14	7.21
		Maximum	3.80	17.10	18.10	13.20
		Minimum	-0.10	0.80	8.80	2.55
10 m	3 Sep 2019–13 Aug 2021	Average	1.63	4.51	12.46	7.12
		Maximum	3.80	11.40	17.30	12.50
		Minimum	0.00	0.80	4.90	2.80
15 m	16 Jul 2019–13 Aug 2021	Average	1.64	3.83	10.79	7.03
		Maximum	3.80	10.60	17.20	12.25
		Minimum	0.00	0.70	1.50	2.90
20 m	3 Sep 2019–13 Aug 2021	Average	1.65	3.27	8.93	6.83
		Maximum	3.80	10.10	17.0	11.60
		Minimum	0.10	0.60	2.90	1.80
30 m	4 May 2020–13 Aug 2021	Average	2.32	2.90	5.69	5.91
		Maximum	3.90	8.25	11.50	9.50
		Minimum	1.30	1.10	2.30	2.80
Salmonier Cove						
0.5 m	22 Apr 2022–11 May 2024	Average	1.49	5.43	16.98	8.59
		Maximum	3.50	17.35	20.90	21.85
		Minimum	-1.00	1.00	11.00	1.45
1 m	22 Apr 2022–11 May 2024	Average	1.61	5.31	16.69	8.63
		Maximum	3.60	17.10	20.90	14.80
		Minimum	-0.70	1.00	10.75	1.50
5 m	22 Apr 2022–11 May 2024	Average	1.75	4.71	15.31	8.71
		Maximum	3.70	13.75	19.15	14.50
		Minimum	0.50	1.00	8.75	2.30
10 m	22 Apr 2022–11 May 2024	Average	1.78	4.08	13.14	8.55
		Maximum	3.70	12.20	18.40	14.15
		Minimum	0.50	0.90	4.10	2.50
15 m	22 Apr 2022–11 May 2024	Average	1.80	3.61	10.85	8.36
		Maximum	3.80	10.00	17.95	13.70
		Minimum	0.50	0.90	3.40	2.60
20 m	22 Apr 2022–11 May 2024	Average	2.01	3.22	8.89	8.02
		Maximum	17.60	9.10	16.75	13.60
		Minimum	0.50	0.80	3.20	3.10
30 m	22 Apr 2022–11 May 2024	Average	1.87	2.99	7.51	7.59
		Maximum	4.20	7.80	14.90	13.40
		Minimum	0.50	0.90	3.15	3.40

Mean water temperatures ranged from 1.49°C in winter (0.5 depth) to 16.98°C in summer (0.5 m depth) at the Salmonier Cove sea farm. Maximum water temperatures at the Murphy Point and Salmonier Cove sea farms were recorded at a depth of 0.5 m in summer, reaching 20.05°C and 20.90°C, respectively. The minimum temperatures occurred in winter at the same depth, measuring -0.20°C and -1.00°C, respectively.

Historical water temperature data for the Great Bay de l'Eau BMA (Figure 7.10) are provided for measurements collected at a depth of 15 m. During 2019–2021, data collected at the Murphy Point sea farm showed a general water temperature increase from April–August, with average temperatures peaking in August and declining thereafter (Figure 7.10A). During 2022–2024, data collected at the Salmonier Cove sea farm indicated an increase in average and maximum temperatures from April–September, while minimum temperatures peaked in November (Figure7.10B).

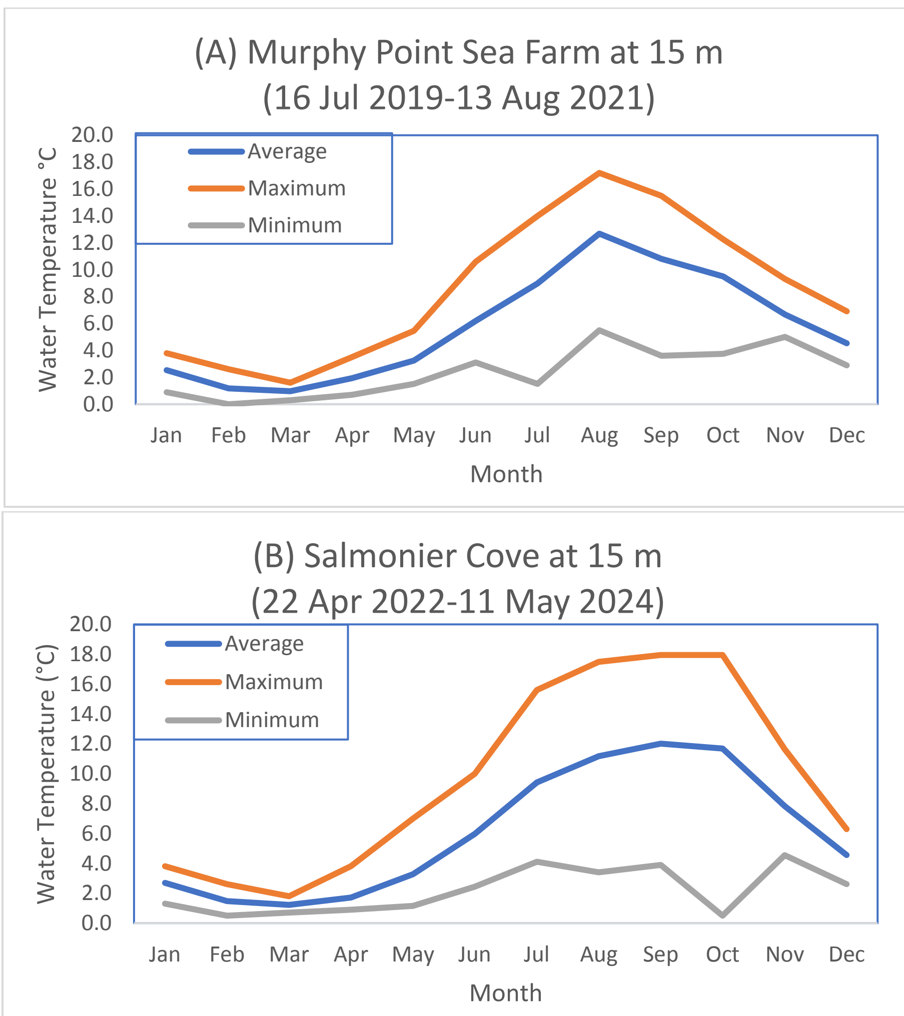


Figure 7.10. Historical water temperature (°C) data at the (A) Murphy Point and (B) Salmonier Cove sea farms in the Great Bay de l'Eau BMA at 15 m depth. Note: There is no water temperature data available for the Dog Cove and Red Cove sea farms.

7.3.2 Dissolved Oxygen

Dissolved oxygen levels were consistently lower in summer compared to the other seasons. Mean dissolved oxygen ranged from 7.80 mg/L in summer (1.0 m depth at Salmonier Cove) to 12.39 mg/L in winter (0.5 m depth at Murphy Point) (Table 7.9). Maximum observed dissolved oxygen was 15.90 mg/L, recorded at a depth of 0.5 m at the Murphy Point sea farm in winter, while minimum dissolved oxygen was 5.11 mg/L, measured at a depth of 0.5 m in the summer at the Salmonier Cove sea farm.

Table 7.9. Average, maximum, and minimum dissolved oxygen (mg/L) at the sea farms in the Great Bay de l'Eau BMA (2020–2024).

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
Murphy Point						
0.5 m	6 Aug 2019–13 Aug 2021	Average	12.39	10.89	8.67	10.45
		Maximum	15.90	15.50	11.30	13.60
		Minimum	10.00	7.80	7.20	5.70
1 m	03 Sep 2019–13 Aug 2021	Average	12.36	10.91	8.74	10.42
		Maximum	15.80	15.60	11.30	13.50
		Minimum	10.00	7.80	7.00	7.25
5 m	6 Aug 2019–13 Aug 2021	Average	12.26	11.23	8.90	10.43
		Maximum	15.70	15.50	11.50	16.00
		Minimum	10.00	8.80	6.50	7.75
10 m	03 Sep 2019–13 Aug 2021	Average	12.14	11.36	9.07	10.34
		Maximum	15.60	15.50	12.40	12.90
		Minimum	9.90	8.95	7.45	7.60
15 m	6 Aug 2019–13 Aug 2021	Average	12.04	11.45	9.27	10.28
		Maximum	15.50	15.30	12.35	12.80
		Minimum	9.90	8.80	7.50	7.70
20 m	03 Sep 2019–13 Aug 2021	Average	11.96	11.50	9.49	10.28
		Maximum	15.40	15.40	12.25	12.70
		Minimum	9.90	9.15	7.65	7.80
30 m	04 May 2020–13 Aug 2021	Average	10.41	10.90	9.60	9.39
		Maximum	11.10	11.75	10.65	10.60
		Minimum	9.90	9.35	8.35	8.20
Salmonier Cove						
0.5 m	22 Apr 2022–11 May 2024	Average	10.72	10.65	7.86	9.35
		Maximum	12.90	12.87	9.75	12.10
		Minimum	9.65	8.30	5.11	7.00
1 m	22 Apr 2022–11 May 2024	Average	10.53	10.64	7.80	9.21
		Maximum	11.70	12.59	9.75	11.68
		Minimum	9.70	8.75	6.00	6.95
5 m	22 Apr 2022–11 May 2024	Average	10.43	10.69	7.88	9.15
		Maximum	11.30	12.55	9.90	11.65
		Minimum	9.60	9.03	5.90	6.95
10 m	22 Apr 2022–11 May 2024	Average	10.39	10.73	8.07	9.13
		Maximum	11.20	12.25	9.96	11.70
		Minimum	9.30	9.20	6.11	6.61
15 m	22 Apr 2022–11 May 2024	Average	10.37	10.69	8.35	9.12
		Maximum	11.30	12.22	10.00	11.69
		Minimum	9.20	9.40	6.18	6.55
20 m	22 Apr 2022–11 May 2024	Average	10.38	10.62	8.65	9.17
		Maximum	11.40	12.30	10.15	11.75
		Minimum	9.30	9.40	6.50	6.90
30 m	22 Apr 2022–11 May 2024	Average	10.36	10.46	8.82	9.27
		Maximum	12.21	11.93	11.01	11.68
		Minimum	9.40	1.60	6.90	7.05

During 2019–2021, a general decline in dissolved oxygen levels was recorded from April–August, followed by an increase in fall and winter at the Murphy Point sea farm (Figure 7.11A). Average oxygen levels peaked in April, while the lowest levels were recorded in August at the Murphy Point sea farm. At the Salmonier Cove sea farm, dissolved oxygen decreased from May–August; both average and maximum oxygen levels peaked in April whereas the lowest oxygen levels were observed in August (Figure 7.11B).

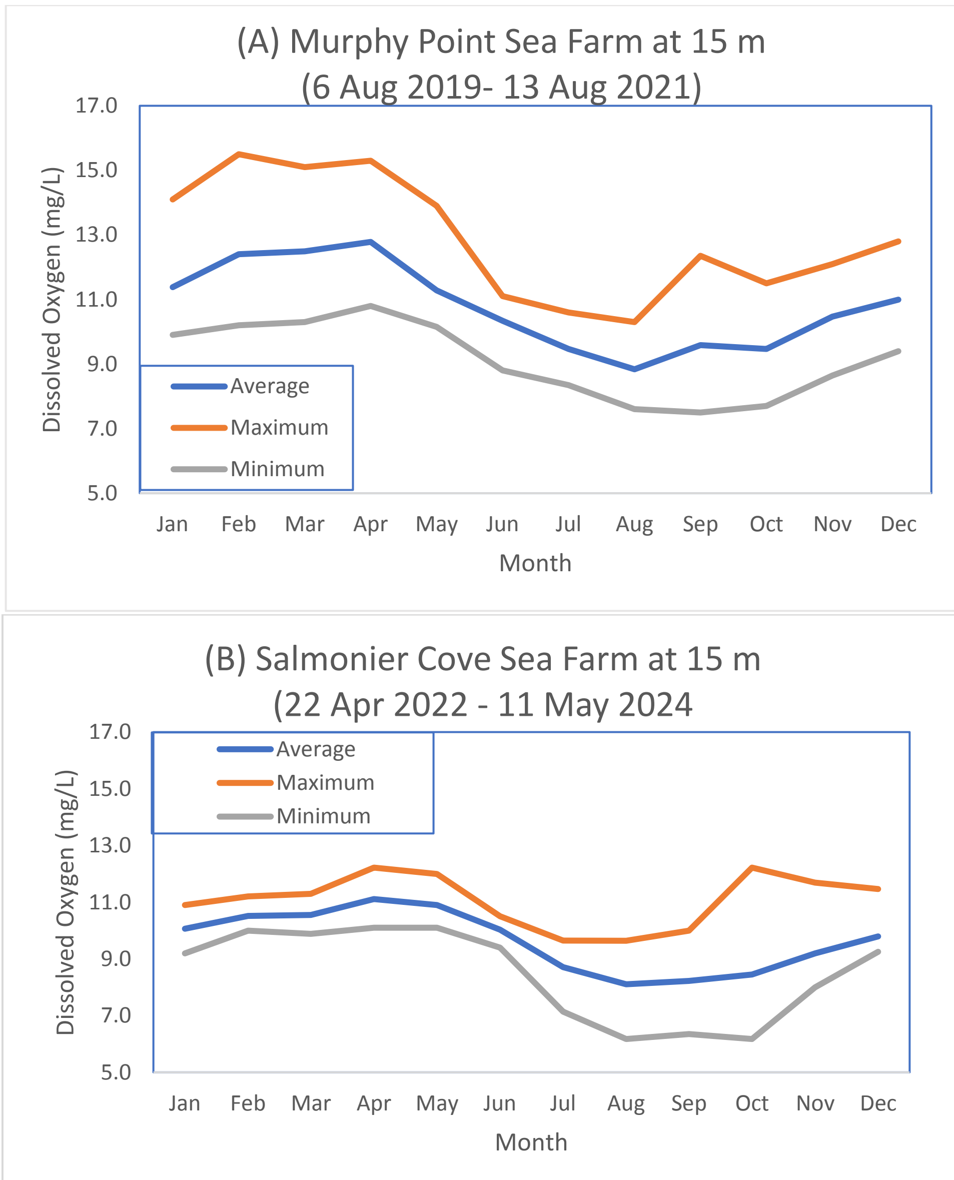


Figure 7.11. Historical dissolved oxygen (mg/L) data at the (A) Murphy Point and (B) Salmonier Cove sea farms in the Great Bay de l'Eau BMA at 15 m depth. Note: There is no dissolved oxygen data available for the Dog Cove and Red Cove sea farms.

7.3.3 Salinity

Salinity was fairly consistent across sea farms and seasons with averages ranging from 27.05–31.01 ppt (Table 7.10). Results indicate a moderate freshwater influence near the surface.

Table 7.10. Average salinity (‰) at the sea farms in the Great Bay de l'Eau BMA (2020–2024).

Water Depth	Sampling Period	Winter	Spring	Summer	Fall
		Salinity (‰)			
Murphy Point					
0.5 m	3 May 2020–13 Aug 2021	29.92	28.82	29.32	29.03
1 m	3 May 2020–13 Aug 2021	30.14	29.39	29.74	29.41
5 m	3 May 2020–13 Aug 2021	30.38	30.12	30.26	30.08
10 m	3 May 2020–13 Aug 2021	30.43	30.41	30.48	30.26
15 m	3 May 2020–13 Aug 2021	30.46	30.55	30.64	30.35
20 m	3 May 2020–13 Aug 2021	30.49	30.65	30.80	30.46
30 m	3 May 2020–13 Aug 2021	30.56	30.78	31.01	30.67
Salmonier Cove					
0.5 m	22 Apr 2022–11 May 2024	28.46	28.75	27.05	28.20
1 m	22 Apr 2022–11 May 2024	29.81	29.74	28.56	29.25
5 m	22 Apr 2022–11 May 2024	30.51	30.64	29.94	30.13
10 m	22 Apr 2022–11 May 2024	30.96	30.79	30.41	30.21
15 m	22 Apr 2022–11 May 2024	30.99	30.85	30.66	30.46
20 m	22 Apr 2022–11 May 2024	30.64	30.90	30.81	30.59
30 m	22 Apr 2022–11 May 2024	30.61	30.96	30.85	30.66

7.4. Oceanographic and Meteorological Data

Bathymetric data are available for all four sea farms in the Great Bay de l'Eau BMA. Current data are available for Salmonier Cove, Dog Cove and Red Cove. In addition to the wind and wave data available for the general area of the Great Bay de l'Eau, site-specific wind and wave data are also available for Red Cove and Salmonier Cove.

7.4.1 Bathymetry

Water depths below the leases and sea cage arrays range from 6–185 m and 34–82 m, respectively (Table 7.11). The shallowest sea farm is Murphy Point where depths range from 34–47 m below the sea cage array. Bathymetric maps were created based on data collected in March 2023 or June and July 2024 (Figures 7.12–7.15).

Table 7.11. Water depth range at sea farms in the Great Bay de l'Eau BMA.

Site No.	Sea Farm	Lease Depth Range (m)	Sea Cage Array Depth Range (m)
AQ 1048	Salmonier Cove	6–61	40–43
AQ 1049	Dog Cove	15–105	58–82
AQ 1065	Red Cove	10–185	n/a
AQ 1088	Murphy Point	16–62	34–47

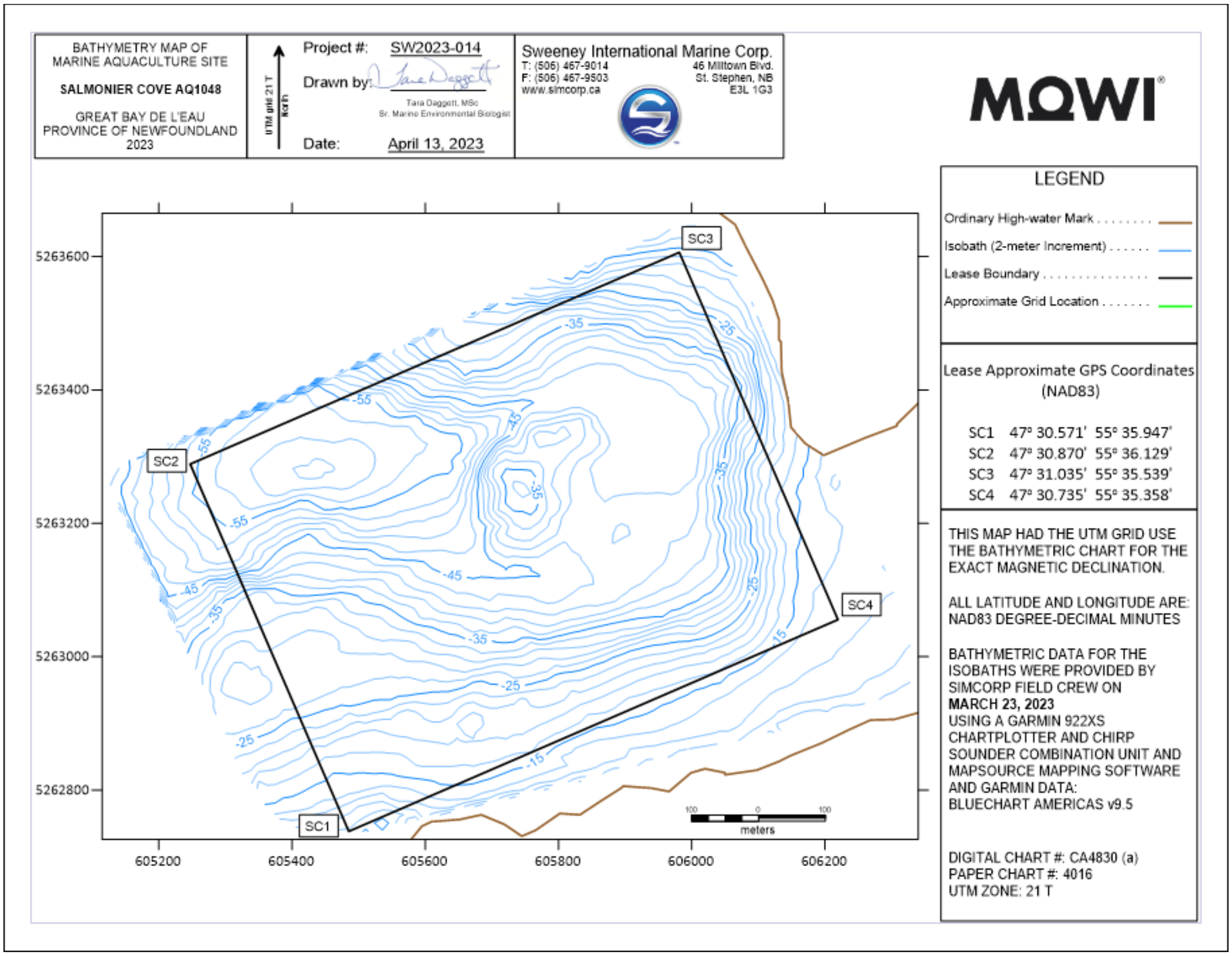


Figure 7.12. Bathymetric map for the Salmonier Cove sea farm (March 2023).

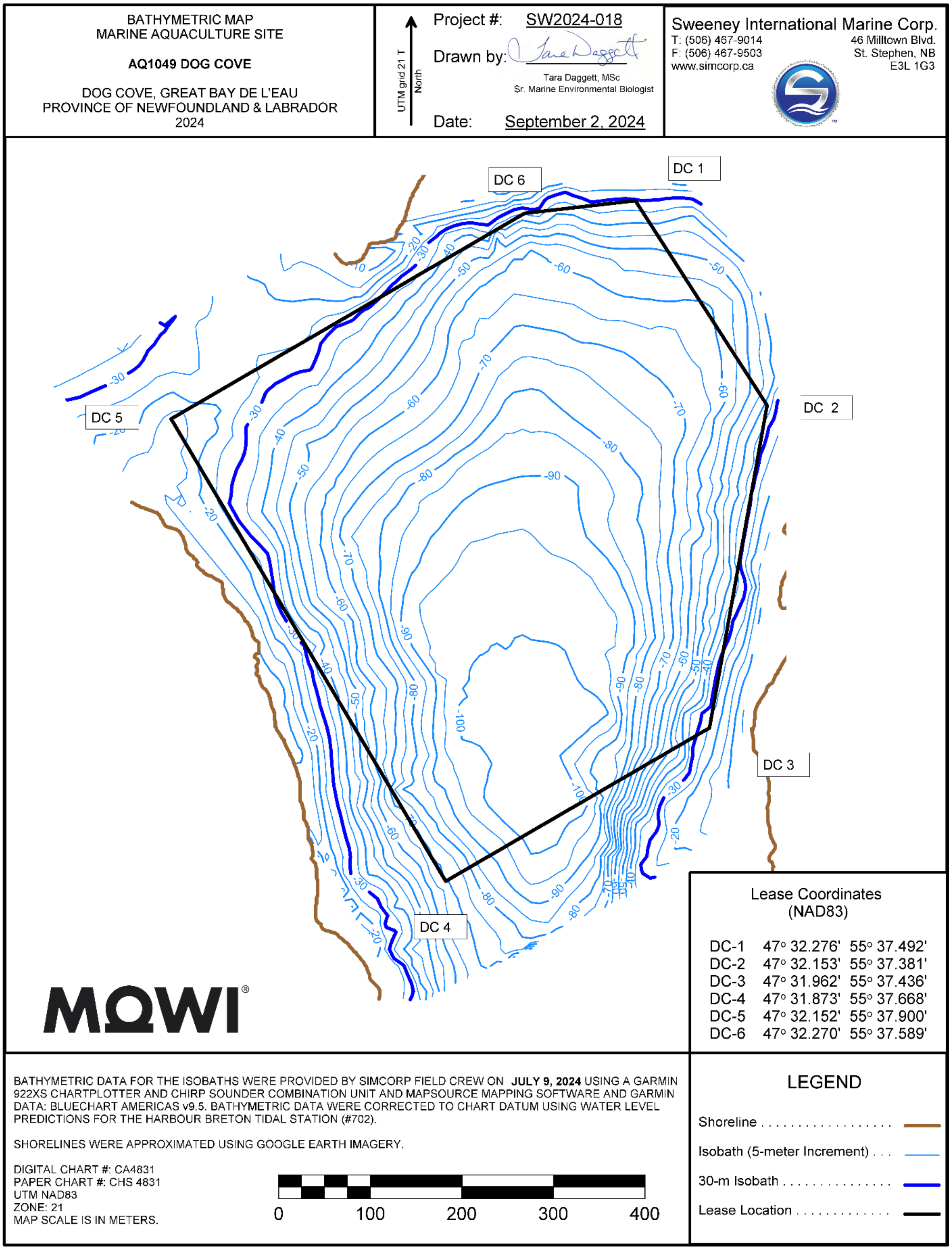


Figure 7.13. Bathymetric map for the Dog Cove sea farm (July 2024).

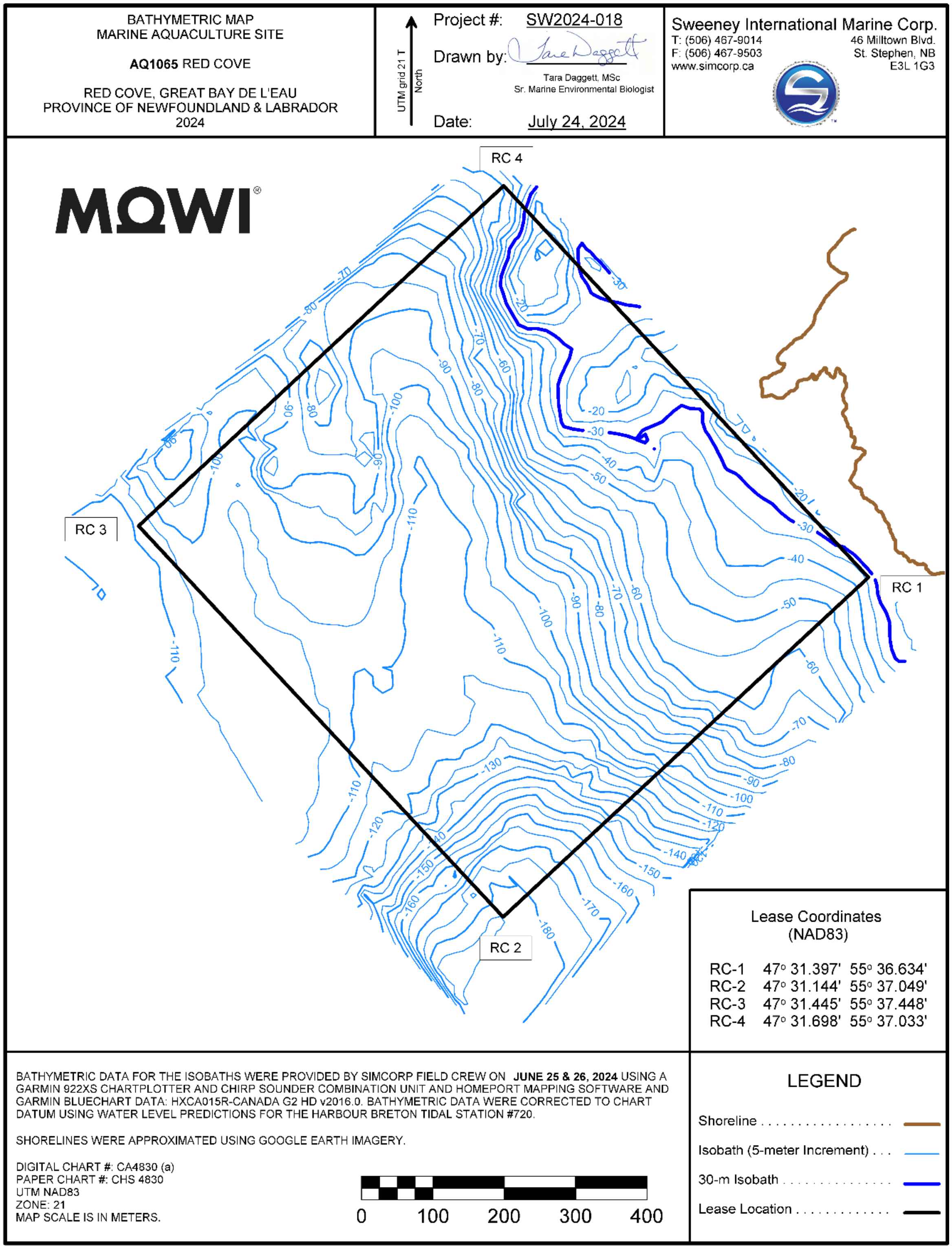


Figure 7.14. Bathymetric map for the Red Cove sea farm (June 2024).

