Labrador Shelf Offshore Area Strategic Environmental Assessment Update

Chapter 9

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File No: 121414574

Final Report

December 13, 2021

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9.0 COMMERCIAL, RECREATIONAL, AND INDIGENOUS FISHERIES

Commercial, recreational, and Indigenous fisheries have played an important role in Labrador's economy and have helped to define much of the Province's character. The fishery remains a critical component of the economy of Newfoundland and Labrador.

This chapter provides an update to the original SEA Report (SEM 2008) regarding commercial fishing activity in the Labrador Shelf SEA Update Area. It also includes information pertaining to current recreational and Indigenous fishing activity that occurs within the Labrador Shelf SEA Update Area. This chapter focuses on describing fishing activity that has occurred since the original SEA Report was prepared, including landings information, geographic distribution of fishing activity, seasonality, and the gear and methods used for harvest activities. As the Labrador Shelf SEA Update Area includes a portion of the marine environment that extends outside the 200 nautical mile EEZ, international commercial harvesting activity is included in this chapter.

Indigenous fishing activity, including harvesting under a food, social, and ceremonial (FSC) licence and under communal-commercial licences is also discussed in this section. IK has been incorporated directly into the applicable commercial fisheries sections, along with information gained from stakeholder engagement activities with commercial fishers. For many parts of the Labrador Shelf SEA Update Area, there is strong IK on the distribution of various species; however, there may be geographic bias of the observations towards more populated areas of the coast related to concentration of hunting and travel by community members. Therefore, a lack of mapped data should not be inferred to mean a lack of species presence. In addition, the IK included within this SEA Update does not represent the total land usage or knowledge held by Indigenous groups with respect to the Labrador Shelf SEA Update Area.

9.1 ADMINISTRATIVE BODIES AND KEY INFORMATION SOURCES

9.1.1 Regulatory Bodies

There are two regulatory bodies that govern commercial fishing activity within the Canada-NL Offshore Area, both within and outside the 200 nautical mile EEZ. The Government of Canada (through DFO) maintains jurisdiction over commercial fish species within Canada's 200 nautical mile EEZ and all sedentary species that occur across the extent of Canada's continental shelf. DFO uses a quota and licence system for the majority of species fished within NL waters, whereby a total allowable catch (TAC) is set for a species, and then licences are issued accordingly. These licences are issued by both NAFO Division and Subdivision, as well as individual species management area (e.g., Shrimp Fishing Area (SFA), Crab Management Area (CMA)).

Outside of the EEZ, NAFO hold jurisdiction over commercial fishing activity for several species and manages the conservation of other environmental features, like corals and sponges. NAFO will set TACs for the species it manages in its jurisdiction, and then issue quotas to multiple member nations (including Canada) who take part in international fishing activity in this area. This occurs within NAFOs Regulatory Area (NRA), which is an area of approximately 2,707,895 km² and spans adjacent to the EEZs of Greenland, Canada, France (St. Pierre et Miquelon), and the United States. Figure 9-1 illustrates both DFO and NAFO regulated waters in relation to the Labrador Shelf SEA Update Area.

Within the Labrador Shelf SEA Update Area, there exists a portion of water along coastal Labrador known as “The Zone” that encompasses approximately 48,690 km² of ocean, extending to the limit of Canada’s territorial sea (SEM 2008). The Zone was established under the Labrador Inuit Land Claims Agreement (LILCA) in 2005. A co-management board (Torngat Joint Fisheries Board) appointed by the Government of Canada, Government of NL, and Nunatsiavut Government is the primary body for making recommendations to governments on the conservation and management of fish species in The Zone. Nunatsiavut