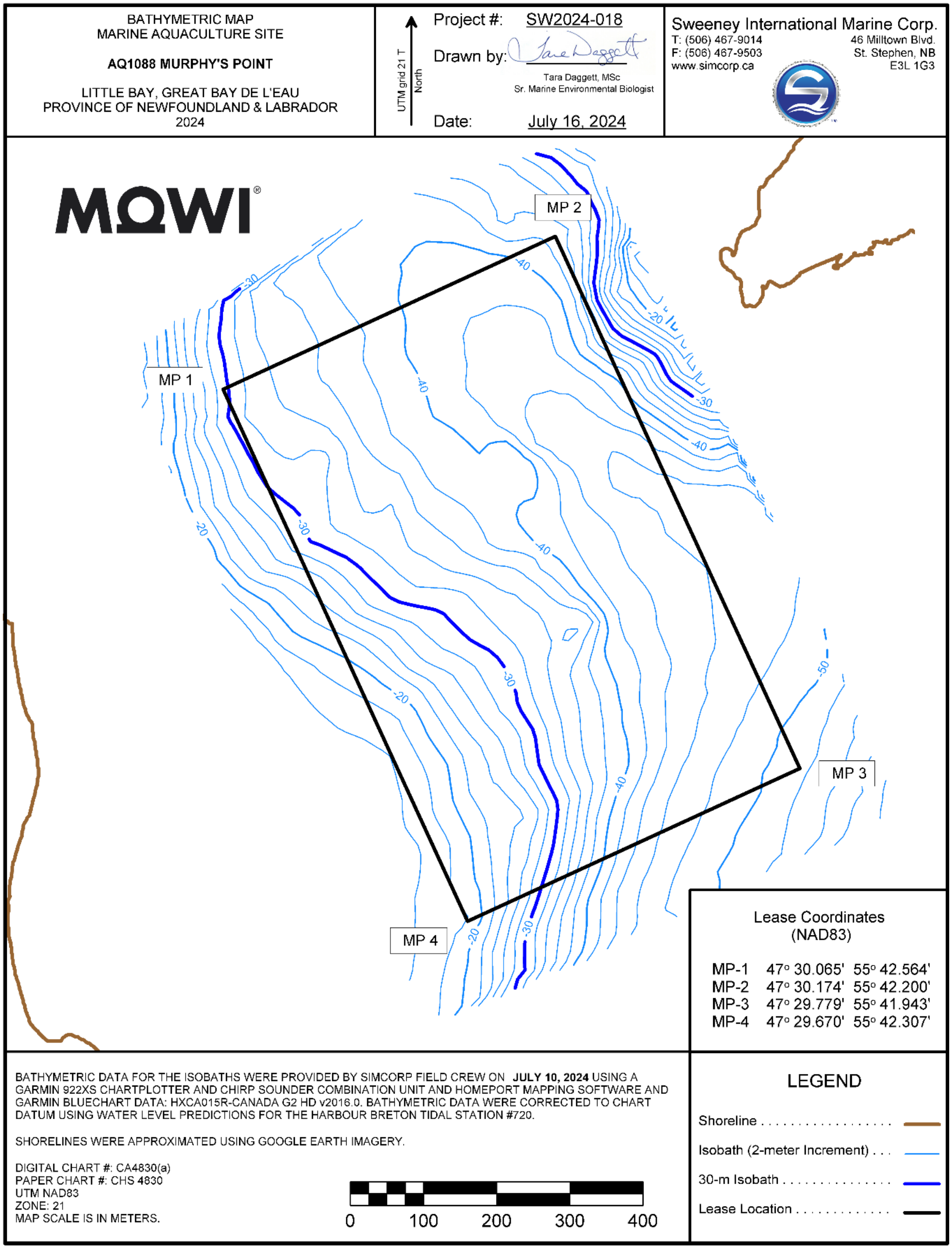


Figure 7.15. Bathymetric map for the Murphy Point sea farm (July 2024).

7.4.2 Currents

Current data were acquired at the Salmonier Cove sea farm from April–August 2024, the Dog Cove sea farm from June–July 2024, and the Red Cove sea farm from March–June 2024. The only current data available for Murphy Point was sourced from DFO and was applied to depositional modelling.

7.4.2.1 Salmonier Cove

During April–August 2024, current measurements were collected at three depths in the Salmonier Cove sea farm (Table 7.12). During this period, the mean current speeds ranged from 4.0 cm/s (at 5 m depth), to 2.7 cm/s (at 15 m depth). Maximum current speeds varied from 19.6 cm/s (at 15 m depth) to 27.0 cm/s (at 10 m depth). Current directions flowed primarily into the bay, toward the southeast (Figure 7.16). Vector-averaged current velocities were also into the bay.

Table 7.12. Current speeds (mean and maximum values) and vector-averages at the Salmonier Cove sea farm (April–August 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	4.0	25.4	1.4 @ 136 °
10	3.1	27.0	1.2 @ 128 °
15	2.7	19.6	0.5 @ 109 °

Notes:
MWL = mean water level.

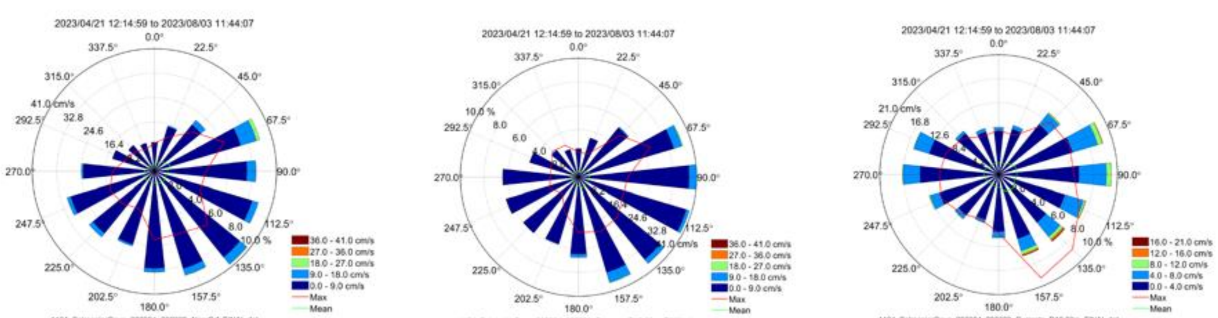


Figure 7.16. Compass rose plots of current speeds at the Salmonier Cove sea farm (April–August 2024). Current speeds and directions at 5 m, 10 m and 15 m are shown from left to right in the figure.

7.4.2.2 Dog Cove

During June–July 2024, current measurements were collected at six depths in the Dog Cove sea farm (Table 7.13). During this period, mean current speeds ranged from 3.0 cm/s near-surface to 1.4 cm/s near-bottom. Maximum measured current speeds ranged from 14–16 cm/s in the upper

20 m, to 9.3 cm/s near-bottom. The flows were bi-directional (northwest-southeast) near surface, becoming more westerly at mid-depth (Figure 7.17). Near-bottom flows were more omni-directional. The largest flows tended to be toward the east-southeast. The vector-averaged currents ranged from 0.2–0.5 cm/s and were toward the northeast quadrant in the upper 10 m, and toward the northwest quadrant in the rest of the water column.

Table 7.13. Current speeds (mean and maximum values) and vector-averages at the Dog Cove sea farm (June–July 2024).

Speed (cm/s)			
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	2.98	15.22	0.4 @ 47 °
10	2.56	15.86	0.2 @ 24 °
15	2.69	16.02	0.2 @ 341 °
20	2.46	13.82	0.5 @ 282 °
27	1.98	10.91	0.5 @ 279 °
49 (5 m above bottom)	1.42	9.25	0.2 @ 270 °

Notes:
MWL = mean water level.

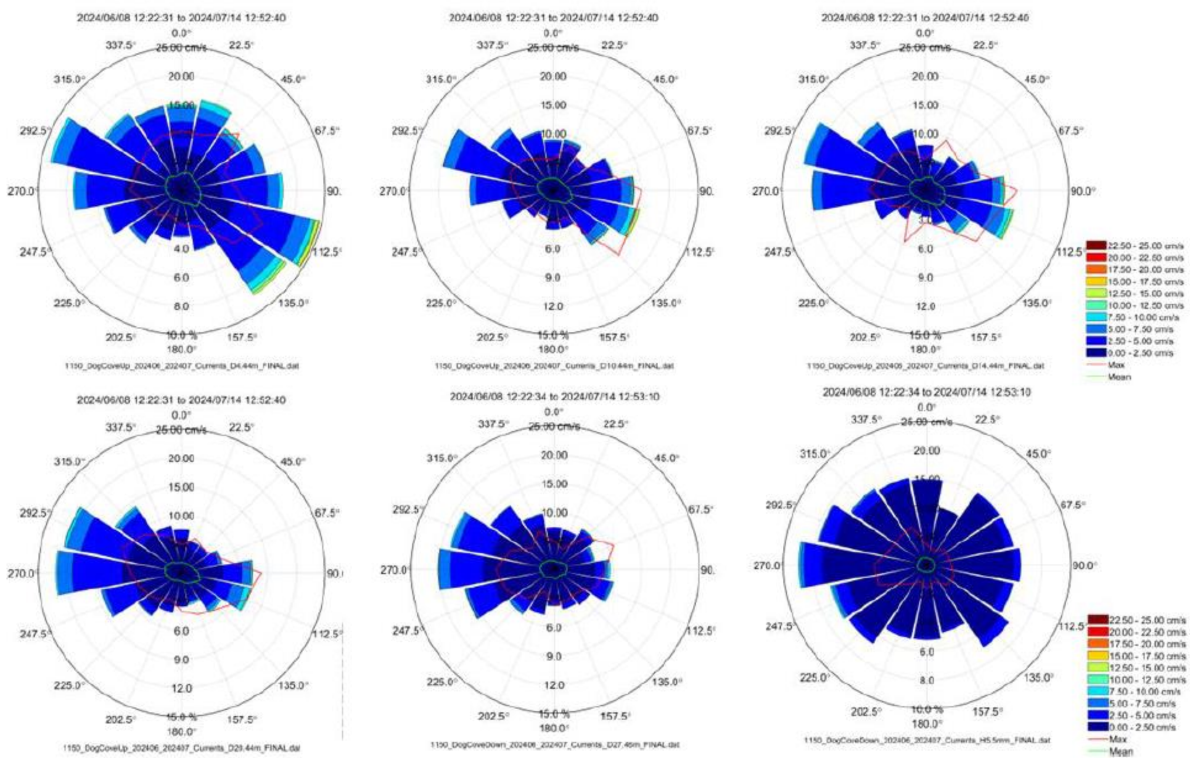


Figure 7.17. Compass rose plots of current speeds at the Dog Cove sea farm (June–July 2024). Current speeds and directions at 5 m, 10 m, 15 m, 27 m (mid-depth), and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

7.4.2.3 Red Cove

During March–June 2024, current measurements were collected at six depths at the Red Cove sea farm (Table 7.14). During this period, mean current speeds ranged from 5.7 cm/s near-surface, to 3.1 cm/s near-bottom. Maximum current speeds were variable ranging from 31 cm/s near-surface, reducing to 20 cm/sec near-bottom. Current directions were primarily westerly (Figure 7.18). The vector-averaged currents in the upper 20 m were north-northwest at about 1–2 cm/sec. At mid-depth the vector-averaged current was 0.4 cm/s towards the west-southwest. Near-bottom the vector-averaged current was 0.9 cm/s towards the east-southeast.

Table 7.14. Current speeds (mean and maximum values) and vector-averages at the Red Cove sea farm (March–June 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	5.7	31.2	1.0 @ 326 °
10	4.8	26.4	1.5 @ 349 °
15	4.4	22.4	1.9 @ 339 °
20	4.2	23.6	1.9 @ 334 °
39	3.6	21.2	0.4 @ 245 °
75 (5 m above bottom)	3.1	20.3	0.9 @ 105 °

Notes:
MWL = mean water level.

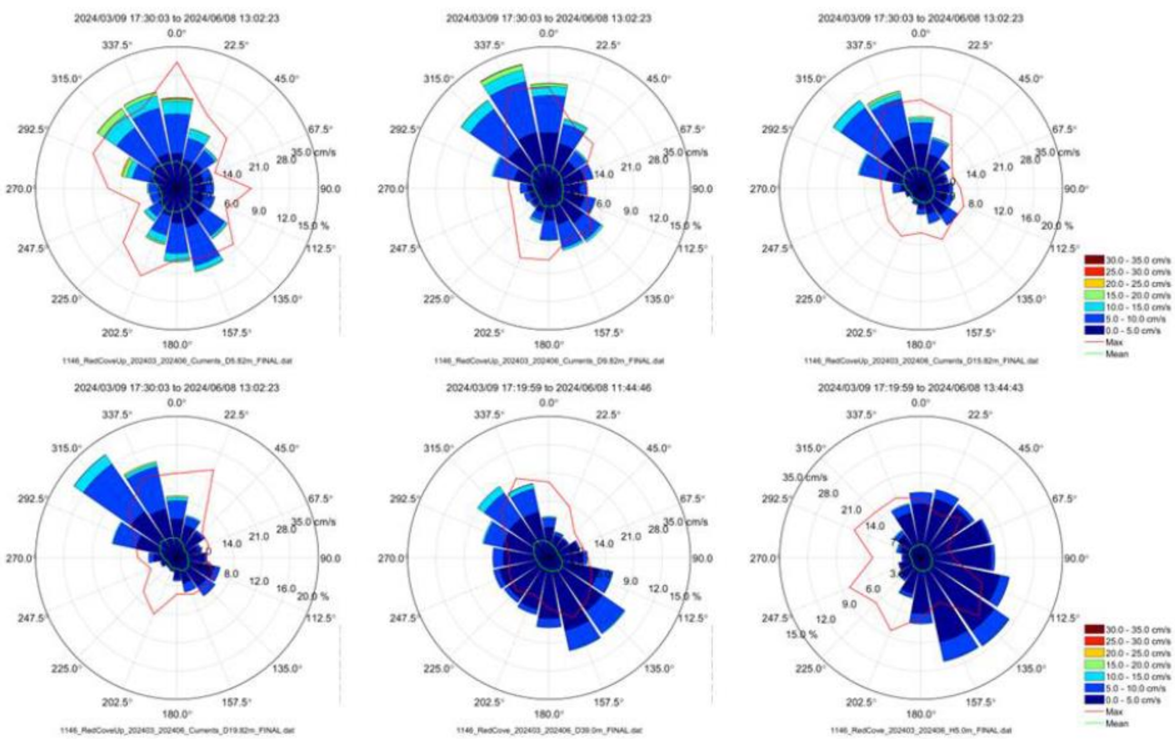


Figure 7.18. Compass rose plots of current speeds at the Red Cove sea farm (March–June 2024). Current speeds and directions at 5 m, 10 m, 15 m, 20 m, mid-depth (39 m), and near-bottom (5 m height) are shown from left to right, top to bottom in the figure.

7.4.2.4 Murphy Point

The only current data available for Murphy Point has been collected by DFO and is not in a format available for presentation. Additional current measurements will be collected prior to any planning to redevelop the sea cage design and mooring.

7.4.3 Wind and Waves

7.4.3.1 Modelling (MSC50 Hindcast Approach) for Atlantic Canada

Mean wind speeds near the Great Bay de l'Eau BMA were highest in December, January, and February and lowest in June, July, and August based on 10 years of historical data (Tables 7.15 and 7.16). Maximum monthly wind speeds of ~20–21 m/s (~72 -76 km/h) occurred in December, January, February, and March. Similarly, maximum monthly wave heights of 3.95–4.59 m occurred during winter months. Wind directions were predominantly from the west, southwest with wind speeds most frequently ranging from ~6–12 m/s (Figure 7.19).

Table 7.15. Monthly wind speeds (mean and maximum) near the Great Bay de l'Eau BMA (at MSC50 grid point M6012357 during 2009–2018).

Month	M6012357	
	Wind Speed Mean (m/s)	Wind Speed Max (m/s)
January	10.80	20.46
February	10.45	21.99
March	9.53	21.28
April	7.95	18.58
May	6.51	14.24
June	5.81	13.31
July	5.42	11.85
August	5.96	14.13
September	7.68	16.97
October	8.83	18.64
November	9.65	19.54
December	10.56	20.49

Table 7.16. Monthly wave heights (m) (mean and maximum) recorded near the Great Bay de l'Eau BMA (at MSC50 grid points M6012357 during 2009–2018).

Month	M6012357	
	Wave Height Mean (m)	Wave Height Max (m)
January	1.73	4.55
February	1.54	4.34
March	1.23	3.77
April	1.03	3.38
May	0.76	2.31
June	0.65	2.07
July	0.70	2.01
August	0.72	2.21
September	1.01	3.01
October	1.19	3.95
November	1.40	4.44
December	1.52	4.59

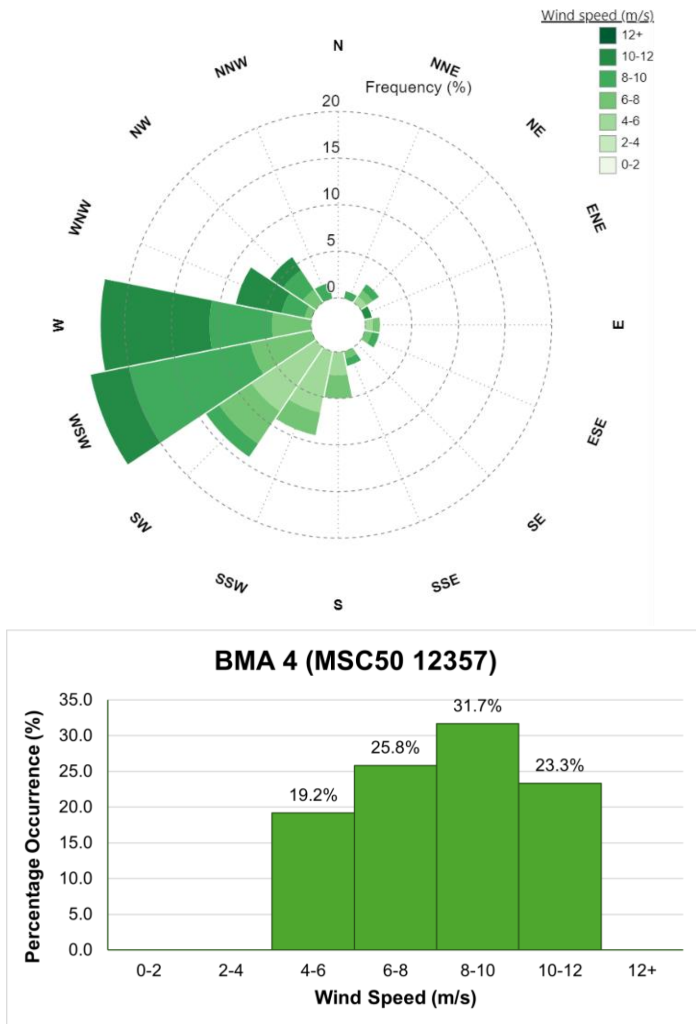


Figure 7.19. Wind rose and wind speed frequency histogram for MSC50 grid point M6012357 near Great Bay de l'Eau BMA (2009–2018).

7.4.3.2 Sea Farm Specific Wave Calculation

In the Great Bay de l'Eau BMA, wave data for the Salmonier Cove sea farm was derived following the Scottish standard SWAN model (see Section 3.4.3.2).

Salmonier Cove

In the Salmonier Cove sea farm, maximum wind speeds of 29.7 m/s (10 yr) and 33.8 m/s (50 yr) from various directions were predicted (Table 7.17). Maximum significant wave heights of 2.2 m (10 yr) and 2.5 m (50-year return period) were predicted for waves originating from the southwest. The highest predicted wind speed was 33.8 m/s (50-year return period) (Table 7.17).

Table 7.17. Wind and wave predictions for 10-year and 50- year return periods in the Salmonier Cove sea farm for wind generated waves using the SWAN model for the mooring frame.

Return Period	From	Sector	N	NE	E	SE	S	SW	W	NW
10 years	Wind	Wind speed (m/s)	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.7
		Direction (°)	0	45	135	135	180	245	270	315
	Wind generated wave condition	Hs (m)	0.9	0.7	0.6	0.7	1.7	2.2	2.1	1.2
		Tp (s)	3.4	2.3	2.4	2.3	7.8	8.8	8.6	3.6
		Direction (°)	329	50	90	128	236	246	251	294
50 years	Wind	Wind speed (m/s)	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8
		Direction (°)	0	45	135	135	180	245	270	315
	Wind generated wave condition	Hs (m)	1.0	0.7	0.7	0.7	1.9	2.5	2.4	1.4
		Tp (s)	3.6	2.4	2.6	2.4	8.4	9.4	9.2	3.9
		Direction (°)	324	50	90	128	236	246	251	294

Notes:
Hs = significant wave height, Tp = wave peak period.

7.4.3.3 *Sea Farm Specific Wave Measurements*

In the Great Bay de l'Eau BMA, sea farm specific wave measurements were collected March–April 2024 at the Red Cove sea farm using a SOFAR wave buoy (see Section 3.4.3.3).

Red Cove

In the Red Cove sea farm, a SOFAR Spotter wave buoy was deployed. Significant wave height (Hs) averaged 0.31 during March–April 2024 (Table 7.18). On March 22, 2024, at 18:51 UTC, winds from the southwest at Sagona Island reached 14.4 m/s, generating waves over 1.50 m with a peak wave period of 6.4 s. Waves predominantly originated from the south/south-southeast which offered the most fetch (Figure 7.20). Swell components were often present but typically masked in the peak period parameter due to the dominance of local sea-wind waves.

Table 7.18. Statistical summary of Hs and Tmean from the Spotter wave buoy deployed in the Red Cove sea farm (March–April 2024).

	Min	1%	5%	25%	50%	mean	75%	95%	99%	std	max	No. valid	Total No.
Hs (m)	0.04	0.06	0.09	0.15	0.24	0.31	0.39	0.77	1.25	0.24	1.50	1172	1172
Tmean (s)	1.45	1.83	2.14	4.46	8.52	9.63	10.26	25.54	25.60	6.84	34.02	1172	1172

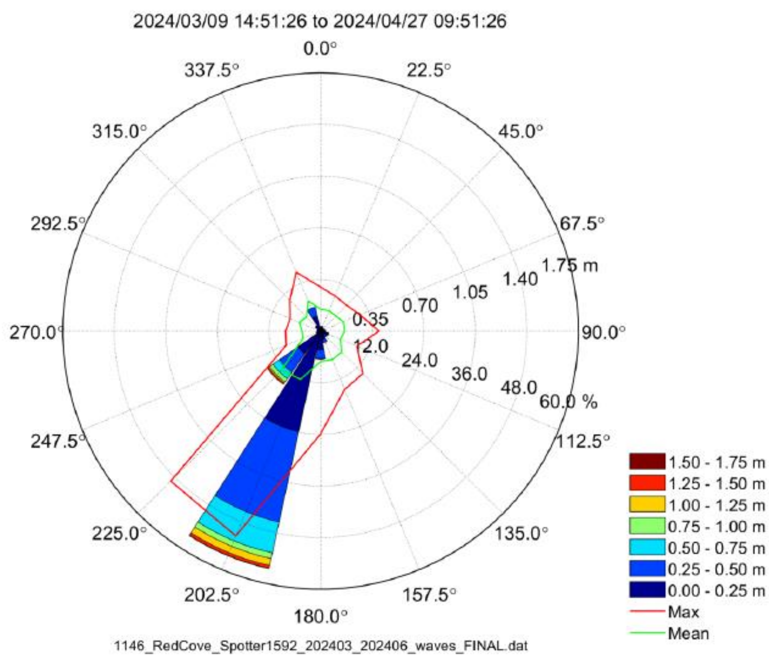


Figure 7.20. Compass rose plot of Hs and peak wave direction at Red Cove (March–April 2024).

7.5 Ice Conditions

Ice conditions for the Study area including Great Bay de l'Eau (BMA 4) are detailed in Section 4.5.

7.6 Storms

Storm conditions for the Study area including Great Bay de l'Eau (BMA 4) are detailed in Section 4.6.

7.7 Tides and Floods

Tide and flood conditions for the Study area including Great Bay de l'Eau (BMA 4) are detailed in Section 4.7.

7.8 Performance of Sea Farms with a Previous Production Cycle

Of the four sea farms in the Great Bay de l'Eau BMA, three (Salmonier Cove, Dog Cove and Murphy Point) have been previously stocked and in production. Red Cove sea farm has not been stocked and in production since 2016 (Table 7.19). The summaries below detail the monitoring, reporting and performance of the three sea farms in the Great Bay de l'Eau BMA during the period that public reporting has been a requirement (2016–present).

7.8.1 Fallowing Periods

Table 7.19 summarizes fallow periods for MCE sea farms in the Great Bay de l'Eau BMA since the enactment of the AAR. The Salmonier Cove, Dog Cove and Murphy Point sea farms have been fallow since April 2024, December 2017 and August 2021, respectively. The Red Cove sea farm has not had production and has been fallow (since 2016 records).

Table 7.19. Summary of the fallow schedule for the Great Bay de l'Eau BMA sea farms since 2016. Green indicates production (month stocked), red indicates harvesting/depopulation (month sea cages were empty), and blue is fallow (not stocked).

Sea Farm	2016	2017	2018	2019	2020	2021	2022	2023	2024
Salmonier Cove	May		Jun				May		Apr
Dog Cove		Dec							
Red Cove									
Murphy Point	Jun		Aug	Jul		Aug			

7.8.2 Benthic monitoring

For Great Bay de l'Eau BMA, modelling of total organic carbon (TOC) deposition has been completed for two sea farms in 2022; Salmonier Cove and Murphy Point (LGL 2025c, Volume 3).

As per the AAR, benthic monitoring of an active sea farm is required during a period of peak salmon feeding. Depending on bottom type (hard or soft), either video monitoring or bottom grabs are collected to determine the amount of BOD matter. During years with active farming, required benthic monitoring at sampling stations in the Great Bay de l'Eau BMA was conducted. All sea farms were within the allowable regulatory threshold based on the BOD indicators (Table 7.20).

Table 7.20. AAR benthic monitoring results for sea farms in the Great Bay de l'Eau BMA (2015–2023). [Green = within allowable regulatory threshold [a]]

AAR Monitoring Year	BOD Indicator	Sea Farm			
		Salmonier Cove	Dog Cove	Red Cove	Murphy Point
2015	Date				
	%Stations				
2016	Date				
	%Stations				
2017	Date	20 Sep 17	22 Sep 17		21 Sep 17
	%Stations	40 (19/48)	33 (15/46)		38 (18/48)
2018	Date				
	%Stations				
2019	Date				
	%Stations				
2020	Date				5 Oct 20
	%Stations				48 (23/48)
2021	Date				
	%Stations				
2022	Date				
	%Stations				
2023	Date	1 Aug 23			
	%Stations	54 (26/48)			

Source: MCE (2024).
Notes:
[a] If >70% of monitoring stations had the presence of *Beggiatoa* species or similar bacteria, marine worms, or barren substrate (as determined by visual monitoring) and/or if the mean concentration of free sulfide in surficial sediment was >3000 µM (as determined by sediment sampling) this is considered an exceedance (fail) of the allowable threshold.

7.8.3 Publicly Reported Performance

As detailed in Section 3.8.3, sea farm performance reports which include mass mortality, disease, and escape information and sea lice count data are available for recent years. Drugs and pesticide use information at sea farms are available for 2016–2022.

7.8.3.1 Mortality Events

No abnormal mortality events have been reported for MCE sea farms within Great Bay de l'Eau BMA for the years publicly reported on NAIA website and the Aquaculture Portal 2019–2024 (Table 7.21).

7.8.3.2 Disease

In 2023, a detection of the non-pathogenic ISAv was detected in one fish sampled at the Salmonier Cove sea farm in Great Bay de l'Eau BMA. The detected strain of ISAv does not cause disease and can be described as non-deleted highly polymorphic region (HPR) or HPR0[14]. This non-pathogenic ISAv strain (HPR0) does not require regulatory action from FFA or CFIA and therefore the site was not placed under quarantine (Table 7.21).

7.8.3.3 Escapes

No fish escapes have been reported at sea farms in the Great Bay de l'Eau BMA for the years publicly reported on NAIA website and the Aquaculture Portal 2019–2024 (Table 7.21).

Table 7.21. Summary of reportable incident events at sea farms in the Great Bay de l'Eau BMA.

Date	Sea Farm	Incident				No. Cages Impacted	No. Fish Affected	Cause	Response Measures
		Abnormal Mortality	Fish Health Suspect	Fish Health Confirmed	Escape				
2023-05-11	Salmonier Cove		ISAv non-pathogenic	ISAv non-pathogenic		1	1	HPR0 strain of ISAv	No action required

Source: aquacultureportal.ca (2024).

[14] ISA is caused by infection with the pathogenic highly polymorphic region (HPR)-deleted infectious salmon anaemia virus (ISAV), or the non-pathogenic HPR0 (non-deleted HPR) ISAV. Infection with HPR-deleted (HPR0) ISAV may cause severe disease in Atlantic salmon. However, detection of HPR0 ISAV has never been associated with clinical signs of disease in Atlantic salmon.

7.8.3.4 *Sea Lice*

Sea lice are reported on the NAIA website as an average number per fish. These results are not reported for each sea farm or BMA but as an average for all active sea farms. Table 4.22 (see Section 4.8.3.4) summarizes the average sea lice/fish for all active farms for reporting years 2021–2024.

7.8.3.5 *Deposits of Drugs and Pesticides*

Between 2016–2020, MCE has used pest management products at its sea farms in BMA 4 including bath treatments (Azamethiphos and Hydrogen Peroxide), and in-feed treatments (Emamectin Benzoate and Ivermectin). In addition, the antibiotic Florfenicol was used in 2016 (Table 7.22). These products have all been approved for use in Canada and four are registered with Health Canada (Azamethiphos, Hydrogen Peroxide, Emamectin Benzoate, and Florfenicol) while Ivermectin is available through Health Canada's EDR program. All applications are under the control of the DAV and only applied by individuals that have received training and licensing for the application.

Table 7.22. Summary of deposits of pesticides and drugs at sea farms in the Great Bay de l'Eau BMA (2016–2022).

BMA	Sea Farm	Year	Bath Treatment		In-Feed Treatment		
			Azamethiphos (Salmosan) (kg)	Hydrogen Peroxide (kg)	Emamectin Benzoate (Slice) (kg)	Florfenicol (Aquaflor) (kg)	Ivermectin (Ivomec)(kg)
4	Dog Cove	2016				15.4	0.5496
4	Dog Cove	2017	31.5		3.00286		
4	Murphy Point	2016				71.3875	0.6372
4	Murphy Point	2017	18.5		13.72909		
4	Murphy Point	2019	0.75	39980.4	0.468		
4	Murphy Point	2021	4.2				
4	Salmonier Cove	2016					0.63
4	Salmonier Cove	2017	38.27		5.63279		
4	Salmonier Cove	2022	15.0		0.69		

Source: National Aquaculture Public Reporting Data Website (2024).
Notes:
At time of writing, 2023 and 2024 data not available.

During 2016–2022, fish at all sea farms in production received treatment from pesticide (bath) or drugs (in-feed) for sea lice. As per the AAR, the total amounts (kg) of each treatment were reported to DFO (see Table 7.22).

7.9 Exposure Zone Modelling

7.9.1 PEZ Modelling

DFO has not conducted PEZ modelling for BMA 4 sea farms.

7.9.2 Dispersion Modelling

Dispersion modelling by BMT was undertaken to model exposure zones of Azamethiphos (bath treatment) in a worst-case scenario approach (see Appendix B). The modelling study estimated an exposure profile for the entire BMA assuming sea farms were treated in sequence and concentrations were modelled from the first treatment at Dog Cove sea cages (4 May 2023 for spring tide; 16 June 2023 for neap tide) through final treatment at Murphy Point sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 7.23).

Exposure zone modelling of a worst-case scenario for Azamethiphos use in the Great Bay de l'Eau BMA predicted maximum areas of 3.04 km² and 1.50 km² during neap and spring tides, respectively, where Azamethiphos concentrations exceeded 100 ng/L (0.1 µg/L) during the treatment duration. The maximum Azamethiphos concentration for the Great Bay de l'Eau BMA was 720 ng/L during the simulated neap tide and 670 ng/L during the spring tide. The peak concentration occurred during the treatments of the last farm, Murphy Point, and decreased shortly after treatments were completed; concentration levels 72 hrs after final treatment were below 100 ng/L (Figures 7.21 and 7.22). The maximum area within BMA 4 where Azamethiphos concentrations were predicted to exceed 100 ng/L was larger during the neap tide scenario (3.04 km²) than during the spring tide scenario (1.50 km²).

Table 7.23. Treatment schedule (assumed dates) for sea farms in BMA 4 during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours From Final Treatment	Treatment Date (Assumed)	Hours From Final Treatment
Dog Cove	1	04 May 23	-315	16 Jun 23	-315
	2	04 May 23	-312	16 Jun 23	-312
	3	05 May 23	-291	17 Jun 23	-291
	4	05 May 23	-288	17 Jun 23	-288
	5	06 May 23	-267	18 Jun 23	-267
	6	06 May 23	-264	18 Jun 23	-264
	7	07 May 23	-243	19 Jun 23	-243
Red Cove	1	07 May 23	-240	19 Jun 23	-240
	2	08 May 23	-219	20 Jun 23	-219
	3	08 May 23	-216	20 Jun 23	-216
	4	09 May 23	-195	21 Jun 23	-195
	5	09 May 23	-192	21 Jun 23	-192
	6	10 May 23	-171	22 Jun 23	-171
	7	10 May 23	-168	22 Jun 23	-168
Salmonier Cove	1	11 May 23	-147	23 Jun 23	-147
	2	11 May 23	-144	23 Jun 23	-144
	3	12 May 23	-123	24 Jun 23	-123
	4	12 May 23	-120	24 Jun 23	-120
	5	13 May 23	-99	25 Jun 23	-99
	6	13 May 23	-96	25 Jun 23	-96
	7	14 May 23	-75	26 Jun 23	-75
Murphy Point	1	14 May 23	-72	26 Jun 23	-72
	2	15 May 23	-51	27 Jun 23	-51
	3	15 May 23	-48	27 Jun 23	-48
	4	16 May 23	-27	28 Jun 23	-27
	5	16 May 23	-24	28 Jun 23	-24
	6	17 May 23	-3	29 Jun 23	-3
	7	17 May 23	0	29 Jun 23	0

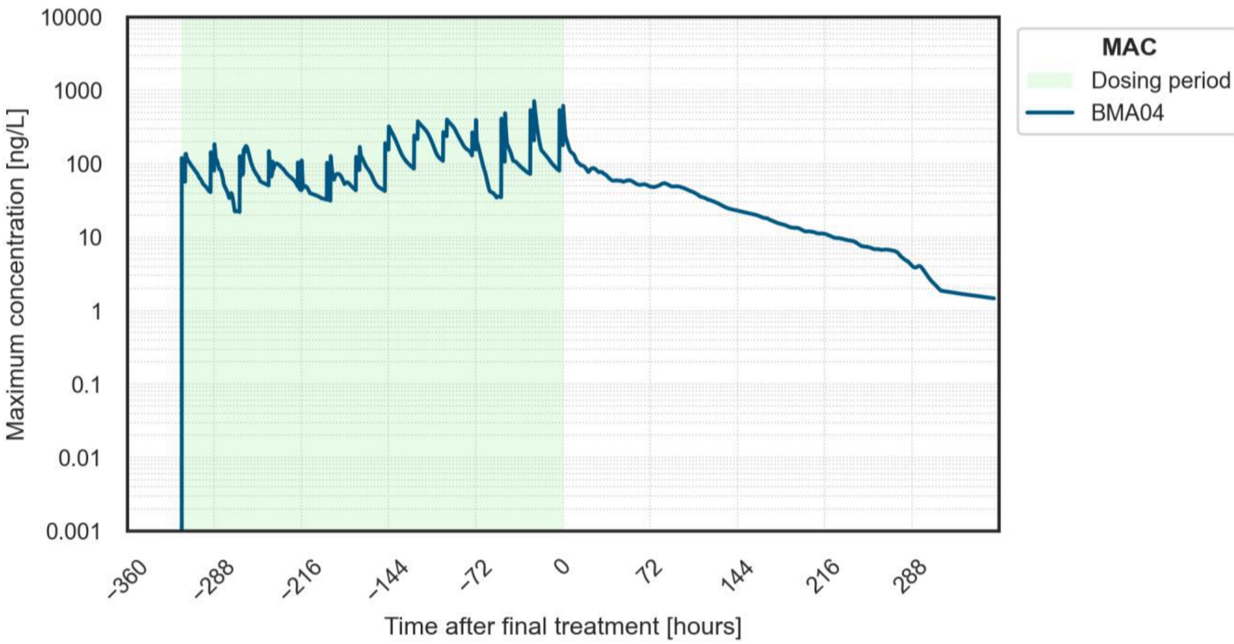


Figure 7.21. Maximum concentrations for Great Bay de l'Eau BMA during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at Dog Cove (assumed 16 June 2023) and final treatment was at Murphy Point (time=0; assumed 29 June 2023).

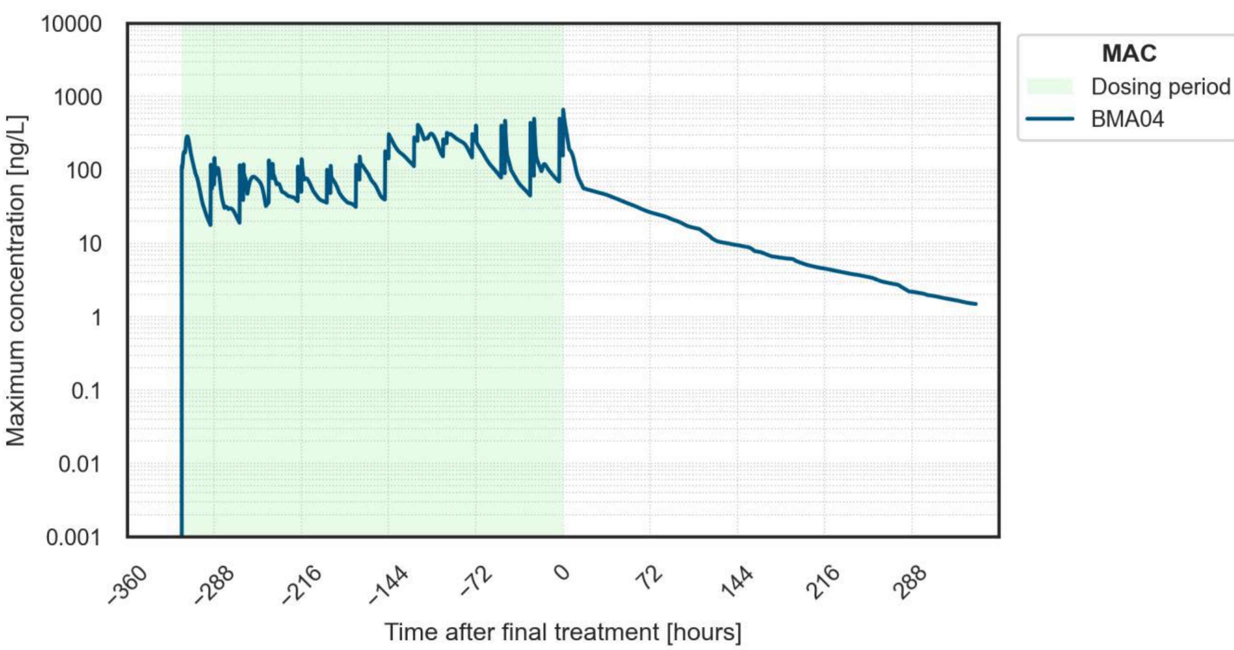


Figure 7.22. Maximum concentrations for Great Bay de l'Eau BMA during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at Dog Cove (assumed 4 May 2023) and final treatment was at Murphy Point (time=0; assumed 17 May 2023).

8.0 Harbour Breton Bay (BMA 5)

The BMA of Harbour Breton Bay (BMA 5) is located in the Bays East Area and includes four licensed sea farms: Harvey Hill East, Harvey Hill North, Broad Cove and Harvey Hill South (Table 8.1; Figure 8.1). All sea farms are located in relatively close proximity to one another. The closest community to these sea farms is Harbour Breton. All four sea farms have had previous production cycles.

Table 8.1. Harbour Breton sea farm coordinates and construction status 2024.

BMA Name	BMA No.	Farm Site Name	AQ Licence No.	Site Coordinates		Construction Status
				Latitude (N)	Longitude (W)	
Harbour Breton Bay	5	Harvey Hill East	991	47.53850	-55.75619	Existing
		Harvey Hill North	993	47.56081	-55.74733	Existing
		Broad Cove	1045	47.50769	-55.77339	Existing
		Harvey Hill South	1121	47.52800	-55.77631	Existing

The sea farms in Harbour Breton Bay were originally designed with either a 1x4 or 2x7 sea cage array with a net circumference of 160 m or 90–100 m and a depth of 25 m or 15 m. Beyond 2025, sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The maximum number of fish per site ranges from 500,000–600,000 with a maximum stocking density of 15 kg/m^3.

The water depths below the leases range from 10–160 m (Table 8.2). Based on the available data, the water depth under the sea cages is similar for the sea farms in Harbour Breton Bay with the shallowest sea farm being Harvey Hill East (48–79 m). The sea farms have bottom sediments consisting of mixed substrates. Three sites were classified as hard bottom, Harvey Hill North was classified as soft bottom.

Currents were reported at near surface, upper, mid-water, and near bottom depths. At 15 m water depth, the maximum water current speed at each site was between ~five to ~six times the mean speed (Table 8.2). There is much vertical variation in the maximum current speed and this variation is larger than the mean current speeds.

Benthic habitat surveys revealed that the predominate flora and fauna at sea farms are anemones, arrow worms and Northern shrimp (Tables 8.3–8.6). Soft corals were also observed in three of four sea farms in Harbour Breton BMA (Harvey Hill North, Broad Cove, and Harvey Hill South).

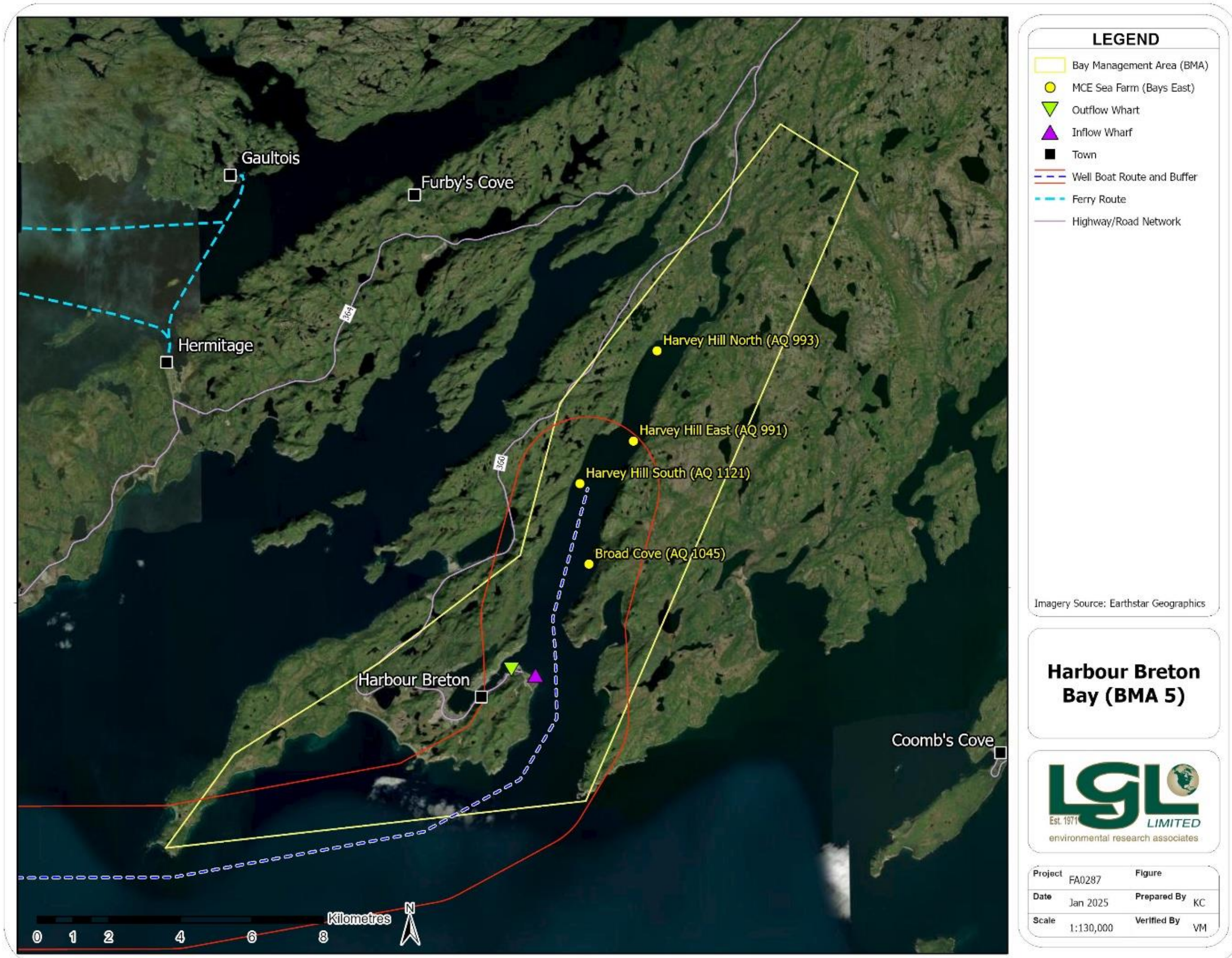


Figure 8.1. Locations of sea farms in the Harbour Breton Bay BMA.

Table 8.2. Summary of historic site-specific sea farm characteristics in Harbour Breton Bay (BMA 5).

Characteristic	Sea Farm			
	Harvey Hill East	Harvey Hill North	Broad Cove	Harvey Hill South
Lease area (ha)	20	20	20	28
Water depth under lease (m)	20–145	10–118	20–150	20–160
Water depth under sea cages (m)	48–79	42–88	42–89	n/a
Predominant Bottom Type	Hard	Soft	Hard	Hard
Water Temperature (Mean °C at 15 m)				
Winter [a]	2.51	n/a	2.2	n/a
Spring [a]	5.13	n/a	4.72	4.23
Summer [a]	10.63	n/a	10.59	5.16
Fall [a]	8.81	n/a	8.86	n/a
Dissolved Oxygen (Mean mg/L at 15 m)				
Winter [a]	10.50	n/a	10.77	n/a
Spring [a]	10.79	n/a	10.85	9.97
Summer [a]	9.07	10.90	9.15	9.73
Fall [a]	9.37	11.53	9.37	n/a
Currents (cm/s at 15 m)				
Mean	3.8	2.32	4.2	4.6
Maximum	18.2	12.74	18.1	26.1

Notes:

[a] Winter includes January, February and March; Spring includes April, May June; Summer includes July, August, September; and Fall includes October, November and December.

Water depth values may vary by approximately ± 2 m depending on tidal influence.

Seasonal water temperatures at 15 m water depth were relatively similar across sea farms (Table 8.2). Mean water temperatures ranged from 2.07°C in winter to 15.72°C in the summer. Dissolved oxygen levels were consistently lower in the summer and fall than winter and spring. Salinity is available for Harvey Hill East, Harvey Hill South and Broad Cove and was fairly consistent across sea farms and seasons with averages ranging from 28.0–31.0 ppt in the three sea farms (see Table 8.10).

During 2009–2018, average monthly wind speeds ranged from 5.40 m/s in July to 10.81 m/s in January (see Table 8.16). The maximum wind speed during this period was 22.00 m/s in February. Wind direction in the Harbour Breton Bay BMA was predominately westerly. Mean wave height from 2009–2018 ranged from 0.71 m in June to 1.93 m in January. The maximum wave height was 5.12 m in December.

8.1 Sea Farm Site Maps

The past designs for sea farms in the Harbour Breton Bay BMA include a 1x4 or 2x7 sea cage array with a net circumference of 160 m or 90–100 m and a depth of 25 m or 15 m. Beyond 2025, sea cages systems will be updated to have cages that are either 140 m or 160 m in circumference with a minimum depth of 20 m. The sea farms in the Harbour Breton Bay BMA are currently third -party certified or will be prior to future stocking [as per FFA policy (FFA 2019).

8.1.1 Harvey Hill East

The Harvey Hill East sea farm has a 1x4 sea cage array with a net circumference of 160 m and a depth of 25 m (Figure 8.2).

8.1.2 Harvey Hill North

As originally designed, the Harvey Hill North sea farm has a 2x7 sea cage array with a net circumference of 90–100 m and a depth of 15 m (Figure 8.3).

8.1.3 Broad Cove

The Broad Cove sea farm has a 1x4 sea cage array with a net circumference of 160 m and a depth of 25 m (Figure 8.4).

8.1.4 Harvey Hill South

The Harvey Hill South sea farm has a 1x4 sea cage array with a net circumference of 160 m and a depth of 25 m (Figure 8.5).

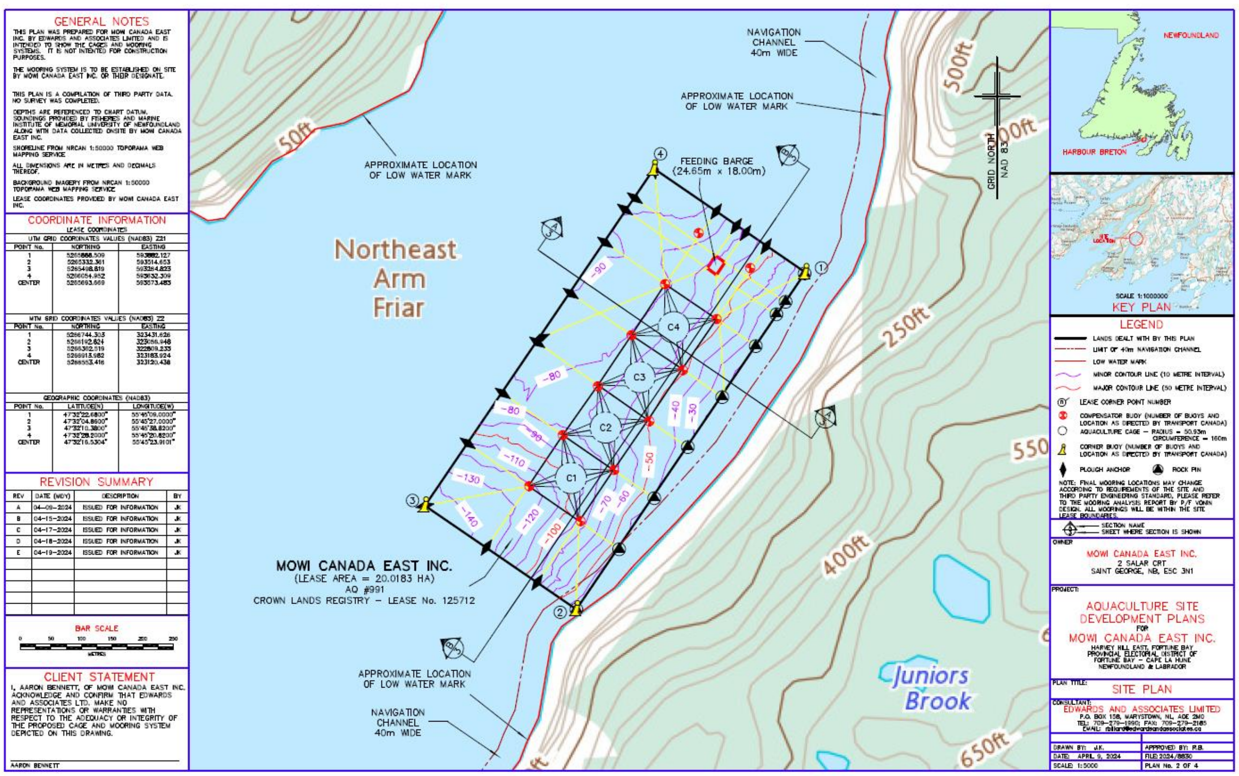
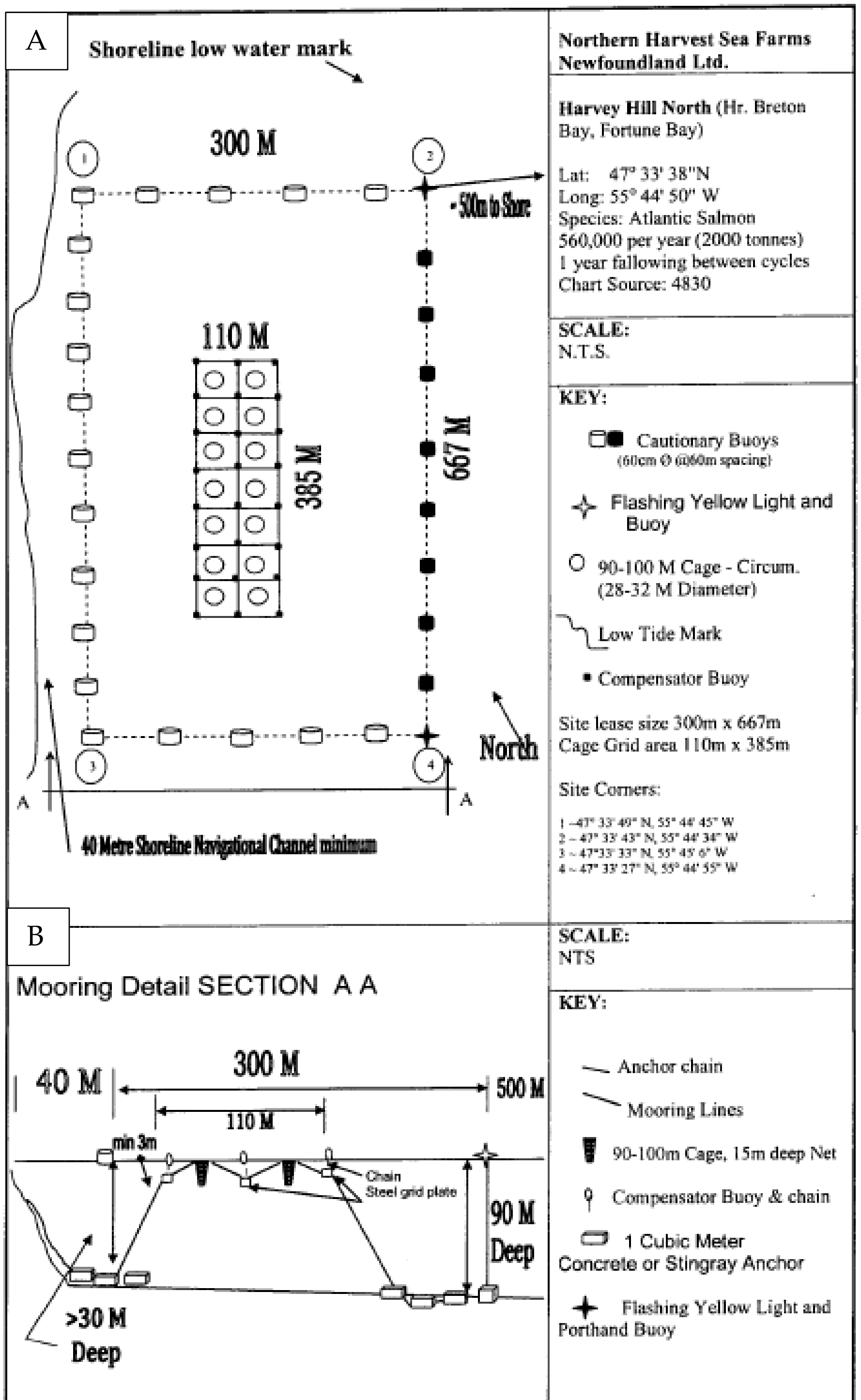


Figure 8.2. Harvey Hill East sea farm map and sea cage layout.



Note: Final Site Markings to be determined by Department of Transport as per NWPA

Figure 8.3. Harvey Hill North (A) sea farm map and (B) sea cage layout.

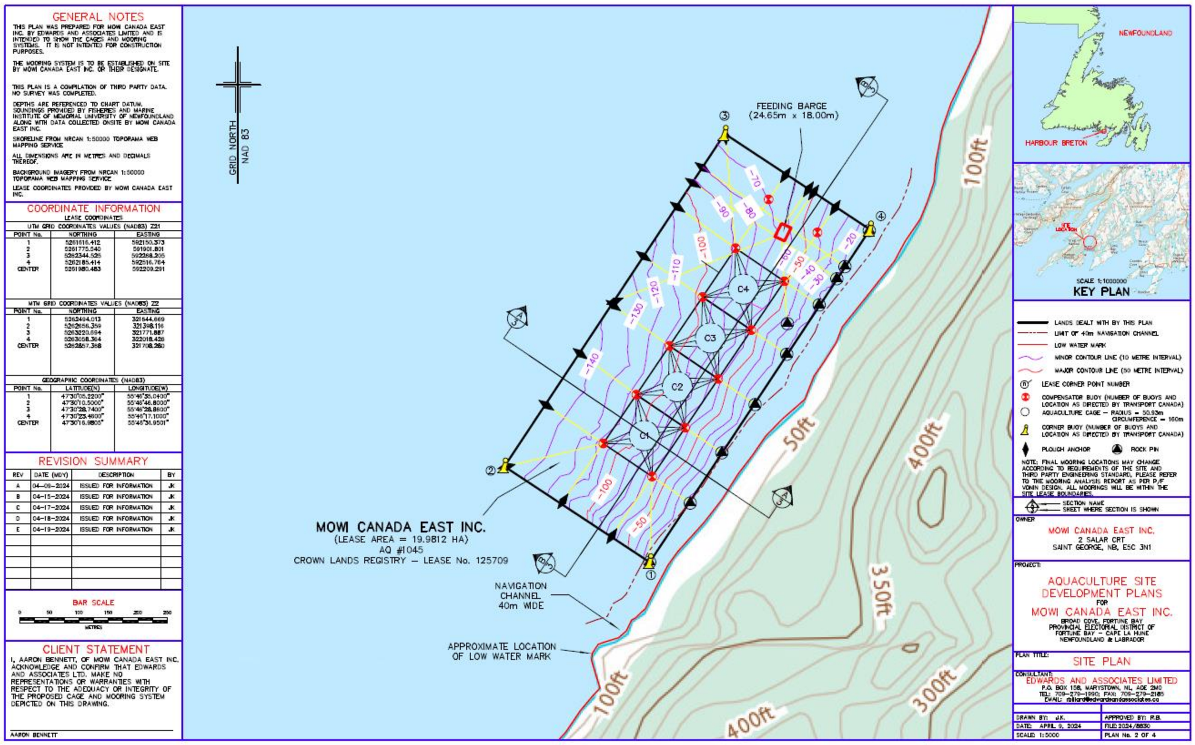


Figure 8.4. Broad Cove sea farm map and sea cage layout.

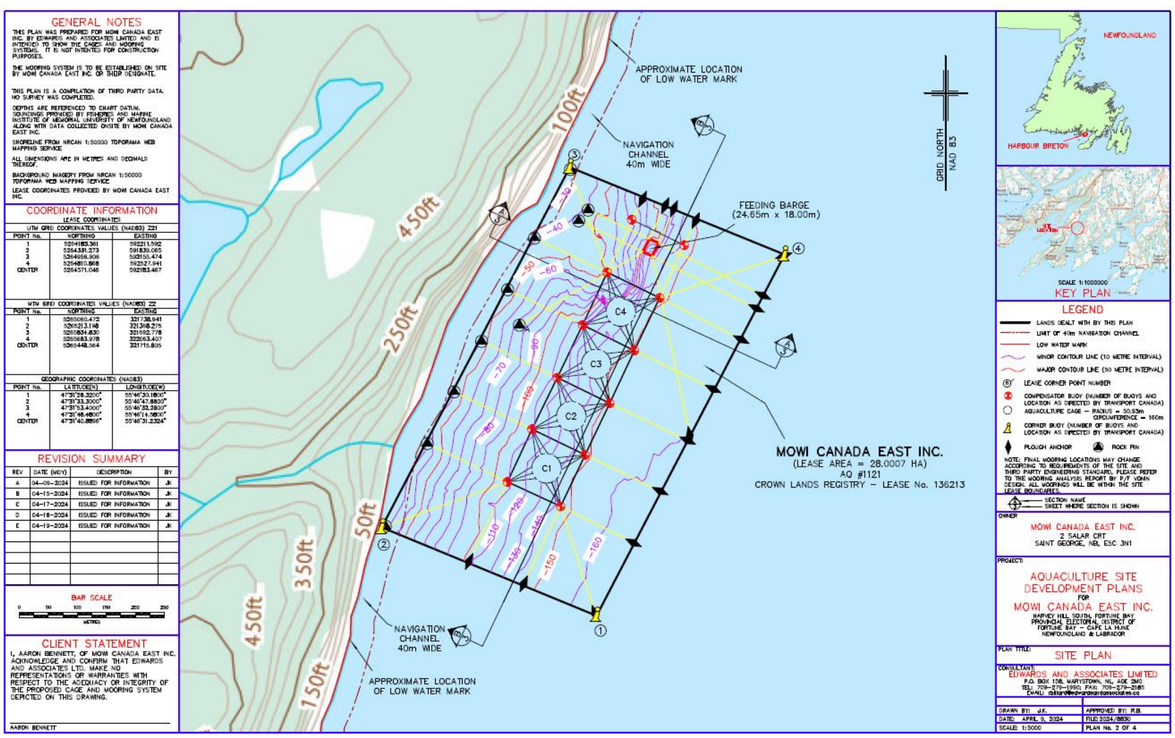


Figure 8.5. Harvey Hill South sea farm map and sea cage layout.

8.2 Benthic Surveys

Benthic surveys at sea farms in the Harbour Breton Bay BMA were conducted in May 2009 (Harvey Hill South), and May 2024 (Harvey Hill East, Harvey Hill North, and Broad Cove). Benthic survey conducted at Harvey Hill South in 2009, were prior to enactment of the AAR and video observations were not made at water depths >100 m. Stations categorized as hard bottom appeared hard visually or did not produce acceptable grab samples.

8.2.1 Harvey Hill East

Based on surveys at 46 sampling stations the composition of the seafloor in the Harvey Hill East sea farm is composed primarily mixed with silt, sand, gravel and cobble (Figure 8.6; Table 8.3). The majority of stations (36 of 46) were considered hard bottom. The predominant species observed included green sea urchins, arrow worms, brittle stars and anemones (Table 8.3).

8.2.2 Harvey Hill North

Based on surveys at 45 of the 49 sampling stations (~8% (n=4) were obstructed by a cage), the composition of the seafloor in the Harvey Hill North sea farm is composed primarily of a mixture of silt, sand, gravel and cobble (Figure 8.7; Table 8.4). More than half (24 of 45) stations were considered soft bottom. The predominant species observed included brittle stars, Northern shrimp, arrow worms, anemones (*Hormathia* sp.) and krill (Table 8.4). One soft coral was observed during the survey.

8.2.3 Broad Cove

Based on surveys at 45 sampling stations, the composition of the seafloor in the Broad Cove sea farm is composed primarily of silt, mud and grain sizes ranging from boulder to silt (Figure 8.8; Table 8.5). More than half of stations (24 of 45) were considered hard bottom. The predominant species observed included arrow worms, anemones (*Hormathia* sp.) and brittle stars. One soft coral was observed (Table 8.5).

8.2.4 Harvey Hill South

Based on surveys at 15 of the 40 sampling stations (~63% (n=25) were too deep to sample), the composition of the sea floor was primarily bedrock and cobble (Figure 8.9; Table 8.6). The majority of stations (14 of 15 sampled) were considered hard bottom. The predominant species observed included kelp, algae and anemones (Table 8.6). Soft corals were observed at two stations.

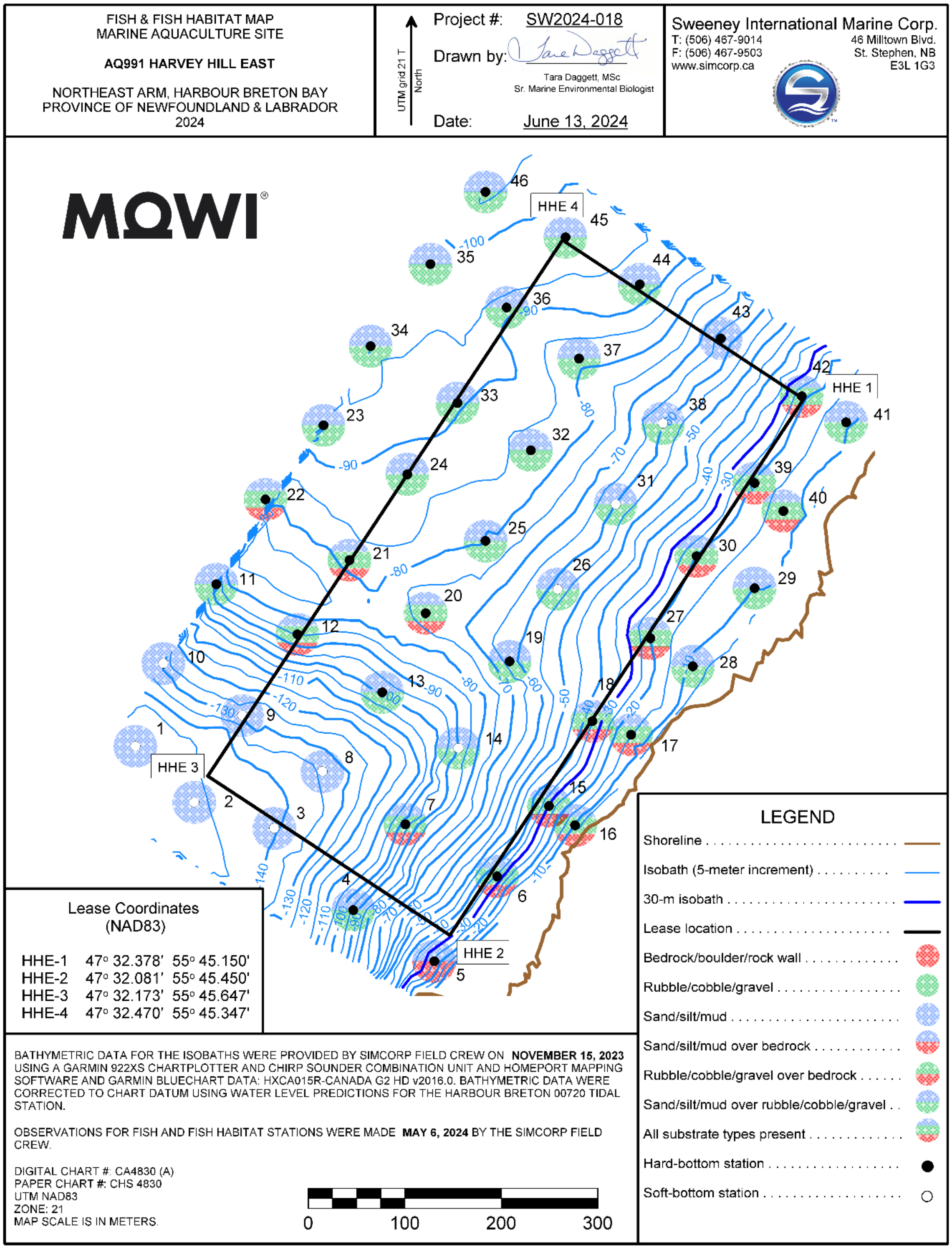


Figure 8.6. Habitat observations at sampling stations in the Harvey Hill East sea farm (May 2024).

Table 8.3. Summary of bottom type and observed flora and fauna at the Harvey Hill East sea farm (May 2024).

Harvey Hill East																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
HHE	1	47 32.190	55 45.707	150	Soft							10%	90%			arrow worm (3), krill (1), *Pandalus* shrimp (7)
HHE	2	47 32.158	55 45.659	149	Soft							10%	90%			feather star (12), *Pandalus* shrimp (9)
HHE	3	47 32.143	55 45.593	135	Soft							10%	90%			*Pandalus* shrimp (17)
HHE	4	47 32.096	55 45.529	96	Hard					35%	10%	40%	15%			arrow worm (2), *Henricia* blood star (1), brittle star (>20), *Cerianthus* anemone (>20), green sea urchin (2), *Pandalus* shrimp (5)
HHE	5	47 32.067	55 45.463	28	Hard	85%						10%	5%			green sea urchin (16), encrusting sponge (<5%), *Lithothamnion* (60%), *Hildenbrandia* (5%), sea colander kelp (10%)
HHE	6	47 32.114	55 45.410	35	Hard		20%	20%	15%	15%	5%	20%	5%			chalice sponge (1), *Asterias* sea star (1), green sea urchin (3)
HHE	7	47 32.144	55 45.485	99	Hard			5%			5%	20%	70%			arrow worm (7), brittle star (>20), *Hormathia* anemone (2), *Pandalus* shrimp (10), snow crab (1)
HHE	8	47 32.174	55 45.553	138	Soft							15%	85%			*Asterias* sea star (1), arrow worm (1), *Pandalus* shrimp (13)
HHE	9	47 32.206	55 45.618	134	Soft							10%	90%			arrow worm (9), brittle star (1), *Geodiidae* sponge (1), *Hormathia* anemone (>20), *Pandalus* shrimp (1), rock gunnel (1)
HHE	10	47 32.236	55 45.683	131	Soft							10%	90%			arrow worm (9), brittle star (5), *Geodiidae* sponge (6), *Hormathia* anemone (>20), *Pandalus* shrimp (11)
HHE	11	47 32.280	55 45.638	89	Hard				15%	20%	20%	35%	10%			brittle star (>20), *Cerianthus* anemone (1), *Geodiidae* sponge (12), green sea urchin (3), *Hormathia* anemone (>20), encrusting sponge (<5%)
HHE	12	47 32.251	55 45.572	91	Hard			5%	10%	15%	45%	20%	5%			arrow worm (6), brittle star (>20), *Cerianthus* anemone (10), feather star (2), green sea urchin (7), *Hormathia* anemone (8), krill (1), *Pandalus* shrimp (3), encrusting sponge (<5%)
HHE	13	47 32.218	55 45.502	106	Hard					15%	25%	50%	10%			arrow worm (3), brittle star (>20), *Cerianthus* anemone (15), green sea urchin (3), blue mussel (9)
HHE	14	47 32.186	55 45.440	102	Soft				5%	5%	15%	25%	50%			arrow worm (4), brittle star (>20), green sea urchin (2), blue mussel (5)
HHE	15	47 32.153	55 45.366	32	Hard			10%	30%	15%	5%	30%	10%			*Asterias* sea star (1), *Geodiidae* sponge (>20), green sea urchin (5), *Lithothamnion* (30%), *Hildenbrandia* (<5%), sea colander kelp (<5%)
HHE	16	47 32.142	55 45.345	11	Hard			20%	30%	10%	5%	30%	5%			*Asterias* sea star (2), *Cerianthus* anemone (2), green sea urchin (2), sea colander kelp (30%)
HHE	17	47 32.192	55 45.297	17	Hard			10%	15%	25%	10%	30%	10%			*Asterias* sea star (3), green sea urchin (4), ctenophore (2), *Pandalus* shrimp (1), encrusting sponge (<5%), *Lithothamnion* (10%), sea colander kelp (30%)
HHE	18	47 32.200	55 45.329	35	Hard			30%	15%	10%	10%	25%	10%			*Asterias* sea star (3), *Geodiidae* sponge (>20), green sea urchin

Harvey Hill East																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																(3), ctenophore (1), *Lithothamnion* (40%), *Hildenbrandia* (<5%)
HHE	19	47 32.234	55 45.397	65	Hard					5%		20%	75%			*Asterias* sea star (11), arrow worm (1), brittle star (5), green sea urchin (2), blue mussel (5), *Pandalus* shrimp (1), toad crab (1)
HHE	20	47 32.262	55 45.465	74	Hard			5%	20%	25%	15%	25%	10%			*Asterias* sea star (3), arrow worm (13), brittle star (>20), *Cerianthus* anemone (>20), green sea urchin (3), *Lithothamnion* (15%)
HHE	21	47 32.292	55 45.528	78	Hard			5%	15%	25%	20%	25%	10%			arrow worm (6), brittle star (>20), *Cerianthus* anemone (10), green sea urchin (3), *Hormathia* anemone (16), encrusting sponge (<5%), *Lithothamnion* (10%), *Hildenbrandia* (<5%), Irish moss (<5%)
HHE	22	47 32.327	55 45.596	78	Hard			5%	20%	30%	20%	20%	5%			*Asterias* sea star (2), arrow worm (2), brittle star (>20), *Cerianthus* anemone (>20), chiton (1), green sea urchin (3), *Hormathia* anemone (>20), encrusting sponge (<5%), *Lithothamnion* (10%)
HHE	23	47 32.368	55 45.547	94	Hard				5%	35%	10%	30%	20%			arrow worm (>20), brittle star (>20), *Cerianthus* anemone (4), *Hormathia* anemone (3), krill (5), toad crab (1)
HHE	24	47 32.340	55 45.479	91	Hard				15%	20%	20%	30%	15%			*Asterias* sea star (4), arrow worm (7), brittle star (>20), *Cerianthus* anemone (>20), *Geodiidae* sponge (>20), green sea urchin (10), *Hormathia* anemone (6), krill (2), encrusting sponge (<5%), whelk (1)
HHE	25	47 32.302	55 45.415	81	Hard				10%	35%	15%	30%	10%			arrow worm (2), brittle star (>20), *Cerianthus* anemone (>20), *Geodiidae* sponge (10), green sea urchin (8), *Hormathia* anemone (2), spiny sun star (1)
HHE	26	47 32.274	55 45.356	59	Soft					5%	10%	30%	55%			arrow worm (2), brittle star (9), green sea urchin (8), blue mussel (7), trumpet worm (2)
HHE	27	47 32.246	55 45.280	23	Hard			20%	30%	15%	5%	20%	10%			*Asterias* sea star (6), *Geodiidae* sponge (>20), green sea urchin (13), blue mussel (7), *Lithothamnion* (40%), sea colander kelp (30%)
HHE	28	47 32.230	55 45.245	11	Hard					60%	10%	15%	15%			*Asterias* sea star (2), *Cerianthus* anemone (10), green sea urchin (>20), ctenophore (2), smooth sun star (1), scallop (1), *Lithothamnion* (5%), *Desmarestia* (<5%)
HHE	29	47 32.273	55 45.193	12	Hard				5%	60%	10%	20%	5%			*Cerianthus* anemone (>20), green sea urchin (>20), ctenophore (2), sea colander kelp (30%)
HHE	30	47 32.291	55 45.241	19	Hard			20%	40%	10%	15%	15%				*Asterias* sea star (5), *Cerianthus* anemone (3), green sea urchin (>20), ctenophore (6), *Lithothamnion* (40%), sea colander kelp (<5%), *Saccharina* (<5%)

Harvey Hill East																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
HHE	31	47 32.321	55 45.307	60	Soft					5%	5%	30%	60%			green sea urchin (13), *Metridium* anemone (3), blue mussel (>20), unidentified brown algae (<5%)
HHE	32	47 32.352	55 45.376	85	Hard				5%	15%	15%	40%	25%			arrow worm (2), brittle star (>20), *Cerianthus* anemone (>20), green sea urchin (5), *Pandalus* shrimp (1), smooth sun star (1), spiny sun star (1)
HHE	33	47 32.379	55 45.436	91	Hard					30%	30%	20%	20%			arrow worm (5), brittle star (>20), *Cerianthus* anemone (10), feather star (2), *Hormathia* anemone (2), krill (8), *Pandalus* shrimp (1)
HHE	34	47 32.412	55 45.507	96	Hard				10%	10%	5%	30%	45%			arrow worm (2), brittle star (>20), *Cerianthus* anemone (>20), green sea urchin (1), *Hormathia* anemone (14), krill (3), *Melonanchora* sponge (1), *Pandalus* shrimp (2), Irish moss (<5%), sculpin (1), fan bryozoan (3)
HHE	35	47 32.457	55 45.457	99	Hard				10%	15%	25%	35%	15%			*Asterias* sea star (3), arrow worm (6), brittle star (>20), *Cerianthus* anemone (2), green sea urchin (15), *Hormathia* anemone (18), krill (6), *Melonanchora* sponge (2), *Pandalus* shrimp (3), encrusting sponge (<5%)
HHE	36	47 32.432	55 45.394	93	Hard					5%	10%	30%	55%			arrow worm (>20), brittle star (>20), *Cerianthus* anemone (15), *Geodiidae* sponge (>20), *Hormathia* anemone (10), krill (12), whelk (2)
HHE	37	47 32.403	55 45.335	82	Hard				5%	30%	20%	30%	15%			arrow worm (>20), brittle star (>20), *Cerianthus* anemone (11), green sea urchin (3), krill (10), *Pandalus* shrimp (2), whelk (1)
HHE	38	47 32.366	55 45.267	63	Soft					5%		50%	45%			arrow worm (2), brittle star (4), green sea urchin (16), krill (>20), blue mussel (>20)
HHE	39	47 32.332	55 45.192	21	Hard		15%	25%	5%	20%	10%	20%	5%			green sea urchin (>20), ctenophore (3), *Lithothamnion* (45%), *Hildenbrandia* (<5%), sea colander kelp (5%)
HHE	40	47 32.316	55 45.168	14	Hard			20%	30%	25%		20%	5%			*Asterias* sea star (2), *Cerianthus* anemone (5), green sea urchin (>20), ctenophore (3), *Lithothamnion* (5%), sea colander kelp (<5%)
HHE	41	47 32.365	55 45.115	13	Hard				10%	40%	15%	25%	10%			*Asterias* sea star (1), *Cerianthus* anemone (9), green sea urchin (10), ctenophore (3), *Lithothamnion* (<5%), *Rhodophyta* (<5%)
HHE	42	47 32.380	55 45.152	26	Hard			15%	20%	25%	5%	20%	15%			*Asterias* sea star (2), green sea urchin (10), *Lithothamnion* (10%), *Hildenbrandia* (<5%), sea colander kelp (<5%)
HHE	43	47 32.413	55 45.218	64	Hard							35%	65%			arrow worm (2), brittle star (5), *Cerianthus* anemone (4), green sea urchin (2), trumpet worm (10)
HHE	44	47 32.444	55 45.284	93	Hard				5%	5%		20%	70%			arrow worm (11), brittle star (>20), *Cerianthus* anemone (16), green sea urchin (4), krill (7),

Harvey Hill East																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																Melonanchora sponge (1), moon jellyfish (1), mussel (10), *Pandalus* shrimp (2), trumpet worm (2), hermit crab (1)
HHE	45	47 32.471	55 45.345	100	Hard				5%	15%	5%	50%	25%			brittle star (>20), *Cerianthus* anemone (6), *Hormathia* anemone (14), krill (5), *Pandalus* shrimp (4), eelpout (1), smooth sun star (2), spiny sun star (1), toad crab (1)
HHE	46	47 32.497	55 45.410	106	Hard				5%	40%	20%	25%	10%			arrow worm (>20), brittle star (>20), *Cerianthus* anemone (5), green sea urchin (3), *Geodiidae* sponge (>20), *Hormathia* anemone (16), krill (6) *Pandalus* shrimp (10), Irish moss (<5%), unidentified brown algae (<5%), unidentified tunicate (1), whelk (6)

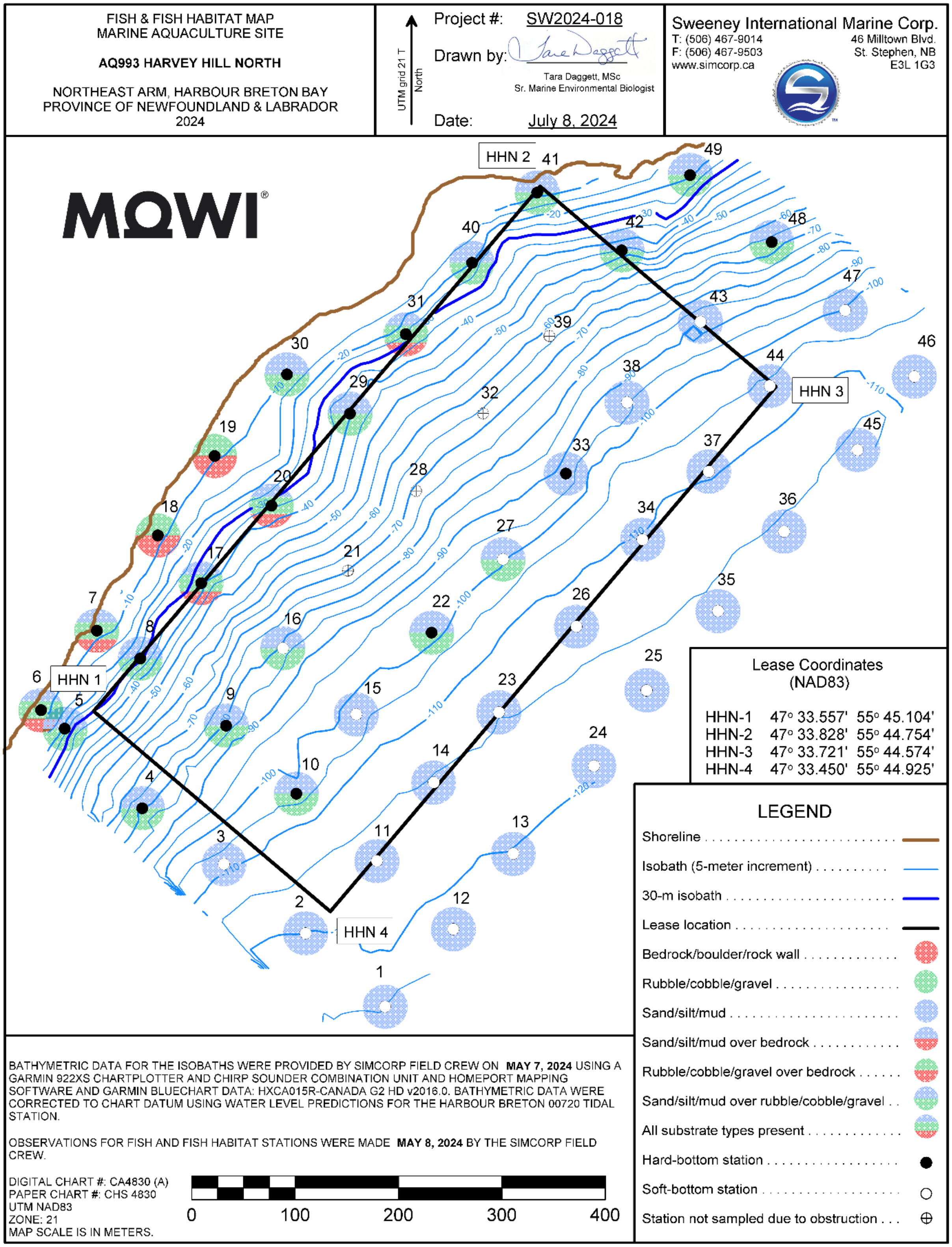


Figure 8.7. Habitat observations at sampling stations in the Harvey Hill North sea farm (May 2024).

Table 8.4. Summary of bottom type and observed flora and fauna at the Harvey Hill North sea farm (May 2024).

Harvey Hill North															
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition									Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
HHN	1	47 33.400	55 44.883	126	Soft								100%			arrow worm (8), *Pandalus* shrimp (10), *Hormathia* anemone (1), infaunal burrow (4)
HHN	2	47 33.439	55 44.944	121	Soft								100%			arrow worm (7), krill (7), *Pandalus* shrimp (6), *Hormathia* anemone (1), snow crab (2), infaunal burrow (4)
HHN	3	47 33.476	55 45.006	110	Soft								100%			arrow worm (1), krill (1), *Pandalus* shrimp (10), *Hormathia* anemone (5), snow crab (2), unidentified crab (4), infaunal burrow (1)
HHN	4	47 33.506	55 45.068	79	Hard					10%	15%		75%			arrow worm (1), krill (13), brittle star (11), *Hormathia* anemone (>20)
HHN	5	47 33.548	55 45.127	25	Hard					15%	20%	45%	20%			*Asterias* sea star (2), green sea urchin (4), comb jelly (2), sea colander (25%), *Desmarestia* (<5%)
HHN	6	47 33.558	55 45.145	10	Hard			25%	20%	15%	20%	15%	5%			green sea urchin (1), infaunal burrow (1), *Desmarestia* (10%)
HHN	7	47 33.599	55 45.101	8	Hard			10%	5%	20%	30%	25%	10%			green sea urchin (2), comb jelly (2), infaunal burrow (1), *Desmarestia* (10%)
HHN	8	47 33.584	55 45.068	28	Hard			<5%	<5%	25%	40%	20%	15%			green sea urchin (3), *Asterias* sea star (1)
HHN	9	47 33.548	55 45.003	83	Hard						5%	20%	75%			brittle star (18), *Hormathia* anemone (11), arrow worm (1), krill (6)
HHN	10	47 33.512	55 44.949	104	Hard					10%	15%	35%	40%			feather star (3), brittle star (11), snow crab (1), unidentified flounder (2), arrow worm (2), *Hormathia* anemone (>20), infaunal burrow (3)
HHN	11	47 33.476	55 44.888	118	Soft								100%			*Pandalus* shrimp (11), arrow worm (4), infaunal burrow (3)
HHN	12	47 33.440	55 44.830	123	Soft								100%			*Pandalus* shrimp (10), infaunal burrow (10), arrow worm (3), krill (4)
HHN	13	47 33.479	55 44.783	122	Soft								100%			cushion star (2), arrow worm (4)
HHN	14	47 33.517	55 44.843	117	Soft								100%			*Pandalus* shrimp (7), arrow worm (9), krill (4), infaunal burrow (5)
HHN	15	47 33.553	55 44.902	103	Soft							5%	95%			brittle star (>20), *Hormathia* anemone (>20), *Pandalus* shrimp (8), feather star (1), krill (2)
HHN	16	47 33.588	55 44.958	83	Soft						5%	15%	80%			worm tube (5), brittle star (11), *Pandalus* shrimp (2), krill (7), green sea urchin (1), *Asterias* sea star (1), arrow worm (1)
HHN	17	47 33.623	55 45.020	41	Hard			10%	15%	25%	20%	25%	5%			*Asterias* sea star (4), green sea urchin (9), *Lithothamnion* (20%), *Hildenbrandia* (<5%)
HHN	18	47 33.648	55 45.053	10	Hard			15%	5%	75%	5%					green sea urchin (>20), *Metridium* anemone (3), *Asterias* sea star (1), *Lithothamnion* (5%)
HHN	19	47 33.689	55 45.008	13	Hard			5%	10%	30%	55%					green sea urchin (19), sea scallop (2), *Cerianthus* anemone (16), *Desmarestia* (5%)
HHN	20	47 33.663	55 44.965	32	Hard			10%	25%	25%	25%	15%				*Asterias* sea star (6), green sea urchin (3), *Lithothamanion* (25%)
HHN	21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Cage obstruction

Harvey Hill North																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
HHN	22	47 33.595	55 44.843	99	Hard						5%	15%	80%			brittle star (>20), *Hormathia* anemone (>20), *Pandalus* shrimp (9), green sea urchin (1), hermit crab (2), krill (3), feather star (1)
HHN	23	47 33.553	55 44.792	118	Soft								100%			infaunal burrow (7), *Pandalus* shrimp (5), arrow worm (5)
HHN	24	47 33.524	55 44.719	120	Soft								100%			*Pandalus* shrimp (>20), *Hormathia* anemone (2), infaunal burrow (8), *Asterias* sea star (1), krill (3), arrow worm (3)
HHN	25	47 33.563	55 44.678	119	Soft							5%	95%			cushion star (1), *Hormathia* anemone (3), *Pandalus* shrimp (13), unidentified crab (1), krill (5), arrow worm (4), infaunal burrow (>20)
HHN	26	47 33.597	55 44.731	114	Soft							5%	95%			*Pandalus* shrimp (8), infaunal burrow (3), krill (2), arrow worm (1)
HHN	27	47 33.633	55 44.787	101	Soft				<5%		5%	15%	80%			brittle star (>20), *Hormathia* anemone (12), *Gersemia* soft coral (1), *Pandalus* shrimp (5), krill (8), arrow worm (2), unidentified flounder (1)
HHN	28	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Cage obstruction
HHN	29	47 33.710	55 44.903	43	Hard					20%	25%	20%	35%			*Asterias* sea star (2), spiny sun star (1), green sea urchin (3), *Metridium* anemone (3)
HHN	30	47 33.731	55 44.951	13	Hard			<5%	<5%	30%	35%	25%	10%			green sea urchin (>20), *Asterias* sea star (4), *Cerianthus* anemone (11), sea scallop (4), *Desmarestia* (5%)
HHN	31	47 33.751	55 44.859	24	Hard			5%	10%	25%	35%	20%	5%			*Asterias* sea star (6), green sea urchin (5), *Lithothamnion* (65%), *Hildenbrandia* (5%)
HHN	32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Cage obstruction
HHN	33	47 33.677	55 44.737	92	Hard							10%	90%			brittle star (>20), *Hormathia* anemone (>20), *Pandalus* shrimp (7), krill (11), arrow worm (2)
HHN	34	47 33.642	55 44.679	112	Soft							5%	95%			*Pandalus* shrimp (6), *Hormathia* anemone (2), arrow worm (6), infaunal burrow (>20), toad crab (1), unidentified flounder (1), krill (3)
HHN	35	47 33.604	55 44.622	117	Soft								100%			*Pandalus* shrimp (3), krill (14), arrow worm (3)
HHN	36	47 33.645	55 44.570	117	Soft								100%			*Pandalus* shrimp (>20), *Hormathia* anemone (2), infaunal burrow (10), arrow worm (1)
HHN	37	47 33.677	55 44.627	109	Soft								100%			*Pandalus* shrimp (9), *Hormathia* anemone (3), arrow worm (3), infaunal burrow (3), snow crab (1)
HHN	38	47 33.714	55 44.689	99	Soft								100%			brittle star (>20), *Hormathia* anemone (>20), *Pandalus* shrimp (3), krill (>20), arrow worm (2)
HHN	39	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Cage obstruction
HHN	40	47 33.788	55 44.807	20	Hard			<5%	15%	35%	20%	25%	5%			green sea urchin (5), *Asterias* sea star (3), *Lithothamnion* (45%), *Hildenbrandia* (5%)
HHN	41	47 33.824	55 44.756	8	Hard				10%	40%	25%	15%	10%			green sea urchin (3), *Cerianthus* anemone (4), blood star (1), infaunal

Harvey Hill North																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																burrow (4), *Desmarestia* (5%), *Saccharina* (10%), *Fucus* (<5%)
HHN	42	47 33.793	55 44.691	45	Hard			<5%	10%	25%	20%	30%	15%			green sea urchin (3), brittle star (9), infaunal burrows (3), *Lithothamnion* (20%)
HHN	43	47 33.755	55 44.632	89	Soft								100%			*Hormathia* anemone (>20), brittle star (>20), *Pandalus* shrimp (6), krill (2)
HHN	44	47 33.721	55 44.579	107	Soft								100%			*Hormathia* anemone (3), *Pandalus* shrimp (1), krill (3), infaunal burrow (6)
HHN	45	47 33.687	55 44.512	116	Soft								100%			*Pandalus* shrimp (>20), spiny sunstar (1), *Hormathia* anemone (18), brittle star (>20), infaunal burrow (10)
HHN	46	47 33.725	55 44.467	108	Soft			<5%					100%			*Hormathia* anemone (>20), brittle star (>20), *Pandalus* shrimp (4), *Geodiiae* sponge (3), toad crab (1), arrow worm (1), krill (1)
HHN	47	47 33.760	55 44.520	104	Soft								100%			brittle star (>20), *Hormathia* anemone (7), cushion star (2), krill (2)
HHN	48	47 33.796	55 44.576	68	Hard					20%	15%	20%	45%			brittle star (>20), *Hormathia* anemone (1), green sea urchin (3)
HHN	49	47 33.832	55 44.638	21	Hard			<5%	25%	25%	20%	20%	10%			*Asterias* sea star (2), green sea urchin (3), *Cerianthus* anemone (3), ctenophore (2), *Lithothamnion* (15%), sea colander (20%)

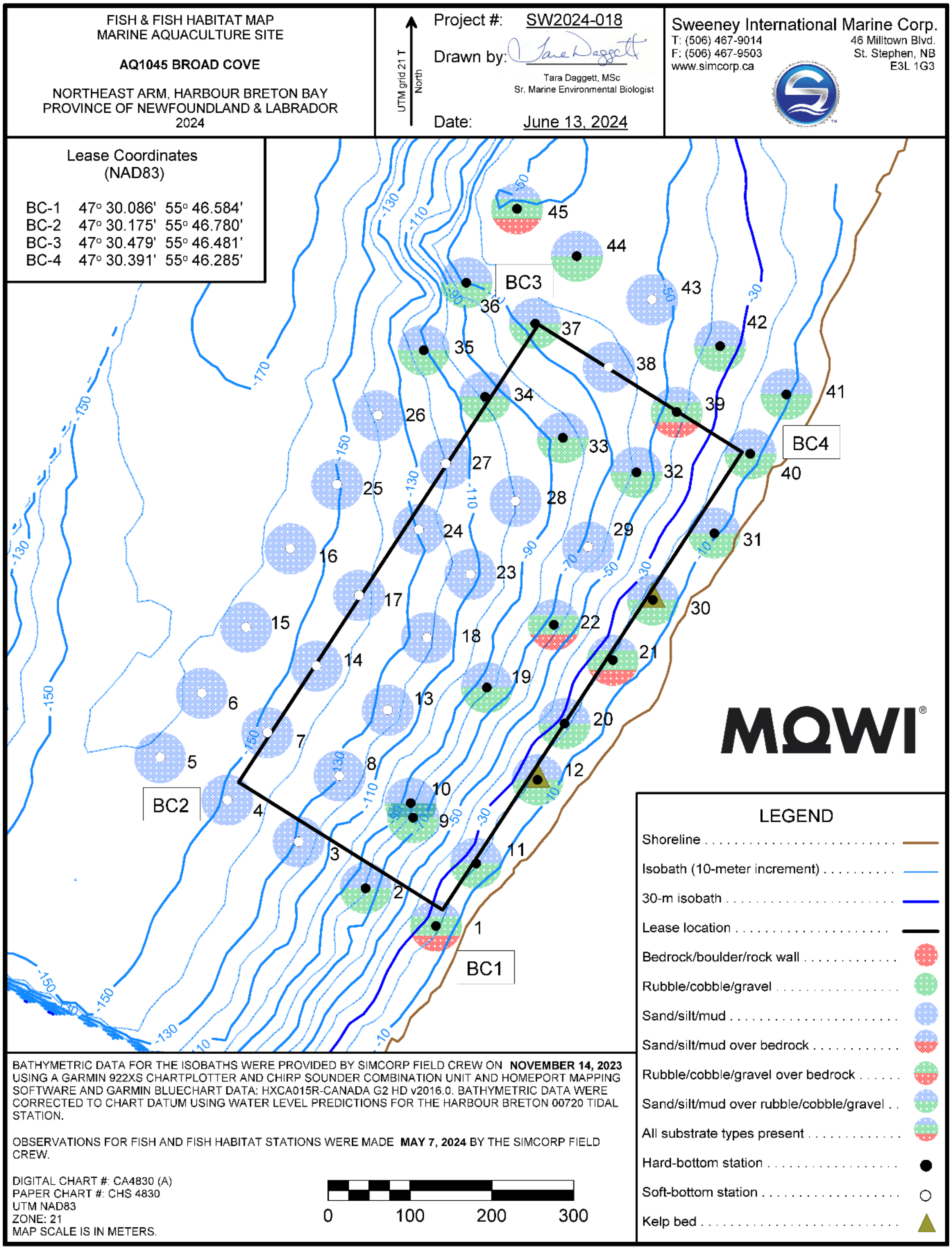


Figure 8.8. Habitat observations at sampling stations in the Broad Cove sea farm (May 2024)

Table 8.5. Summary of bottom type and observed flora and fauna at the Broad Cove sea farm (May 2024).

Broad Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
BRC	1	47 30.076	55 46.590	21	Hard		50%	5%	<5%		10%	30%	5%			rock crab (1), *Henricia* sea star (2), *Cerianthus* anemone (1), unidentified crab (1), green sea urchin (1), sea colander (40%), *Saccharina* (<5%), Rhodophyta (<5%)
BRC	2	47 30.102	55 46.658	75	Hard					15%	30%	55%				*Pandalus* shrimp (1), brittle star (>20), *Hormathia* anemone (3), *Cerianthus* anemone (2), feather star (1), round sponge (1), arrow worm (9)
BRC	3	47 30.134	55 46.723	131	Soft								100%			arrow worm (>20), *Hormathia* anemone (>20), *Pandalus* shrimp (2), *Gersemia* soft coral (1)
BRC	4	47 30.163	55 46.791	152	Soft								100%			*Pandalus* shrimp (2), arrow worm (9), infaunal burrow (1), krill (4)
BRC	5	47 30.192	55 46.856	161	Soft								100%			*Hormathia* anemone (10), brittle star (16), *Pandalus* shrimp (1), krill (10), unidentified fish (1)
BRC	6	47 30.235	55 46.814	160	Soft								100%			*Hormathia* anemone (3), arrow worm (19), *Pandalus* shrimp (10), infaunal burrow (5), rock gunnel (1)
BRC	7	47 30.208	55 46.751	149	Soft								100%			arrow worm (11), *Pandalus* shrimp (5), infaunal burrow (4), krill (5), Acadian redfish (1)
BRC	8	47 30.178	55 46.682	126	Soft					<5%			100%			*Pandalus* shrimp (7), *Hormathia* anemone (2), krill (4), arrow worm (5)
BRC	9	47 30.149	55 46.611	76	Hard					15%	15%	35%	35%			brittle star (>20), arrow worm (15), *Hormathia* anemone (3), feather star (1), *Cerianthus* anemone (3), encrusting sponge (<5%)
BRC	10	47 30.159	55 46.613	83	Hard					15%	40%	25%	20%			brittle star (>20), arrow worm (>20)
BRC	11	47 30.118	55 46.550	23	Hard			<5%	20%	20%	35%	25%				northern sea star (2), scallop (1), comb jellyfish (1) green sea urchin (1), Rhodophyta (5%), sea colander (25%), *Saccharina* (<5%)
BRC	12	47 30.173	55 46.489	16	Hard					10%	80%	10%				scallop (1), northern sea star (1), ctenophore (1), sea colander (30%), *Saccharina* (35%)
BRC	13	47 30.222	55 46.634	126	Soft							100%				*Pandalus* shrimp (2), arrow worm (16), whelk (1), *Hormathia* anemone (2), infaunal burrow (6), brittle star (4), feather star (1)
BRC	14	47 30.252	55 46.702	150	Soft					<5%			100%			infaunal burrow (7), mud star (1), arrow worm (12), *Pandalus* shrimp (2)
BRC	15	47 30.279	55 46.770	161	Soft								100%			arrow worm (2), *Pandalus* shrimp (5), krill (2), infaunal burrow (4)
BRC	16	47 30.331	55 46.726	157	Soft								100%			krill (2), Pandalus shrimp (6), arrow worm (2), infaunal burrow (2)
BRC	17	47 30.299	55 46.660	145	Soft								100%			*Pandalus* shrimp (7), mud star (3), *Hormathia* anemone (2), arrow worm (9), feather star (2), infaunal burrow (10)
BRC	18	47 30.270	55 46.594	123	Soft								100%			*Pandalus* shrimp (4), arrow worm (12), infaunal burrow (2), feather star (1), Acadian redfish (1), brittle star (4), blue mussel (>20), krill (6)
BRC	19	47 30.236	55 46.537	81	Hard					10%	30%	35%	25%			brittle star (>20), arrow worm (11), *Cerianthus* anemone (1), northern sea

Broad Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
																star (1)
BRC	20	47 30.211	55 46.462	30	Hard			<5%	30%	40%	20%	10%				scallop (1), ceriantid anemone (1), sea colander (30%), *Saccharina* (<5%)
BRC	21	47 30.253	55 46.414	20	Hard			20%	5%	45%	10%	20%				northern sea star (2), hydroid (<5%), sea colander (30%), *Saccharina* (<5%)
BRC	22	47 30.277	55 46.471	71	Hard			5%	10%	30%	30%	25%				brittle star (>20), arrow worm (2), green sea urchin (3), northern sea star (4), scallop (1), polar sea star (2), cerianthid anemone (3)
BRC	23	47 30.312	55 46.551	116	Soft							100%				*Hormathia* anemone (6), brittle star (1), infaunal burrow (2), arrow worm (>20)
BRC	24	47 30.343	55 46.601	136	Soft								100%			arrow worm (>20), *Hormathia* anemone (4), infaunal burrow (6), *Pandalus* shrimp (5), krill (2), mud star (1), unidentified fish (1)
BRC	25	47 30.374	55 46.680	155	Soft								100%			arrow worm (>20), *Pandalus* shrimp (5), infaunal burrow (1), krill (1)
BRC	26	47 30.420	55 46.639	141	Soft								100%			mud star (1), feather star (1) infaunal burrow (5), *Hormathia* anemone (5), arrow worm (11), krill (5), *Pandalus* shrimp (1)
BRC	27	47 30.387	55 46.573	120	Soft					<5%			100%			*Hormathia* anemone (>20), worm tube (12), arrow worm (7), *Pandalus* shrimp (3), Geodiidae sponge (1), unidentified fish (1), Northern sea star (1), infaunal burrow (4)
BRC	28	47 30.361	55 46.506	101	Soft					<5%		100%				worm tube (6), brittle star (>20), *Hormathia* anemone (>20), northern sea star (2), whelk (2), green sea urchin (4), mud star (1), encrusting sponge (<5%), *Pandalus* shrimp (2)
BRC	29	47 30.329	55 46.436	64	Soft							100%				arrow worm (6), green sea urchin (>20), toad crab (3), northern sea star (1)
BRC	30	47 30.293	55 46.374	17	Hard				10%	80%		10%				green sea urchin (1), unidentified crab (1), sea colander (60%), *Saccharina* (5%)
BRC	31	47 30.337	55 46.313	15	Hard					35%	50%	15%				scallop (4), cerianthid anemone (2), sea colander (15%), Rhodophyta (<5%)
BRC	32	47 30.379	55 46.388	58	Hard					<5%	5%	95%				
BRC	33	47 30.403	55 46.459	88	Hard						5%	95%				green sea urchin (10), trumpet worm (8), *Metridium* anemone (10), *Hormathia* anemone (1), northern sea star (10), arrow worm (2)
BRC	34	47 30.431	55 46.534	103	Hard					10%	20%	70%				brittle star (>20), *Hormathia* anemone (11), Geodiidae sponge (2), whelk (3), northern sea star (1), arrow worm (7), krill (2)
BRC	35	47 30.463	55 46.593	112	Hard						10%	90%				*Hormathia* anemone (>20), mud star (2), *Pandalus* shrimp (2), arrow worm (5), brittle star (1)
BRC	36	47 30.508	55 46.551	113	Hard					5%	15%	80%				brittle star (>20), *Hormathia* anemone (>20), *Pandalus* shrimp (3), whelk (6), arrow worm (8)
BRC	37	47 30.480	55 46.484	69	Hard			<5%	10%	10%	30%	50%				brittle star (>20), infaunal burrow (8), arrow worm (1), cerianthid anemone (>20), whelk (5), spiny sun star (1)

Broad Cove																
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc	
BRC	38	47 30.450	55 46.413	68	Soft							100%				green sea urchin (8)
BRC	39	47 30.419	55 46.348	48	Hard			5%	5%	40%	30%	20%				green sea urchin (10), northern sea star (1), scallop (1), *Lithothamnion* (10%), *Hildenbrandia* (<5%)
BRC	40	47 30.390	55 46.277	16	Hard			<5%		45%	40%	15%				northern sea star (3), scallop (5), ctenophore (1), rock crab (1), green sea urchin (1), sea colander (10%), *Saccharina* (<5%), *Desmarestia* (<5%)
BRC	41	47 30.430	55 46.241	15	Hard					40%	40%	20%				northern sea star (3), *Desmarestia* (15%)
BRC	42	47 30.463	55 46.305	36	Hard			<5%	10%	35%	5%	50%				northern sea star (3), green sea urchin (2), sea colander (<5%)
BRC	43	47 30.495	55 46.370	55	Soft						<5%		100%			unidentified macroalgae (<5%)
BRC	44	47 30.525	55 46.443	57	Hard					20%	20%	60%				brittle star (18), green sea urchin (1), cerianthid anemone (>20), northern sea star (1), hermit crab (1)
BRC	45	47 30.557	55 46.500	53	Hard			35%	35%		5%	25%				brittle star (>20), cerianthid anemone (8), northern sea star (1), unidentified fish (1), Geodiidae sponge (1), trumpet worm (>20)

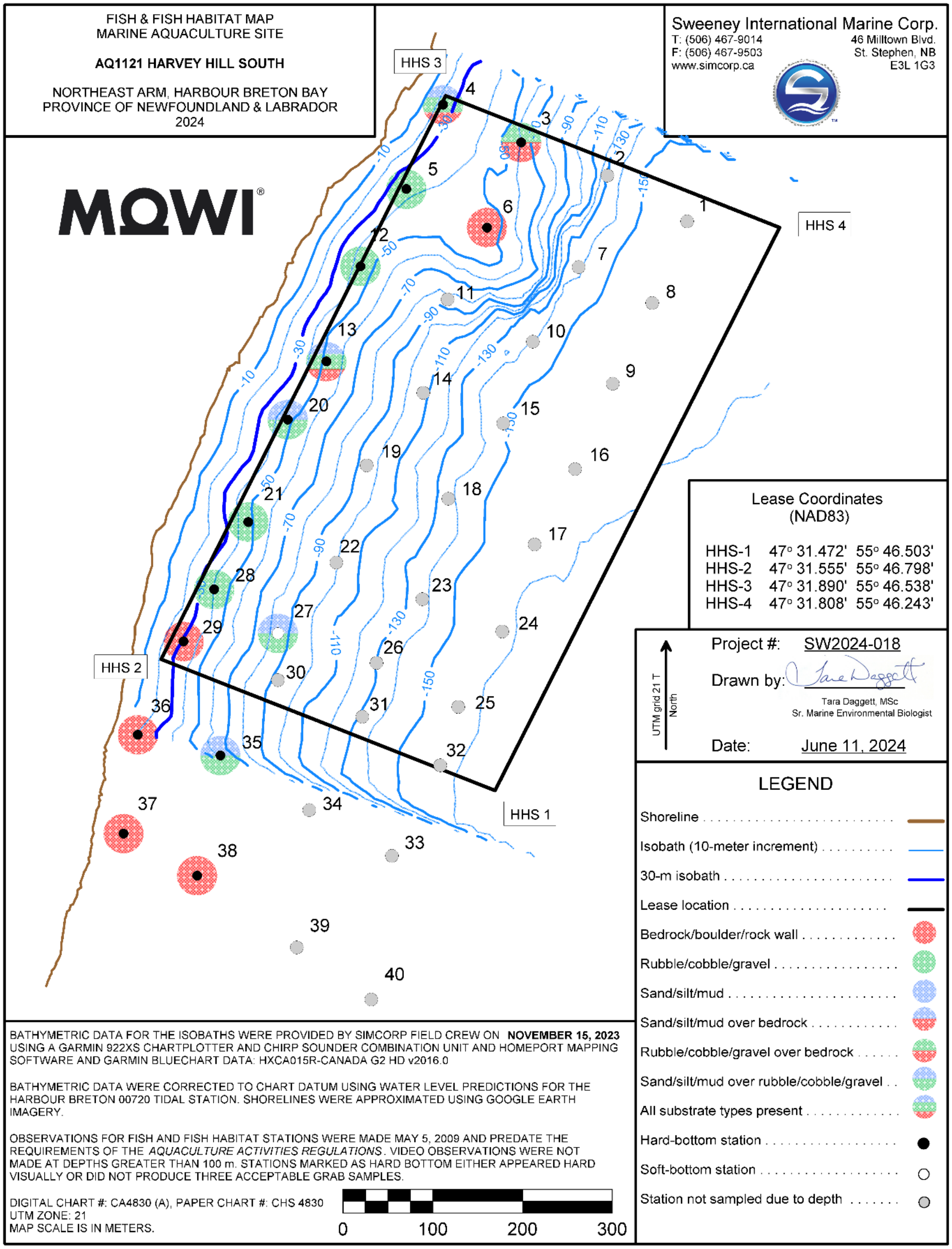


Figure 8.9. Habitat observations at sampling stations in the Harvey Hill South sea farm (May 2009).

Table 8.6. Summary of bottom type and observed flora and fauna at the Harvey Hill South sea farm (May 2009).

Harvey Hill South																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
HHS	1	47 31.813	55 46.325	153	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	2	47 31.841	55 46.395	137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	3	47 31.862	55 46.471	55	n/a		x	x	x				x			coralline algae, shell debris, sponge	N
HHS	4	47 31.885	55 46.540	27	n/a		x			x			x			kelp, coralline algae	N
HHS	5	47 31.835	55 46.574	36	n/a				x	x	x					coralline algae, shell debris, kelp	N
HHS	6	47 31.811	55 46.503	44	n/a		x	x								coralline algae, starfish, kelp, soft corals	N
HHS	7	47 31.786	55 46.422	143	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	8	47 31.764	55 46.357	154	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	9	47 31.716	55 46.393	154	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	10	47 31.742	55 46.464	140	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	11	47 31.768	55 46.539	107	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	12	47 31.789	55 46.616	45	n/a					x	x		x			coralline algae, shell debris	N
HHS	13	47 31.732	55 46.647	52	n/a		x	x	x		x		x			coralline algae, shell debris	N
HHS	14	47 31.712	55 46.562	107	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	15	47 31.693	55 46.491	140	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	16	47 31.665	55 46.428	155	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	17	47 31.620	55 46.465	160	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	18	47 31.648	55 46.541	140	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	19	47 31.669	55 46.613	104	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	20	47 31.697	55 46.682	45	n/a					x	x		x			coralline algae, kelp, shell debris	N
HHS	21	47 31.636	55 46.719	47	n/a				x				x			coralline algae, shell debris	N
HHS	22	47 31.611	55 46.641	107	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	23	47 31.588	55 46.565	131	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	24	47 31.568	55 46.495	157	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	25	47 31.523	55 46.535	156	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	26	47 31.550	55 46.607	134	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N

Harvey Hill South																	
Station		Coordinates (NAD83)		Depth (m)	Bottom Type	Bottom Type and Condition										Description, Comments and Observations [a]	Attempted Grab (Y/N)
		Latitude	Longitude			Rockwall	Bedrock	Boulder	Rubble	Cobble	Gravel	Sand	Silt/Mud	Organic	Floc		
HHS	27	47 31.569	55 46.694	82	n/a					x		x	x			brittle stars, shell debris, anemones	Y
HHS	28	47 31.596	55 46.750	41	n/a				x	x	x					coralline algae, kelp	N
HHS	29	47 31.565	55 46.778	34	n/a			x								kelp (*Laminaria*), coralline algae, shell debris	N
HHS	30	47 31.541	55 46.695	98	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	31	47 31.518	55 46.620	123	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	32	47 31.488	55 46.552	152	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	33	47 31.434	55 46.596	157	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	34	47 31.462	55 46.669	118	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	35	47 31.496	55 46.747	76	n/a					x			x			brittle stars, anemones	N
HHS	36	47 31.509	55 46.820	20	n/a		x	x								kelp (*Laminaria*), coralline algae	N
HHS	37	47 31.450	55 46.834	27	n/a		x	x								kelp, sea anemones, soft corals	N
HHS	38	47 31.424	55 46.769	76	n/a				x	x			x			ocean pout, feather star, shell debris	N
HHS	39	47 31.380	55 46.682	126	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N
HHS	40	47 31.348	55 46.616	153	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	station too deep to sample	N

Notes:
x = observed substrates.

8.3 Water Quality

The amount and temporal coverage of water quality data collected in the Harbour Breton Bay BMA are variable (Table 8.7). Seasonal water quality measurements at the sea farms are summarized in Tables 8.8–8.10 for water temperature, dissolved oxygen, and salinity, respectively. There are no available temperature data for the Harvey Hill North and Harvey Hill South sea farms and a limited data set for dissolved oxygen and salinity for Harvey Hill South sea farm.

Table 8.7. Available water quality data for the Harbour Breton Bay BMA (2019–2024).

Available Data			
Year	**Measurement**	**Depth(s) (m)**	**Month(s)**
Broad Cove			
2019	Temperature (°C)	0.5	14 Jun–22 Nov
		1	3 Sep–22 Nov
		5	14 Jun–22Nov
		10	3 Sep–22 Nov
		15	14 Jun–22Nov
		20	3 Sep–22 Nov
		30	n/a
	Dissolved Oxygen (mg/L)	0.5	7 Aug–22 Nov
		1	3 Sep–22 Nov
		5	7 Aug–22 Nov
		10	3 Sep–22 Nov
		15	7 Aug–22 Nov
		20	3 Sep–22 Nov
		30	n/a
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2021	Temperature (°C)	all	27 Jun–31 Dec
	Oxygen (mg/L)	all	27 Jun–31 Dec
	Salinity (‰)	all	27 Jun–31 Dec
2022	Temperature (°C)	all	2 Jan–31 Dec
	Oxygen (mg/L)	all	2 Jan–31 Dec
	Salinity (‰)	all	2 Jan–31 Dec
2023	Temperature (°C)	all	2 Jan–4 Apr
	Oxygen (mg/L)	all	2 Jan–4 Apr
	Salinity (‰)	all	2 Jan–4 Apr
2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
Harvey Hill East			
2019	Temperature (°C)	0.5	17 Jun–27 Nov
		1	3 Sep–27 Nov
		5	15 Jun–27 Nov
		10	3 Sep–27 Nov
		15	14 Jun–27 Nov
		20	3 Sep–27 Nov
		30	n/a
	Oxygen (mg/L)	0.5	5 Aug–27 Nov
		1	3 Sep–27 Nov
		5	5 Aug–27 Nov
		10	3 Sep–27 Nov
		15	5 Aug–27 Nov
		20	3 Sep–27 Nov
		30	n/a

Available Data			
Year	**Measurement**	**Depth(s) (m)**	**Month(s)**
	Salinity (‰)	n/a	n/a
2020	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2021	Temperature (°C)	all	25 May–31 Dec
	Oxygen (mg/L)	all	25 May–31 Dec
	Salinity (‰)	all	25 May–31 Dec
2022	Temperature (°C)	all	2 Jan–31 Dec
	Oxygen (mg/L)	all	2 Jan–31 Dec
	Salinity (‰)	all	2 Jan–31 Dec
2023	Temperature (°C)	all	2 Jan–6 Mar
	Oxygen (mg/L)	all	2 Jan–6 Mar
	Salinity (‰)	all	2 Jan–6 Mar
2024	Temperature (°C)	all	6 Jul–8 Jul
	Oxygen (mg/L)	all	6 Jul–8 Jul
	Salinity (‰)	all	6 Jul–8 Jul
Harvey Hill North			
2019	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	0.5	6 Aug– 27 Nov
		1	3 Sep– 27 Nov
		5	n/a
		10	3 Sep–27 Nov
		15	6 Aug–27 Nov
		20	3 Sep–27 Nov
		30	6 Aug–27 Nov
	Salinity (‰)	0.5	n/a
		1	n/a
		5	14 Jun–27 Nov
		10	3 Sep–27 Nov
		15	14 Jun–27 Nov
		20	3 Sep–27 Nov
		30	14 Jun–27 Nov
2020–2024	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
Harvey Hill South			
2019–2023	Temperature (°C)	n/a	n/a
	Oxygen (mg/L)	n/a	n/a
	Salinity (‰)	n/a	n/a
2024	Oxygen (mg/L)	0.5	29 Jun–8 Jul
		1	28 Jun–8 Jul
		5	28 Jun–8 Jul
		10	28 Jun
		15	28 Jun–8 Jul
		20	28 Jun–8 Jul
		30	28 Jun–8 Jul
	Salinity (‰)	0.5–15, 30	29 Jun–8 Jul
		20	28 Jun–8 Jul

8.3.1 Water Temperature

Seasonal water temperatures were relatively consistent across sea farms with available data (Table 8.8). Temperature trends are typical of those observed by MCE in coastal Newfoundland waters. A thermocline develops in spring as surface waters warm. This thermocline becomes more pronounced and deeper in summer until it breaks down in the fall as air temperature decreases. During winter, temperatures throughout the water column tend to be more uniform until spring, when the seasonal water temperature pattern repeats. Mean water temperatures ranged from 2.1°C in winter at the Broad Cove sea farm (0.5 m depth) to 15.7°C in summer at the Harvey Hill East sea farm (0.5 m depth). Maximum water temperatures at the Broad Cove and Harvey Hill East farms were recorded at a depth of 0.5 m in summer, reaching 19.7°C and 20.2°C, respectively. Minimum temperatures for the Broad Cove and Harvey Hill East sea farms occurred at a depth of <1 m in winter, measuring 0.08°C and 0.30°C, respectively.

Table 8.8. Average, maximum, and minimum water temperatures (°C) at the sea farms in the Harbour Breton Bay BMA (2019–2024).

Water Depth	Sampling Period	Water Temperature Parameter	Winter	Spring	Summer	Fall
			Temperature (°C)			
Broad Cove						
0.5 m	14 Jun 2019–4 Apr 2023	Average	2.07	7.45	15.31	9.04
		Maximum	4.60	15.80	19.65	15.45
		Minimum	0.08	1.60	6.40	2.40
1 m	3 Sep 2019–4 Apr 2023	Average	2.09	6.88	15.37	9.01
		Maximum	4.60	15.60	19.40	15.35
		Minimum	0.35	1.60	9.80	2.40
5 m	14 Jun 2019–4 Apr 2023	Average	2.15	6.31	14.17	9.01
		Maximum	4.60	12.50	18.65	15.25
		Minimum	0.40	1.50	6.00	3.15
10 m	3 Sep 2019–4 Apr 2023	Average	2.19	5.35	13.11	8.94
		Maximum	4.60	10.75	17.85	15.10
		Minimum	0.50	1.50	4.60	3.40
15 m	14 Jun 2019–4 Apr 2023	Average	2.22	4.72	10.59	8.86
		Maximum	4.60	10.10	16.45	14.95
		Minimum	0.70	1.50	1.90	3.40
20 m	3 Sep 2019–4 Apr 2023	Average	2.24	4.30	9.83	8.74
		Maximum	4.60	9.90	16.30	14.70
		Minimum	0.70	1.30	3.00	3.40
30 m	27 Jun 2021–4 Apr 2023	Average	2.28	3.88	8.77	8.61
		Maximum	4.70	9.25	16.10	14.60
		Minimum	0.85	1.30	3.40	3.40
Harvey Hill East						
0.5 m	17 Jun 2019–8 Jul 2024	Average	2.22	8.43	15.72	8.97
		Maximum	4.50	16.35	20.20	15.75
		Minimum	0.30	2.10	8.80	2.70
1 m	3 Sep 2019–8 Jul 2024	Average	2.24	7.98	15.70	8.96
		Maximum	4.50	15.60	20.20	15.70
		Minimum	0.30	2.10	9.55	2.70
5 m	15 Jun 2019–8 Jul 2024	Average	2.38	7.16	14.47	8.96
		Maximum	4.60	14.25	18.75	15.35
		Minimum	0.40	2.00	6.70	2.85
10 m	3 Sep 2019–8 Jul 2024	Average	2.46	5.89	12.94	8.90
		Maximum	4.90	11.55	18.25	15.25
		Minimum	1.00	2.00	4.70	3.40
15 m	14 Jun 2019–8 Jul 2024	Average	2.51	5.13	10.58	8.81
		Maximum	5.00	10.95	16.35	14.90
		Minimum	1.10	1.90	1.80	3.50
20 m	3 Sep 2019–8 Jul 2024	Average	2.56	4.53	9.54	8.71
		Maximum	4.90	10.55	16.25	14.75
		Minimum	1.20	2.00	3.25	3.60
30 m	26 May 2021–8 Jul 2024	Average	2.63	3.98	8.07	8.65
		Maximum	4.80	8.65	15.80	14.60
		Minimum	1.20	2.00	2.80	3.75
Harvey Hill North						
all	n/a	Average	n/a	n/a	n/a	n/a
		Maximum	n/a	n/a	n/a	n/a
		Minimum	n/a	n/a	n/a	n/a
Harvey Hill South						
all	n/a	Average	n/a	n/a	n/a	n/a
		Maximum	n/a	n/a	n/a	n/a
		Minimum	n/a	n/a	n/a	n/a

Historical water temperature data for the Harbour Breton Bay BMA (Figure 8.10) are provided for measurements collected at a depth of 15 m. During 2019–2023, data collected at the Broad Cove sea farm showed a general water temperature increase from April–September, with average temperatures peaking in September and declining thereafter (Figure 8.10A). During 2019–2024, data collected at the Harvey Hill East sea farm indicated an increase in average and maximum temperatures from April–September, while minimum temperatures increased from August–October (Figure 8.10B).

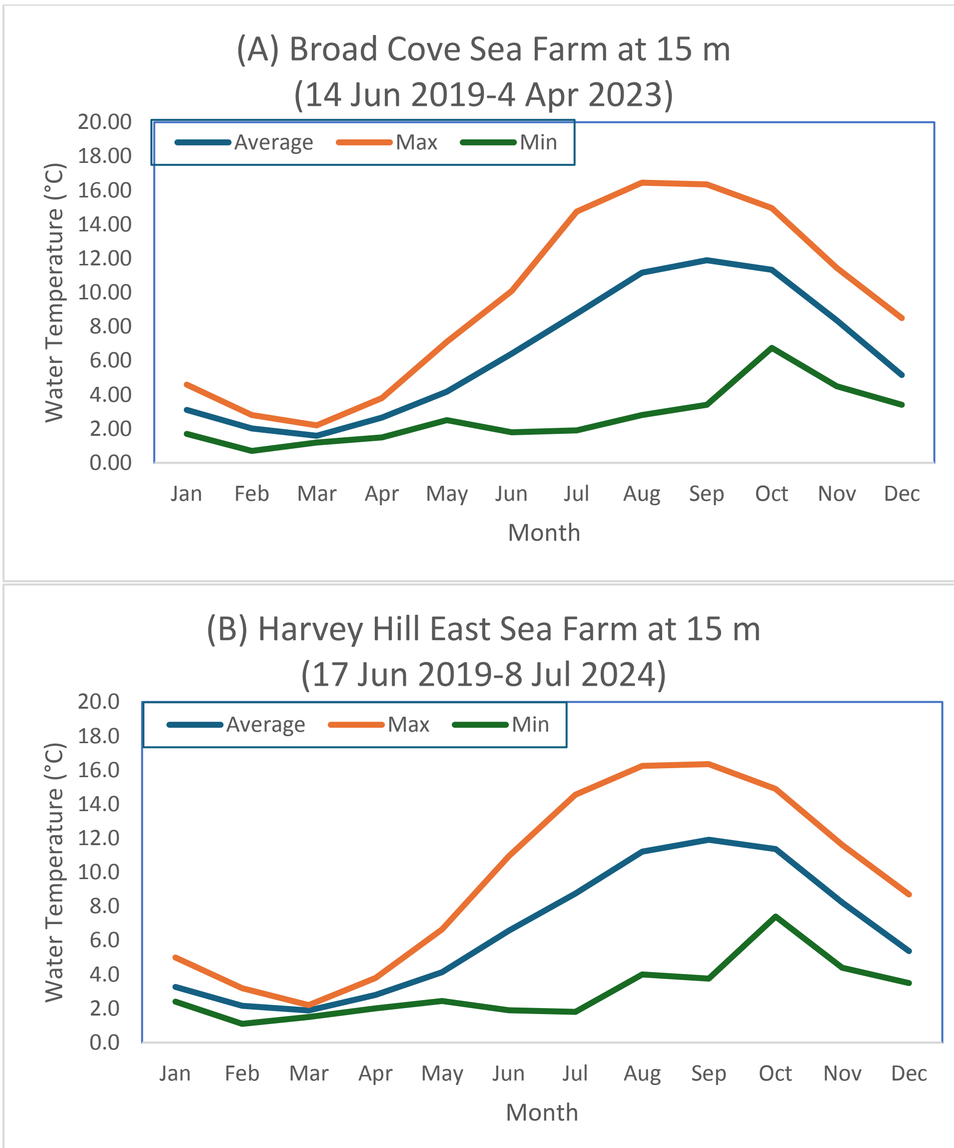


Figure 8.10. Historical water temperature (°C) data at 15 m depth for the (A) Broad Cove and (B) Harvey Hill East sea farms in the Harbour Breton Bay BMA. Note: No water temperature data was collected at Harvey Hill North or Harvey Hill South sea farms.

8.3.2 Dissolved Oxygen

Dissolved oxygen levels were consistently lower in summer and fall compared to winter and spring (Table 8.9). Mean dissolved oxygen ranged from 8.16 mg/L in summer (1 m depth in Broad Cove sea farm) to 11.55 mg/L in fall (10 m depth; Harvey Hill North sea farm). Maximum observed dissolved oxygen was 13.80 mg/L, recorded at a depth of 15 m at the Harvey Hill North sea farm in summer; minimum dissolved oxygen was 5.45 mg/L, measured at a depth of 1 m in summer at the Broad Cove sea farm.

During 2019–2023, a general decline in dissolved oxygen levels was recorded from May–September, followed by an increase in winter and early spring at the Broad Cove sea farm (Figure 8.11A). Average oxygen levels peaked in April, while the lowest levels were recorded in September at the Broad Cove sea farm. At the Harvey Hill East sea farm, dissolved oxygen increased from November–April; both average oxygen levels peaked in April whereas the lowest oxygen levels were observed in July (Figure 8.11B).

Table 8.9. Average, maximum, and minimum dissolved oxygen (mg/L) at the sea farms in the Harbour Breton Bay BMA (2020–2024).

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
Broad Cove						
0.5 m	7 Aug 2019–4 Apr 2023	Average	10.99	10.09	8.37	9.56
		Maximum	11.93	12.20	11.45	12.20
		Minimum	9.70	6.45	6.00	7.25
1 m	3 Sep 2019–4 Apr 2023	Average	10.94	10.14	8.16	9.49
		Maximum	11.90	12.30	11.45	12.00
		Minimum	9.70	6.25	5.45	7.15
5 m	7 Aug 2019–4 Apr 2023	Average	10.87	10.40	8.37	9.39
		Maximum	11.90	12.30	11.45	11.90
		Minimum	9.40	7.80	5.60	7.05
10 m	3 Sep 2019–4 Apr 2023	Average	10.83	10.71	8.58	9.37
		Maximum	11.60	12.30	11.60	11.90
		Minimum	9.30	8.85	5.50	5.50
15 m	7 Aug 2019–4 Apr 2023	Average	10.77	10.85	9.15	9.37
		Maximum	11.50	12.30	13.10	11.80
		Minimum	8.30	9.35	6.85	7.60
20 m	3 Sep 2019–4 Apr 2023	Average	10.76	10.89	9.24	9.40
		Maximum	11.50	12.30	12.10	11.70
		Minimum	7.80	9.60	6.85	7.50
30 m	27 Jun 2021–4 Apr 2023	Average	10.75	10.86	9.19	9.00
		Maximum	11.50	12.10	10.40	10.40
		Minimum	9.40	9.58	7.50	7.60
Harvey Hill East						
0.5 m	5 Aug 2019–8 Jul 2024	Average	10.72	10.22	8.64	9.63
		Maximum	12.60	12.10	11.25	12.15
		Minimum	9.60	8.05	7.00	7.65
1 m	3 Sep 2019–8 Jul 2024	Average	10.69	10.26	8.52	9.56
		Maximum	11.70	12.20	11.25	12.20
		Minimum	9.70	7.85	7.05	7.60
5 m	5 Aug 2019–8 Jul 2024	Average	10.61	10.45	8.56	9.46
		Maximum	11.70	12.10	11.15	12.00
		Minimum	9.40	8.05	6.75	7.15
10 m	3 Sep 2019–8 Jul 2024	Average	10.56	10.69	8.70	9.40
		Maximum	11.50	12.00	11.50	11.90

Water Depth	Sampling Period	Dissolved Oxygen Parameter	Winter	Spring	Summer	Fall
			Dissolved Oxygen (mg/L)			
		Minimum	9.50	8.90	6.65	7.35
15 m	5 Aug 2019–8 Jul 2024	Average	10.50	10.79	9.07	9.37
		Maximum	11.40	12.00	12.30	11.80
		Minimum	9.50	9.20	7.10	7.40
20 m	3 Sep 2019–8 Jul 2024	Average	10.46	10.81	9.27	9.38
		Maximum	11.10	12.00	12.10	11.80
		Minimum	9.60	9.40	7.15	7.55
30 m	26 May 2021–8 Jul 2024	Average	10.41	10.78	9.29	8.90
		Maximum	11.00	11.80	10.90	10.20
		Minimum	9.30	9.75	7.40	7.70
Harvey Hill North						
0.5	6 Aug–27 Nov 2019	Average	n/a	n/a	10.37	11.30
		Maximum	n/a	n/a	12.90	12.50
		Minimum	n/a	n/a	8.20	9.40
1	3 Sep–27 Nov 2019	Average	n/a	n/a	11.11	11.49
		Maximum	n/a	n/a	12.80	12.30
		Minimum	n/a	n/a	8.50	9.50
5	n/a	Average	n/a	n/a	n/a	n/a
		Maximum	n/a	n/a	n/a	n/a
		Minimum	n/a	n/a	n/a	n/a
10	3 Sep–27 Nov 2019	Average	n/a	n/a	11.20	11.54
		Maximum	n/a	n/a	12.80	12.30
		Minimum	n/a	n/a	9.00	9.40
15	6 Aug–27 Nov 2019	Average	n/a	n/a	10.90	11.53
		Maximum	n/a	n/a	13.80	12.40
		Minimum	n/a	n/a	8.20	9.40
20	3 Sep–27 Nov 2019	Average	n/a	n/a	11.35	11.48
		Maximum	n/a	n/a	12.70	12.50
		Minimum	n/a	n/a	8.40	9.40
30	6 Aug–27 Nov 2019	Average	n/a	n/a	10.43	11.55
		Maximum	n/a	n/a	12.80	12.40
		Minimum	n/a	n/a	8.20	9.40
Harvey Hill South						
0.5 m	29 Jun–8 Jul 2024	Average	n/a	9.45	9.19	n/a
		Maximum	n/a	9.60	10.05	n/a
		Minimum	n/a	9.30	8.65	n/a
1 m	28 Jun–8 Jul 2024	Average	n/a	10.43	10.06	n/a
		Maximum	n/a	10.70	10.75	n/a
		Minimum	n/a	10.20	9.70	n/a
5 m	28 Jun–8 Jul 2024	Average	n/a	10.67	10.48	n/a
		Maximum	n/a	10.80	10.70	n/a
		Minimum	n/a	10.40	9.95	n/a
10 m	28 Jun 2024	Average	n/a	9.30	n/a	n/a
		Maximum	n/a	9.30	n/a	n/a
		Minimum	n/a	9.30	n/a	n/a
15 m	28 Jun–8 Jul 2024	Average	n/a	9.97	9.73	n/a
		Maximum	n/a	10.30	10.35	n/a
		Minimum	n/a	9.70	9.50	n/a
20 m	28 Jun–8 Jul 2024	Average	n/a	9.43	9.15	n/a
		Maximum	n/a	9.60	9.40	n/a
		Minimum	n/a	9.30	8.75	n/a
30 m	28 Jun–8 Jul 2024	Average	n/a	10.70	10.33	n/a
		Maximum	n/a	10.70	10.80	n/a
		Minimum	n/a	10.70	9.75	n/a

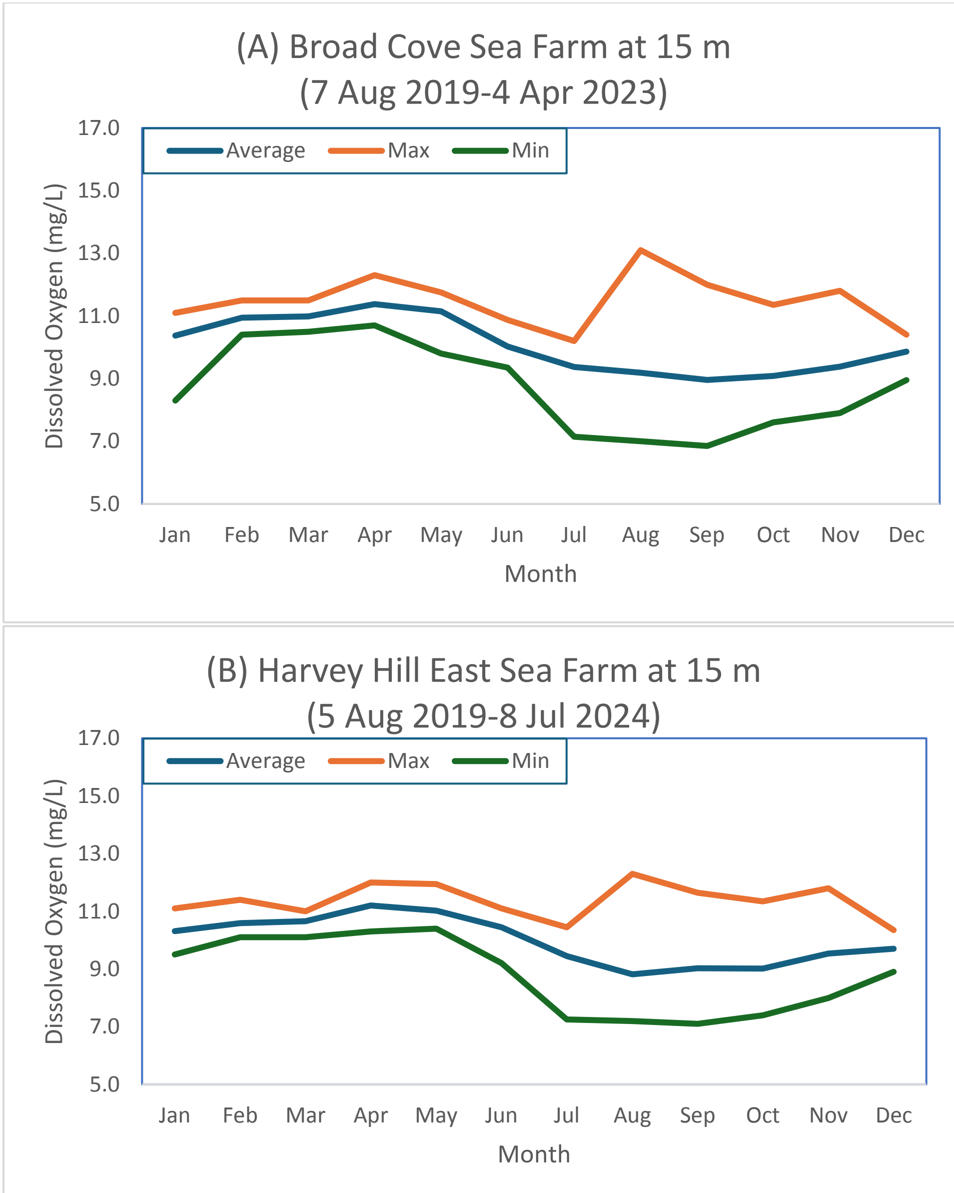


Figure 8.11. Historical dissolved oxygen (mg/L) data at the (A) Broad Cove and (B) Harvey Hill East sea farms in the Harbour Breton Bay BMA at 15 m depth. Note: Limited dissolved oxygen data was collected at Harvey Hill North and Harvey Hill South sea farms.

8.3.3 Salinity

Salinity was fairly consistent across Broad Cove, Harvey Hill East and Harvey Hill South sea farms and seasons (where data was available) with averages ranging from 27.55–30.77 ppt (Table 8.10).

Table 8.10. Average salinity (‰) at the sea farms in the Harbour Breton Bay BMA (2019–2024).

Water Depth	Sampling Period	Winter	Spring	Summer	Fall
		Salinity (‰)			
Broad Cove					
0.5 m	27 Jun 2021–4 Apr 2023	28.96	29.45	29.79	29.81
1 m	27 Jun 2021–4 Apr 2023	29.19	29.54	29.88	29.92
5 m	27 Jun 2021–4 Apr 2023	29.34	29.86	30.11	30.09
10 m	27 Jun 2021–4 Apr 2023	29.42	30.01	30.30	30.16
15 m	27 Jun 2021–4 Apr 2023	29.43	30.13	30.46	30.18
20 m	27 Jun 2021–4 Apr 2023	29.46	30.22	30.59	30.24
30 m	27 Jun 2021–4 Apr 2023	29.51	30.32	30.68	30.29
Harvey Hill East					
0.5 m	26 May 2021–8 Jul 2024	29.49	29.61	29.30	29.60
1 m	26 May 2021–8 Jul 2024	29.80	29.79	29.44	29.80
5 m	25 May 2021–8 Jul 2024	30.11	30.32	29.90	30.18
10 m	26 May 2021–8 Jul 2024	30.22	30.49	30.19	30.28
15 m	26 May 2021–8 Jul 2024	30.29	30.52	30.37	30.33
20 m	26 May 2021–8 Jul 2024	30.33	30.61	30.46	30.38
30 m	26 May 2021–8 Jul 2024	30.39	30.77	30.55	30.44
Harvey Hill South					
0.5 m	28 Jun–8 Jul 2024	n/a	27.68	29.73	n/a
1 m	28 Jun–8 Jul 2024	n/a	27.55	29.07	n/a
5 m	28 Jun–8 Jul 2024	n/a	28.20	30.24	n/a
10 m	28 Jun–8 Jul 2024	n/a	27.83	30.38	n/a
15 m	28 Jun–8 Jul 2024	n/a	28.39	30.60	n/a
20 m	28 Jun–8 Jul 2024	n/a	n/a	n/a	n/a
30 m	28 Jun–8 Jul 2024	n/a	28.35	30.51	n/a

8.4 Oceanographic and Meteorological Data

Bathymetric, current, wind and wave data are available for all four sea farms in the Harbour Breton Bay BMA.

8.4.1 Bathymetry

Water depths below the leases and sea cage arrays range from 10–160 m and 42–89 m, respectively (Table 8.11). The shallowest sea farm is Harvey Hill East where depths range from 48–79 m below the sea cage array. Bathymetric maps were created for all sea farms using data from 2023 and 2024 (Figure 8.12–8.15).

Table 8.11. Water depth range at sea farm in the Harbour Breton Bay BMA.

Site No.	Sea Farm	Lease Depth Range (m)	Sea Cage Array Depth Range (m)
AQ 991	Harvey Hill East	20–145	48–79
AQ 993	Harvey Hill North	10–118	42–88
AQ 1045	Broad Cove	20–150	42–89
AQ 1121	Harvey Hill South	20–160	n/a

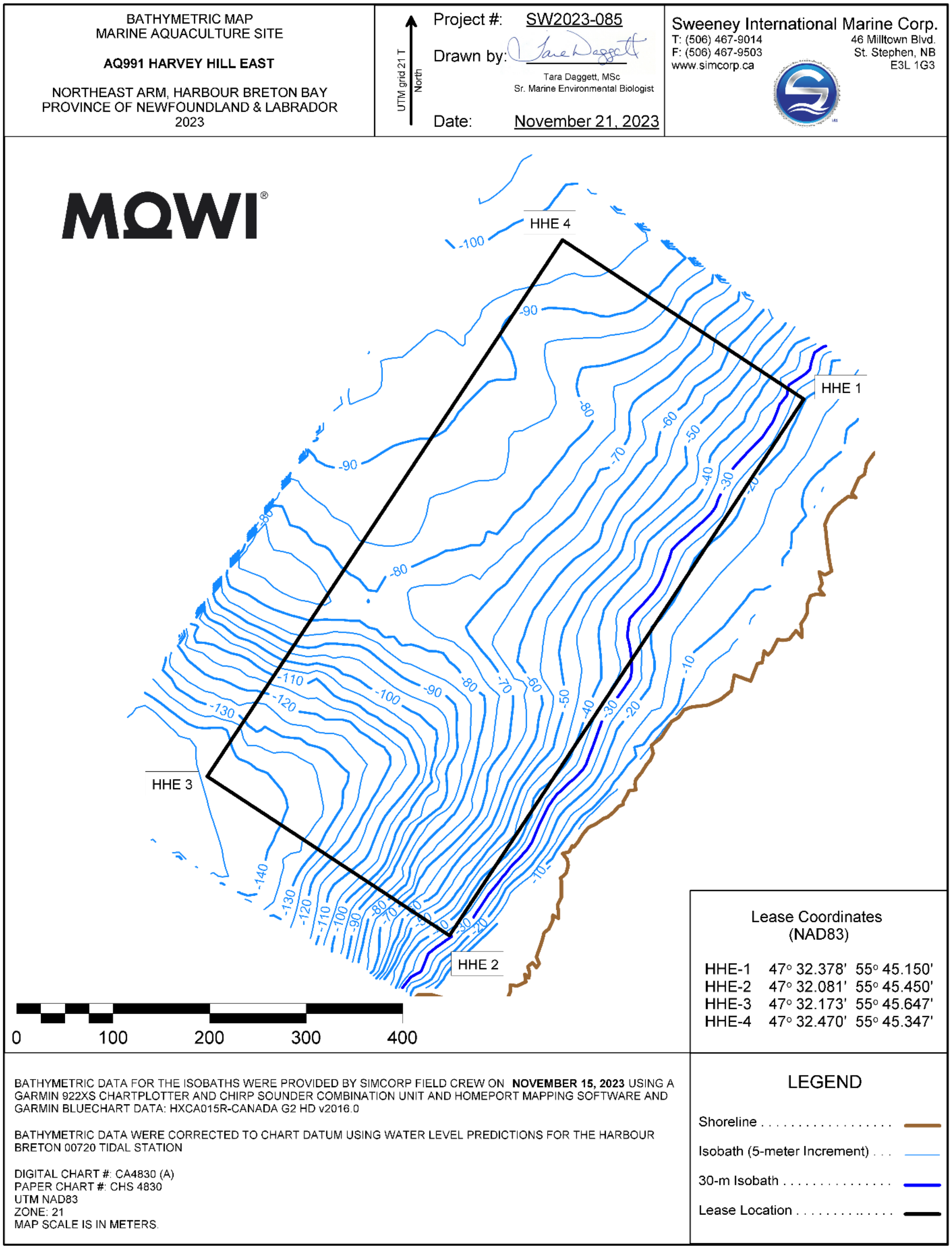


Figure 8.12. Bathymetric map for the Harvey Hill East sea farm (2023).

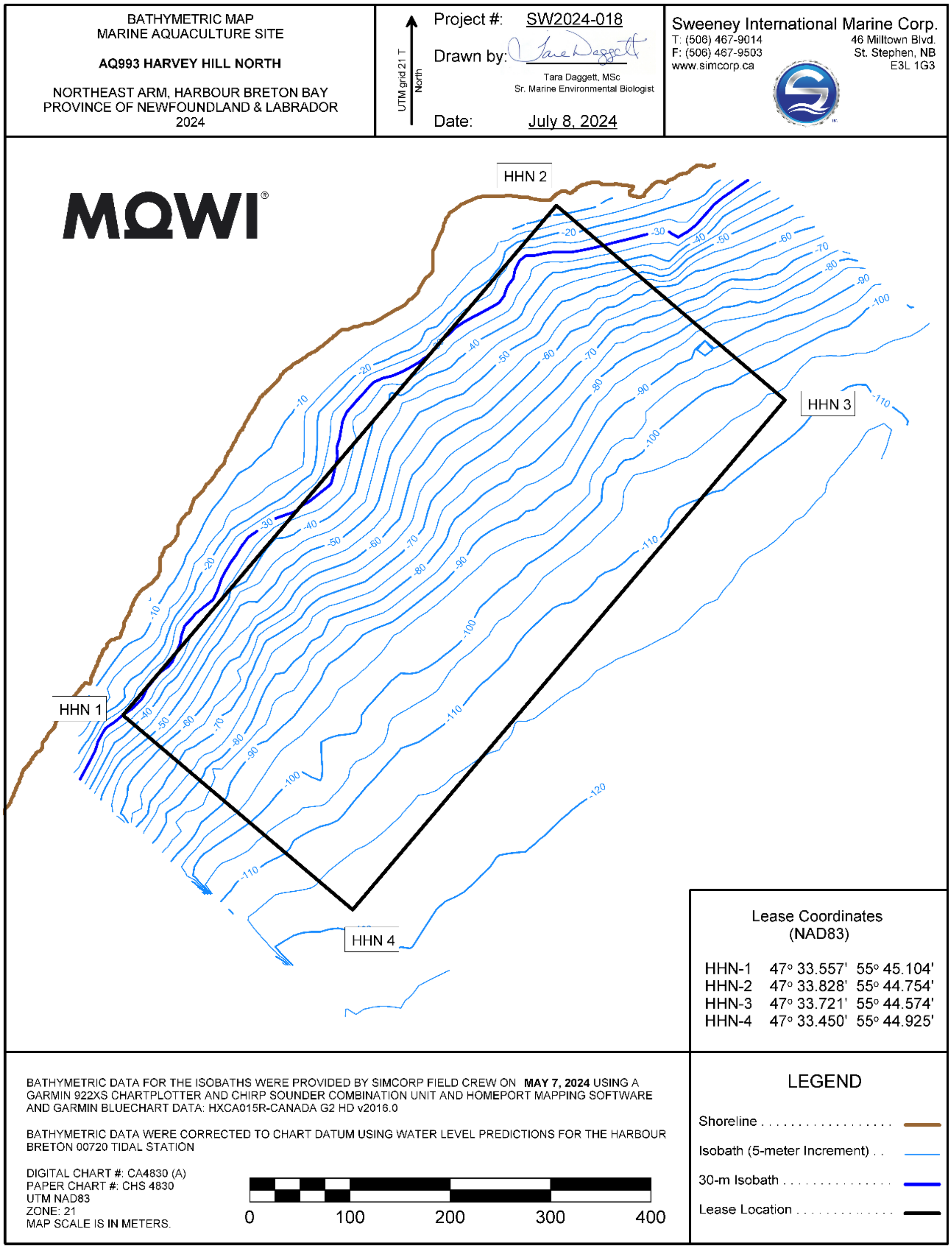


Figure 8.13. Bathymetric map for the Harvey Hill North sea farm (May 2024).

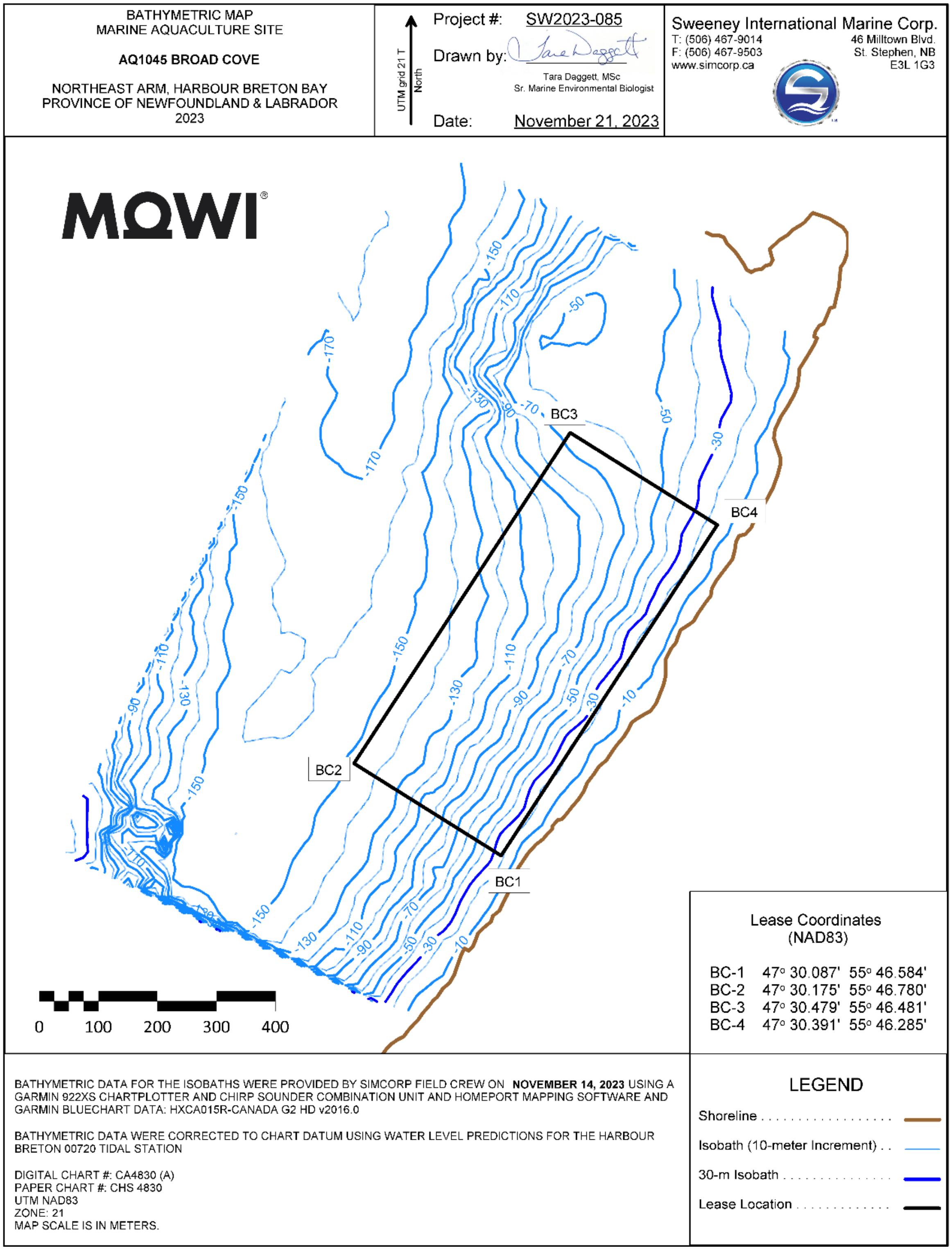


Figure 8.14. Bathymetric map for the Broad Cove sea farm (2023).

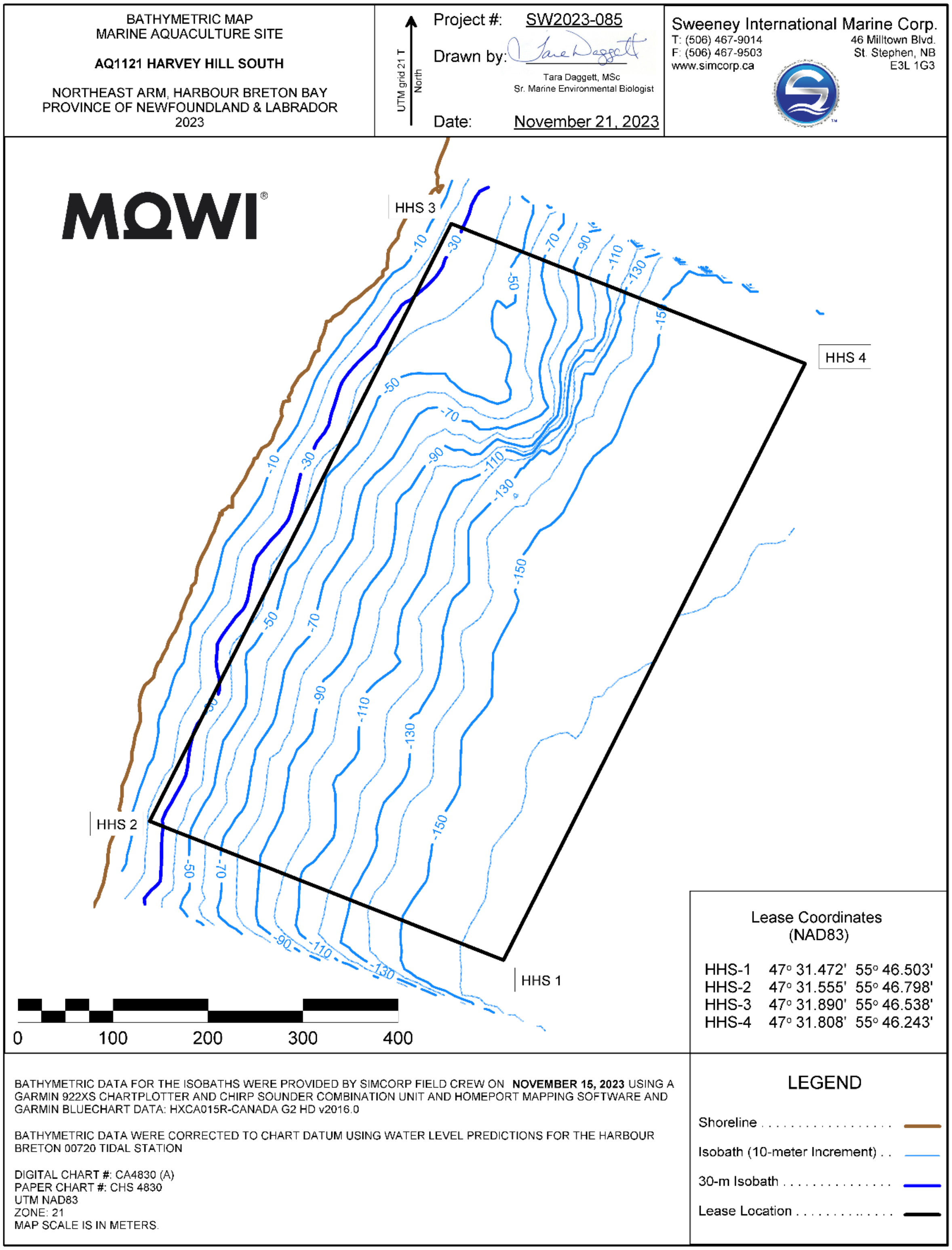


Figure 8.15. Bathymetric map for the Harvey Hill South sea farm (2023).

8.4.2 Currents

8.4.2.1 Harvey Hill East

During April–August 2024, current measurements were collected at three depths in the Harvey Hill East sea farm (Table 8.12; Figure 8.16). During this period, the mean current speed at 5 m was 4.8 cm/s, reducing slightly to 3.8 cm/s at 15 m. Maximum measured current speeds ranged from 26.2 cm/s at 5 m, 20.7 cm/s at 10 m, and 18.2 cm/s at 15 m. The vector-averaged currents were 0.5–0.7 cm/s towards the east southeast.

Table 8.12. Current speeds (mean and maximum values) and vector-averages at the Harvey Hill East sea farm (April–August 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	4.8	26.2	0.7 @ 132 °
10	4.3	20.7	0.5 @ 104 °
15	3.8	18.2	0.7 @ 72 °

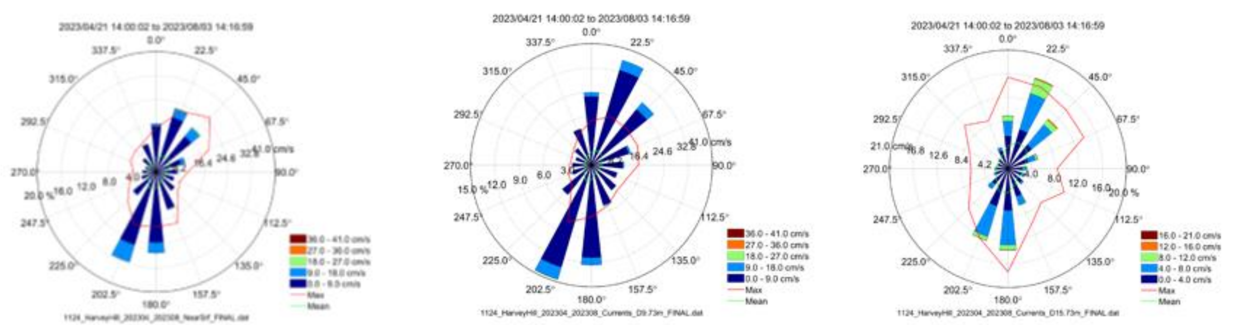


Figure 8.16. Compass rose plots of current speeds at the Harvey Hill East sea farm (April–August 2024). Current speeds and directions at 5 m,10 m and 15 m are shown from left to right in the figure.

8.4.2.2 Harvey Hill North

During June–July 2024, current measurements were collected at six depths in the Harvey Hill North sea farm (Table 8.13). During this period, the mean current speeds ranged from 3.5 cm/s near-surface to 1.9 cm/s near-bottom. Maximum current speeds ranged from 16.9 cm/s near-surface to 7.4 cm/s mid-depth, and 12.5 cm/s near-bottom. Flows were aligned northeast to southwest with the dominant direction and highest speeds towards the southwest (Figure 8.17). The vector-averaged currents ranged from 0. 6–1. 7 cm/s toward the southwest in the upper 20 m and mid-depth while near-bottom vector-averaged currents were 0. 3 cm/s towards the south-southwest.

Table 8.13. Current speeds (mean and maximum values) and vector-averages at the Harvey Hill North sea farm (June–July 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	3.51	16.60	1.7 @ 223 °
10	2.71	16.87	0.8 @ 223 °
15	2.32	12.74	0.6 @ 220 °
20	2.18	11.27	0.8 @ 219 °
27	2.01	7.36	0.6 @ 216 °
53 (5 m above bottom)	1.90	12.45	0.3 @ 203 °

Notes:
MWL = mean water level.

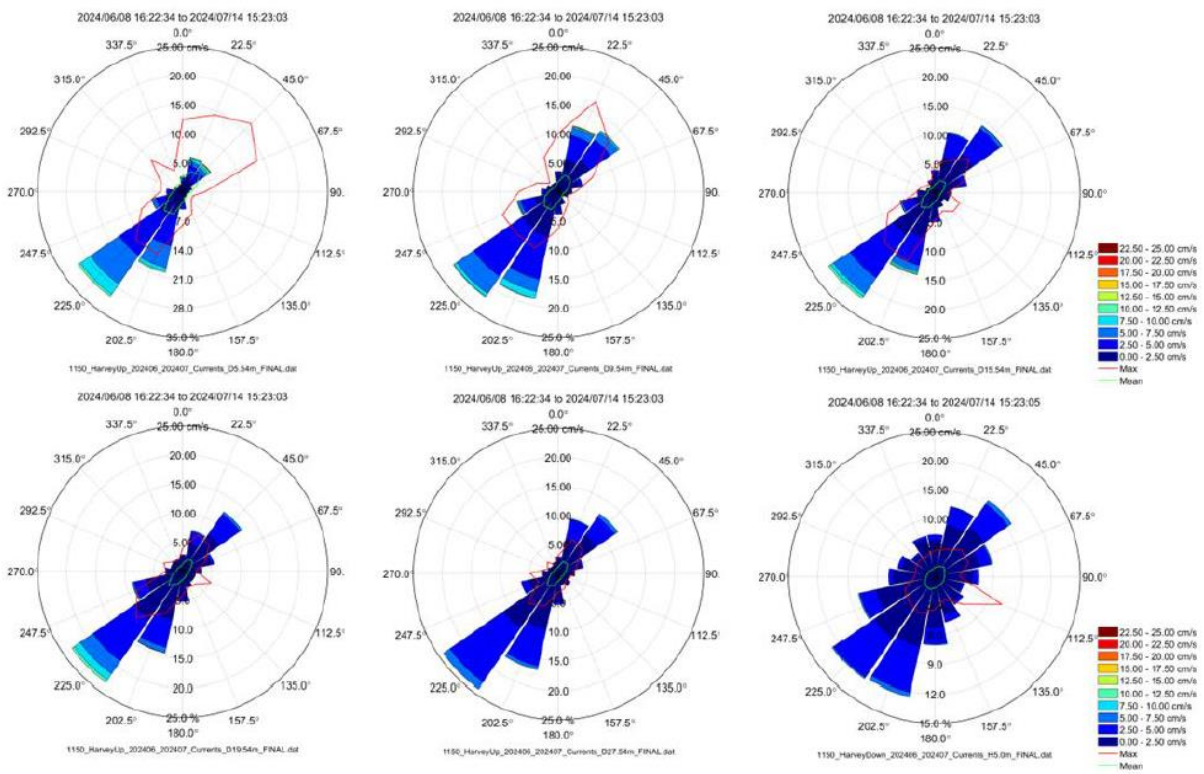


Figure 8.17. Compass rose plots of current speeds at the Harvey Hill North sea farm (June–July 2024). Current speeds and directions at 5 m,10 m, 15 m, 20 m, 27 m (mid-depth) and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

8.4.2.3 Broad Cove

During April–August 2023, current measurements were collected at three depths in the Broad Cove sea farm (Table 8.14; Figure 8.18). During this period, the mean current speed at 5 m was 6.3 cm/s, reducing slightly to 4.2 cm/s at 15 m. Maximum measured current speeds were 29.5 cm/s at 5 m, 32.6 cm/s at 10 m, and 18.1 cm/s at 15 m. The peak measured current of 32.6 cm/s occurred at 10 m depth on 27 June 2023 at the start of a rising tide. The vector-averaged currents ranged from 0.33 cm/s at 5 m to 1.0 cm/s at 15 m, with directions shifting from south-southeast at 5 m to northeast at 10 and 15 m.

Table 8.14. Current speeds (mean and maximum values) and vector-averages at the Broad Cove sea farm (April–August 2024).

	Speed (cm/s)		
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	6.3	29.5	0.33 @ 169 °
10	5.1	32.6	0.82 @ 39 °
15	4.2	18.1	1.0 @ 50 °

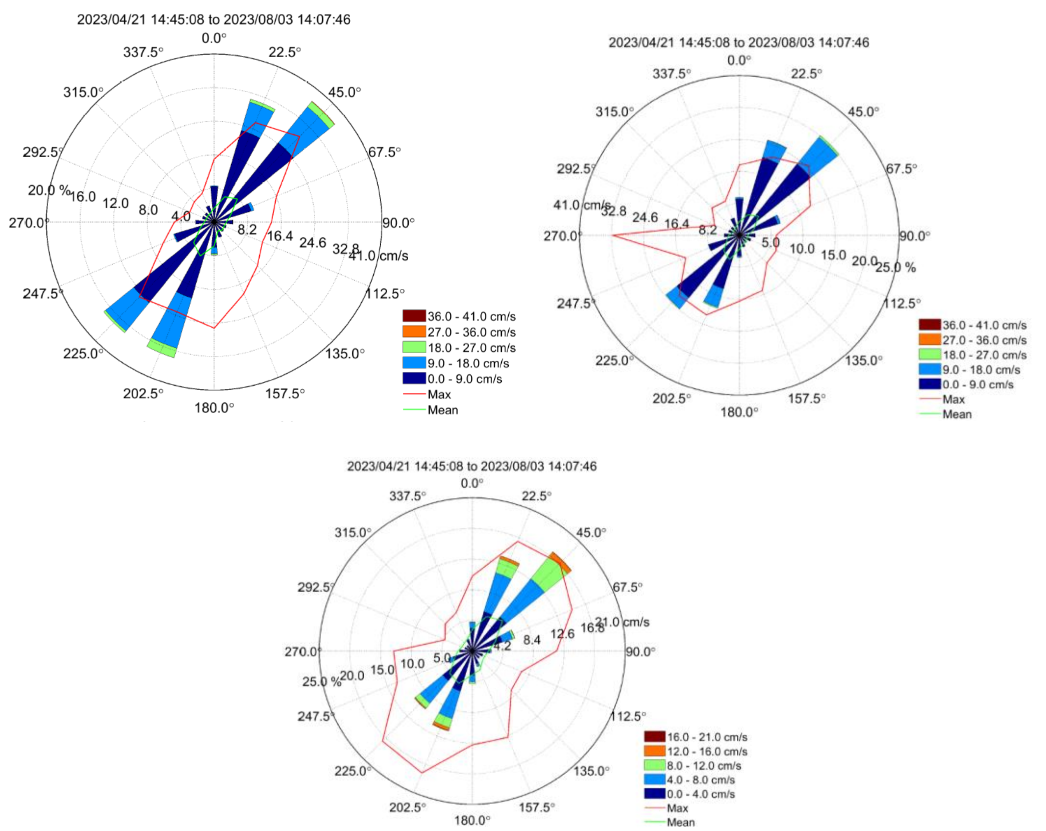


Figure 8.18. Compass rose plots of current speeds at the Broad Cove sea farm (April–August 2024). Current speeds and directions at 5 m,10 m and 15 are shown from left to right, top to bottom in the figure.

8.4.2.4 *Harvey Hill South*

During December 2023–March 2024, current measurements were collected at six depths in the Harvey Hill South sea farm (Table 8.15; Figure 8.19). During this period, mean current speeds ranged from 2.8 cm/s near-bottom to 6.4 cm/s near-surface. Maximum measured current speeds were 36.6 cm/s at 5 m, reducing to 13.8 cm/s near-bottom. The largest current speed measurement of 36.6 cm/s was at 5 m depth on 14 February 2024, during a rising tide. The vector-averaged currents were approximately 0.8–1.5 cm/s and were generally directed down inlet towards the southwest, except near bottom where they shifted downslope towards the east southeast.

Table 8.15. Current speeds (mean and maximum values) and vector-averages at the Harvey Hill South sea farm (December 2023–March 2024).

Speed (cm/s)			
Depth (below MWL) (m)	Mean	Maximum	Vector-Average
5	6.4	36.6	1.5 @ 213 °
10	5.6	30.9	1.3 @ 216 °
15	4.6	26.1	1.3 @ 214 °
20	4.1	22.8	1.4 @ 216 °
75	3.7	18.3	0.8 @ 231 °
140 (5 m above bottom)	2.8	13.8	1.3 @ 112 °

Notes:
MWL = mean water level.

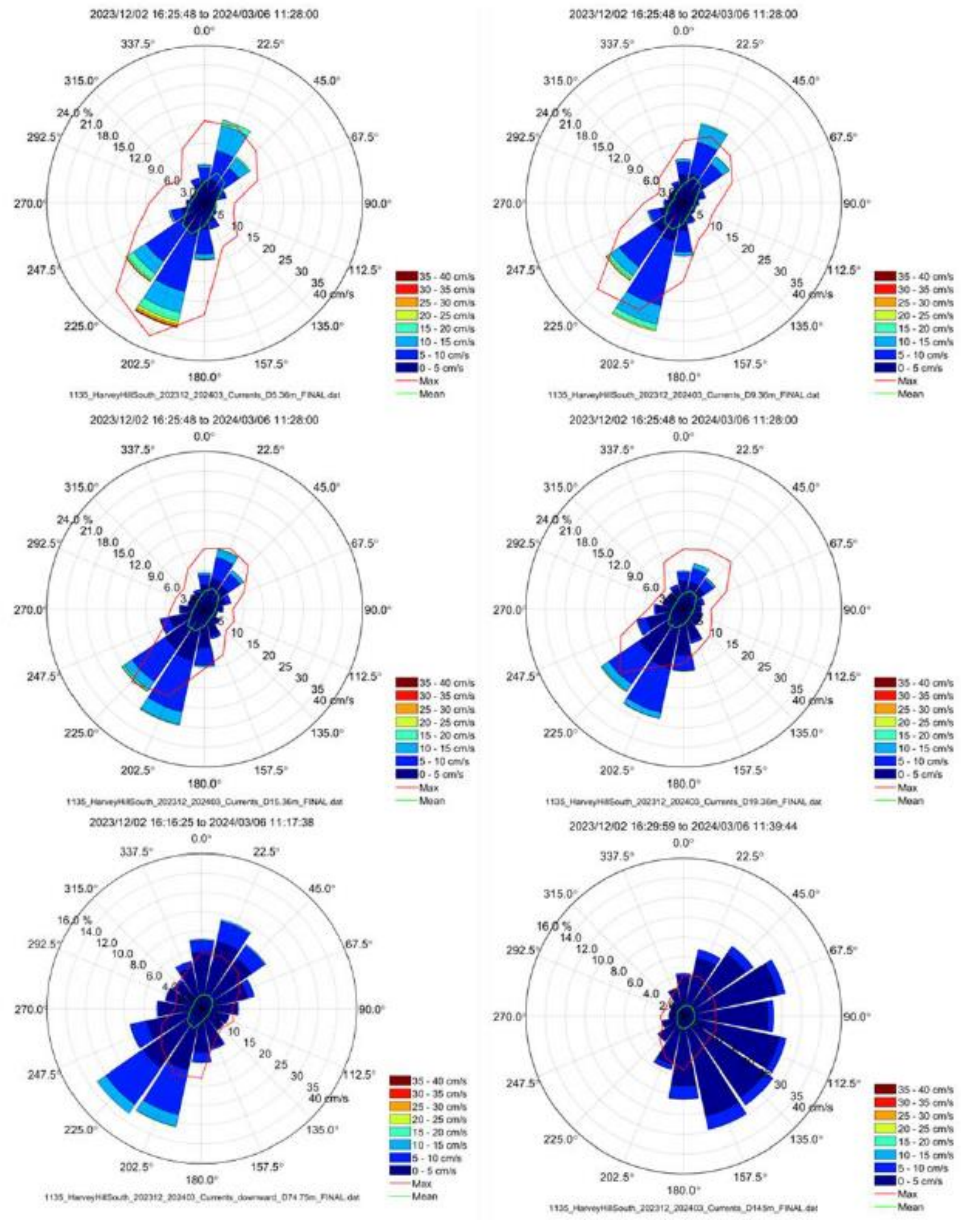


Figure 8.19. Compass rose plots of current speeds at the Harvy Hill South sea farm (December 2023–March 2024). Current speeds and directions at 5 m,10 m, 15 m, 20 m, 75 m (mid-depth) and near bottom (5 m height) are shown from left to right, top to bottom in the figure.

8.4.3 Wind and Waves

8.4.3.1 Modelling (MSC50 Hindcast Approach) for Atlantic Canada

Mean wind speeds and mean wave heights near the Harbour Breton Bay BMA were highest in December, January, and February and lowest in June, July, and August based on 10 years of historical data (Tables 8.16 and 8.17). Maximum monthly wind speeds of ~20–22 m/s (~72-79 km/h) occurred in December, January, February, and March. Similarly, maximum monthly wave heights were higher in the winter months, ranging from 4.55–5.12 m (Table 8.17). Wind directions were predominantly westerly, and speeds most frequently ranged from ~8–10 m/s (Figure 8.20).

Table 8.16. Monthly wind speeds (mean and maximum) near the Harbour Breton Bay BMA (at MSC50 grid points M6012355 and M6012356 during 2009–2018).

Month	M6012355		M6012356	
	Wind Speed Mean (m/s)	Wind Speed Max (m/s)	Wind Speed Mean (m/s)	Wind Speed Max (m/s)
January	10.81	20.70	10.80	20.59
February	10.44	21.99	10.44	22.00
March	9.52	21.28	9.52	21.29
April	7.93	18.64	7.94	18.61
May	6.49	14.32	6.50	14.27
June	5.79	13.44	5.80	13.37
July	5.40	11.88	5.41	11.85
August	5.94	14.09	5.95	14.11
September	7.67	16.93	7.67	16.95
October	8.83	18.64	8.83	18.64
November	9.65	19.65	9.65	19.59
December	10.54	20.57	10.55	20.53

Notes:
Grid point M6012720 is ~4 km from the Rencontre Island East sea farm.

Table 8.17. Monthly wave heights (m) (mean and maximum) recorded near the Harbour Breton Bay BMA (at MSC50 grid points M6012355 and M6012356 during 2009–2018).

Month	M6012355		M6012356	
	Wave Height Mean (m)	Wave Height Max (m)	Wave Height Mean (m)	Wave Height Max (m)
January	1.93	5.05	1.83	4.74
February	1.73	4.87	1.64	4.55
March	1.40	4.13	1.33	3.90
April	1.17	3.72	1.10	3.51
May	0.89	2.54	0.82	2.41
June	0.76	2.25	0.71	2.13
July	0.80	2.17	0.74	2.06
August	0.82	2.43	0.77	2.29
September	1.13	3.32	1.06	3.11
October	1.35	4.33	1.27	4.09
November	1.58	4.94	1.48	4.64
December	1.72	5.12	1.62	4.82

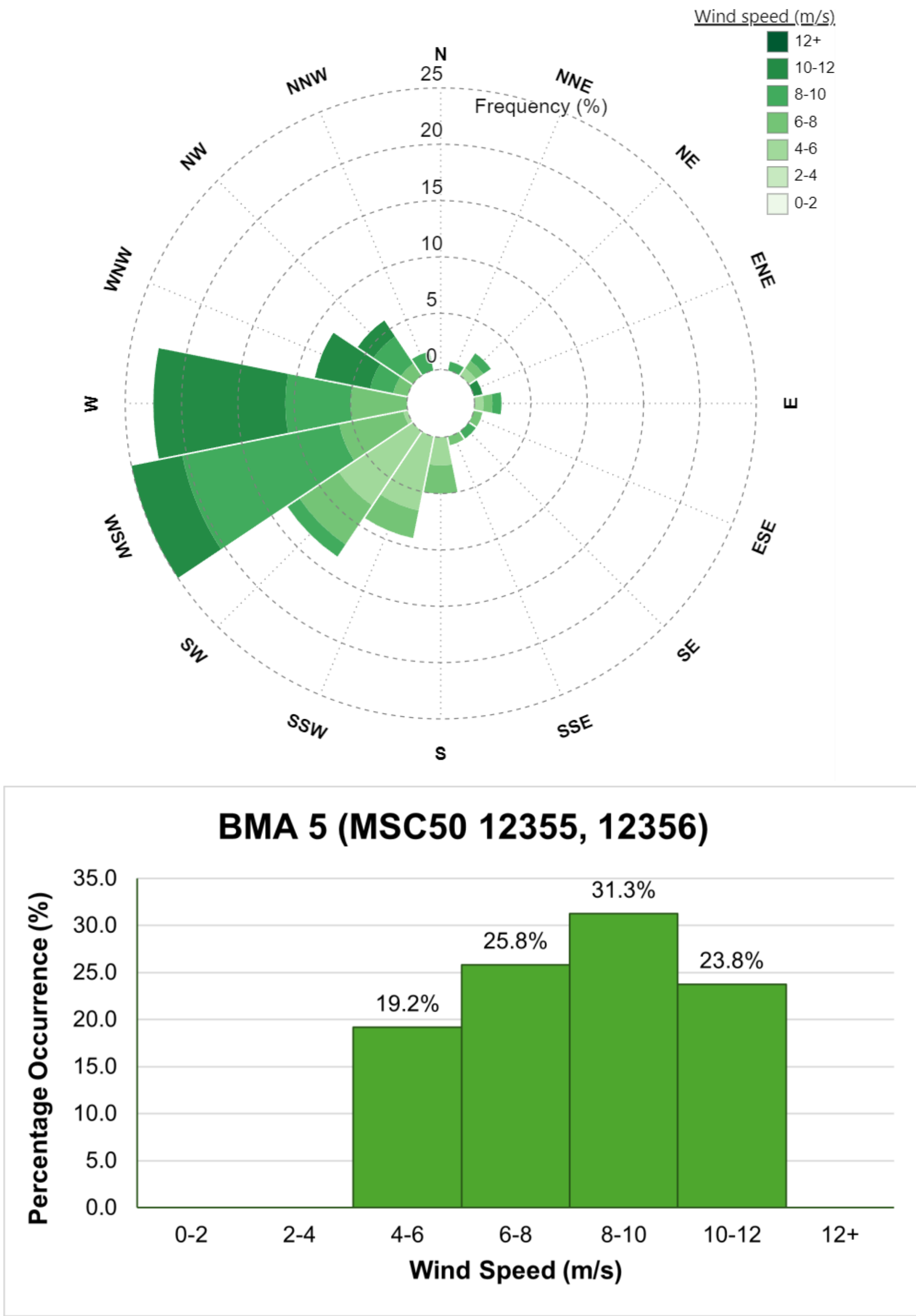


Figure 8.20. Wind rose and wind speed frequency histogram for MSC50 grid points M6012355 and M6012356 near the Harbour Breton Bay BMA (2009–2018).

8.4.3.2 *Sea Farm Specific Wave Measurements*

In the Harbour Breton Bay BMA, sea farm specific wave measurements were collected December 2023–March 2024 in the Harvey Hill South sea farm using a SOFAR spotter wave buoy (see Section 3.4.3.3).

Harvey Hill South

During December 2023–March 2024, a SOFAR Spotter wave buoy was deployed at the Harvey Hill South sea farm. Over this period, significant wave height (Hs) averaged 0.17 m, with a maximum of 0.9 m (Table 8.18). Mean wave period averaged 4 seconds, with maximum wave periods up to 17 seconds. Waves predominantly originated from the south/south-southwest which offered the most fetch (Figure 8.21). The largest wave event occurred on 12 December 2023 with waves from the south reaching Hs of 0.9 m. A secondary wave event occurred on 14 February 2024, with waves from the northeast reaching a Hs of approximately 0.7 m.

Table 8.18. Statistical summary of Hs and Tmean from the Spotter wave buoy deployed at the Harvey Hill South sea farm (December 2023–March 2024).

	Min	1%	5%	25%	50%	mean	75%	95%	99%	std	max	# valid	Total #
Hs (m)	0.00	0.02	0.03	0.08	0.14	0.17	0.23	0.42	0.54	0.12	0.88	2278	2280
Tmean (s)	1.46	1.70	1.92	2.36	3.19	4.22	5.48	9.38	12.14	2.48	16.90	2278	2280

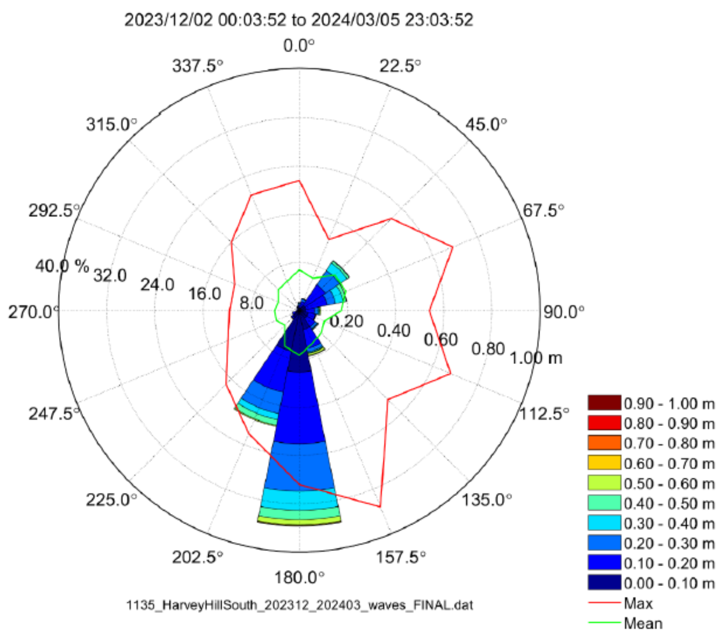


Figure 8.21. Compass rose plot of Hs and mean wave direction from the Spotter wave data collected at the Harvey Hill South sea farm (December 2023–March 2024).

8.5 Ice Conditions

Ice conditions for the Study area including Harbour Breton Bay (BMA 5) are detailed in Section 4.5.

8.6 Storms

Storm conditions for the Study Area including Harbour Breton Bay (BMA 5) are detailed in Section 4.6.

8.7 Tides and Floods

Tide and flood conditions for the Study Area including Harbour Breton Bay (BMA 5) are detailed in Section 4.7.

8.8 Performance of Sea Farms with a Previous Production Cycle

The Harbour Breton Bay BMA has been previously stocked and in production. The summaries below detail the monitoring, reporting and performance of the four sea farms in the Harbour Breton Bay BMA during the period that public reporting has been a requirement (2016–present).

8.8.1 Fallowing Periods

Table 8.19 summarizes fallow periods for MCE sea farms in the Harbour Breton Bay BMA since the enactment of the AAR. The Harvey Hill East, Broad Cove and Harvey Hill South sea farms are currently in production and stocked with fish. Harvey Hill North has been fallow since November 2019. It is anticipated that the three farms currently in production will be harvested in 2026 and the fallow period will follow.

Table 8.19. Summary of fallow schedule for Harbour Breton Bay BMA sea farms since 2016. Green indicates production (month stocked), red indicates harvesting/depopulation (month sea cages were empty), and blue is fallow (not stocked).

Sea Farm	2016	2017	2018	2019	2020	2021	2022	2023	2024
Harvey Hill East		Sep	Jun	Dec		May		Mar	Jul
Harvey Hill North		May	Jun	Nov					
Broad Cove		Feb	May	Dec		Jun		Apr	Aug
Harvey Hill South									Jul

8.8.2 Benthic Monitoring

For Harbour Breton Bay BMA, regulatory modelling of deposition (i.e., DEPOMOD) has not been required and not completed to date.

As per AAR requirements, benthic monitoring of an active sea farm is required during a period of peak salmon feeding. Depending on bottom type (hard or soft), either video monitoring or bottom grabs are collected to determine the amount of BOD matter. During years with active farming, required benthic monitoring at sampling stations in the Harbour Breton Bay BMA was conducted. All sea farms were within the allowable regulatory threshold based on the BOD indicators (Table 8.20). Current production plans have three farms (Harvey Hill East, Broad Cove and Harvey Hill South) in Harbour Breton Bay BMA stocked in 2024.

Table 8.20. AAR benthic monitoring results for sea farms in the Harbour Breton Bay BMA (2015–2023). [Green = within allowable regulatory threshold[a]]

AAR Monitoring Year	BOD Indicator	Sea Farm			
		Harvey Hill East	Harvey Hill North	Broad Cove	Harvey Hill South
2015	Date				
	%Stations				
2016	Date	26 Sep 16	27 Sep 16	28 Sep 16	
	%Stations	47 (22/47)	50 (22/44)	52 (25/48)	
2017	Date				
	%Stations				
2018	Date				
	%Stations				
2019	Date	24 Sep 19	26 Sep 19	23 Sep 19	
	%Stations	40 (19/48)	34 (15/44)	38 (18/48)	
2020	Date				
	%Stations				
2021	Date				
	%Stations				
2022	Date	14,15 Sep 22		15 Sep 22	
	%Stations	43 (20/46)		47 (22/47)	
2023	Date				
	%Stations				

Source: MCE (2024).
Notes:
[a] If >70% of monitoring stations had the presence of *Beggiatoa* species or similar bacteria, marine worms, or barren substrate (as determined by visual monitoring) and/or if the mean concentration of free sulfide in surficial sediment was >3000 µM (as determined by sediment sampling) this is considered an exceedance (fail) of the allowable threshold.

8.8.3 Publicly Reported Performance

As detailed in Section 3.8.3, sea farm performance reports which include mass mortality, disease, and escape information and sea lice count data are available for recent years. Drugs and pesticide use information at sea farms are available for 2016–2022.

8.8.3.1 Mortality Events

No abnormal mortality events have been reported for farms within Harbour Breton Bay BMA for the years publicly reported on NAIA website and the Aquaculture Portal 2019–2024 (Table 8.21).

8.8.3.2 Disease

In 2021, IPN was detected in both the Broad Cove (public notice January 2022) and Harvey Hill East sea farms. Strains of the IPN virus endemic to Newfoundland and Labrador have not been associated with clinical signs of disease in Atlantic salmon raised in sea farms in the region, nor has there been any observed increase in mortality attributed to IPNv. Also detected on the Harvey Hill East farm in 2019 and again in 2023 was ISAv. During both instances, the sea farm was quarantined and the fish in the affected cage were harvested (Table 8.21).

8.8.3.3 Escapes

In 2021, damage (tears) were identified in the netting of one cage at the Harvey Hill East sea farm. The tears were repaired upon detection and no escapes were observed. In compliance with regulations, a notice was issued to regulators and the public via the NAIA website and the Aquaculture Portal 2019–2024 (Table 8.21).

Table 8.21. Summary of reportable incident events at sea farms in the Harbour Breton Bay BMA.

Date	Sea Farm	Incident				No. Cages Impacted	No. Fish Affected	Cause	Response Measures
		Abnormal Mortality	Fish Health Suspect	Fish Health Confirmed	Escape				
2022-01-21[a]	Broad Cove		IPNv			1	1	IPN virus	No action required
2019-07-[a]	Harvey Hill East		ISAv			1		ISA virus	Quarantine
2019-10-[a]	Harvey Hill East			ISAv		1			Quarantine & harvested
2021-07-15[a]	Harvey Hill East				suspect	1	No escapes observed	tear in netting	Tear repaired upon detection
2021-10-04[a]	Harvey Hill East		IPNv			1		IPN virus	No action required
2023-05-04[b]	Harvey Hill East		ISAv			2		ISA virus	Quarantine & harvested

Source: [a]naia.ca (2024); [b]aquacultureportal.ca (2024).

8.8.3.4 Sea Lice

Sea lice are reported on the NAIA website as an average number per fish. These results are not reported for each sea farm or each BMA but as an average for all active sea farms. Table 4.22 (see Section 4.8.3.4) summarizes the average sea lice/fish for all active farms for reporting years 2021–2024.

8.8.3.5 Deposits of Drugs and Pesticides

Between 2016–2020, MCE has used pest management products at its sea farms in BMA 5 including bath treatments (Azamethiphos and Hydrogen Peroxide), and in-feed treatments (Emamectin Benzoate and Ivermectin). In addition, the antibiotic Florfenicol was used in 2018

(Table 8.22). These products have all been approved for use in Canada and four are registered with Health Canada (Azamethiphos, Hydrogen Peroxide, Emamectin Benzoate, and Florfenicol) while Ivermectin is available through Health Canada's EDR program. All applications are under the control of the DAV and only applied by individuals that have received training and licensing for the application.

Table 8.22. Summary of deposits of pesticides and drugs at sea farms in the Harbour Breton Bay BMA (2016–2022).

BMA	Sea Farm	Year	Bath Treatment		In-Feed Treatment		
			Azamethiphos (Salmosan) (kg)	Hydrogen Peroxide (kg)	Emamectin benzoate (Slice) (kg)	Florfenicol (Aquaflor) (kg)	Ivermectin (Ivomec)(kg)
5	Broad Cove	2016	28.5		7.879		
5	Broad Cove	2019	29.4				
5	Broad Cove	2021	29.4	1158	0.38		
5	Broad Cove	2022	98.4		1.81		
5	Harvey Hill East	2016	13.5		11.076		
5	Harvey Hill East	2017	10.5				
5	Harvey Hill East	2018				11.857	
5	Harvey Hill East	2019	38.85				
5	Harvey Hill East	2021	49.35	13970.5	0.52		
5	Harvey Hill East	2022	104.7		2.13		
5	Harvey Hill North	2016	30		3.976		
5	Harvey Hill North	2019	25.2				

Source: National Aquaculture Public Reporting Data Website (2024).
Notes:
2023 and 2024 data not available.

During 2016–2022, fish at the Broad Cove, Harvey Hill East, and Harvey Hill North sea farms received treatment from pesticide (bath) and drugs (in-feed) for sea lice. As per the AAR, the total amounts (kg) of each treatment were reported to DFO (see Table 8.22).

8.9 Exposure Zone Modelling

8.9.1 PEZ Modelling

DFO has not conducted PEZ modelling for BMA 5 sea farms.

8.9.2 Dispersion Modelling

Dispersion modelling by BMT was undertaken to model exposure zones of Azamethiphos (bath treatment) in a worst-case scenario approach (see Appendix B). The modelling study estimated an exposure profile for the entire BMA assuming sea farms were treated in sequence and concentrations were modelled from the first treatment at Harvey Hill North sea cages (4 May 2023 for spring tide; 16 June 2023 for neap tide) through final treatment at Broad Cove sea cages (17 May 2023 for spring tide; 29 June 2023 for neap tide) (Table 8.23).

Exposure zone modelling of a worst-case scenario for Azamethiphos use in the Harbour Breton Bay BMA predicted maximum areas of 1.91 km^2 and 1.43 km^2 during neap and spring tides, respectively, where Azamethiphos concentrations exceeded 100 ng/L (0.1 µg/L) during the treatment duration. The maximum Azamethiphos concentration for the Harbour Breton Bay BMA was 970 ng/L during the simulated neap tide and 1100 ng/L during the spring tide. The peak concentration occurred during the treatments of the last farm, Broad Cove, and decreased shortly after treatments were completed; concentration levels 72 hrs after final treatment were below 100 ng/L (Figures 8.22 and 8.23). The maximum area within BMA 5 where Azamethiphos concentrations were predicted to exceed 100 ng/L was larger during the neap tide scenario (1.91 km^2) than during the spring tide scenario (1.43 km^2).

Table 8.23. Treatment schedule (assumed dates) for sea farms in BMA 5 during a simulated spring and neap tide event.

Sea Farm	Sea Cage No.	Spring Tide		Neap Tide	
		Treatment Date (Assumed)	Hours from Final Treatment	Treatment Date (Assumed)	Hours from Final Treatment
Harvey Hill North	1	04 May 23	-315	16 Jun 23	-315
	2	04 May 23	-312	16 Jun 23	-312
	3	05 May 23	-291	17 Jun 23	-291
	4	05 May 23	-288	17 Jun 23	-288
	5	06 May 23	-267	18 Jun 23	-267
	6	06 May 23	-264	18 Jun 23	-264
	7	07 May 23	-243	19 Jun 23	-243
Harvey Hill East	1	07 May 23	-240	19 Jun 23	-240
	2	08 May 23	-219	20 Jun 23	-219
	3	08 May 23	-216	20 Jun 23	-216
	4	09 May 23	-195	21 Jun 23	-195
	5	09 May 23	-192	21 Jun 23	-192
	6	10 May 23	-171	22 Jun 23	-171
	7	10 May 23	-168	22 Jun 23	-168
Harvey Hill South	1	11 May 23	-147	23 Jun 23	-147
	2	11 May 23	-144	23 Jun 23	-144
	3	12 May 23	-123	24 Jun 23	-123
	4	12 May 23	-120	24 Jun 23	-120
	5	13 May 23	-99	25 Jun 23	-99
	6	13 May 23	-96	25 Jun 23	-96
	7	14 May 23	-75	26 Jun 23	-75
Broad Cove	1	14 May 23	-72	26 Jun 23	-72
	2	15 May 23	-51	27 Jun 23	-51
	3	15 May 23	-48	27 Jun 23	-48
	4	16 May 23	-27	28 Jun 23	-27
	5	16 May 23	-24	28 Jun 23	-24
	6	17 May 23	-3	29 Jun 23	-3
	7	17 May 23	0	29 Jun 23	0

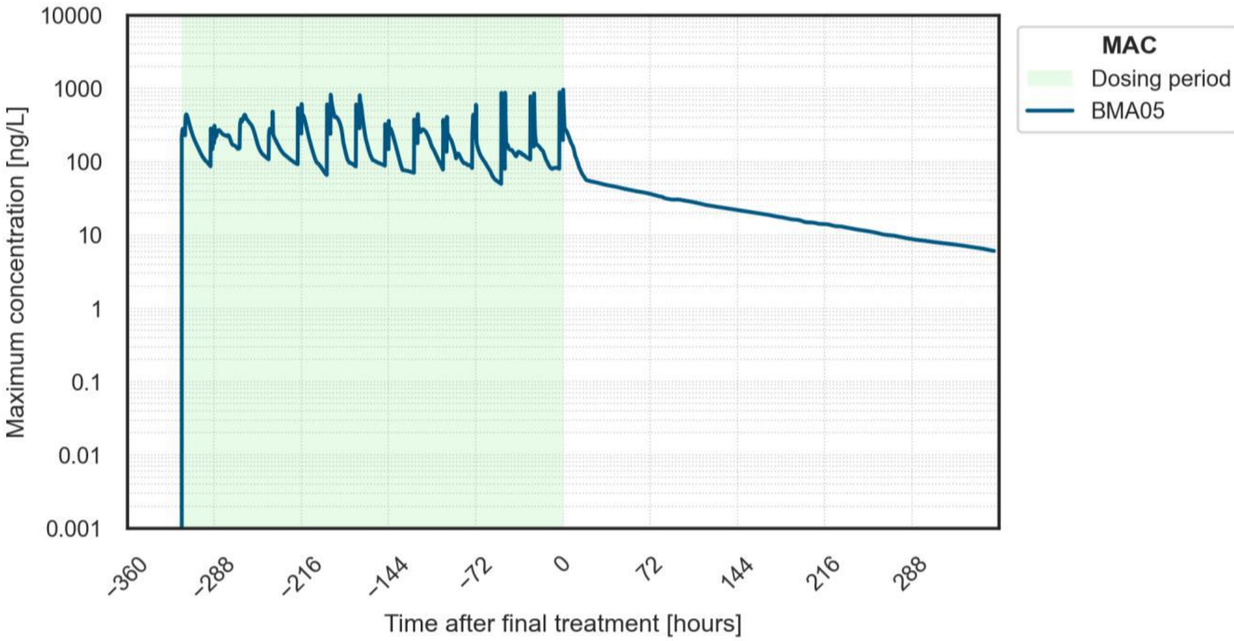


Figure 8.22. Maximum concentrations for Harbour Breton Bay BMA during a bath Azamethiphos treatment in a simulated neap tide. First treatment commenced at Harvey Hill North (assumed 16 June 2023) and final treatment was at Broad Cove (time=0; assumed 29 June 2023).

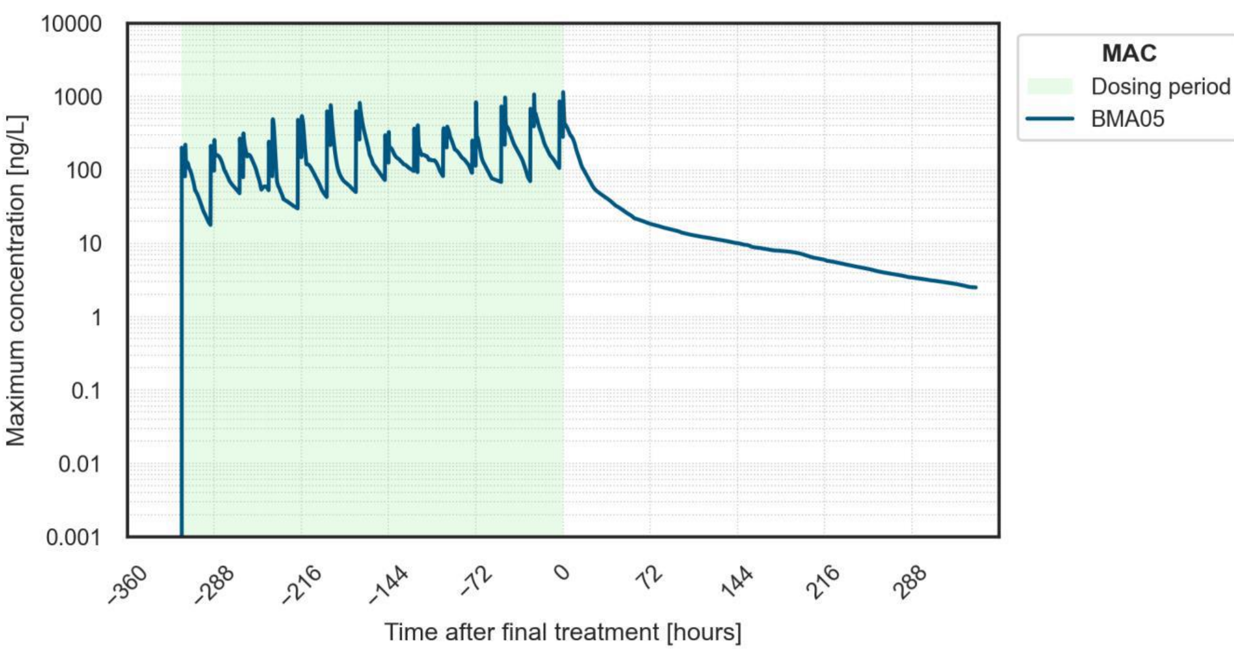


Figure 8.23. Maximum concentrations for Harbour Breton Bay BMA during a bath Azamethiphos treatment in a simulated spring tide. First treatment commenced at Harvey Hill North (assumed 4 May 2023) and final treatment was at Broad Cove (time=0; assumed 17 May 2023)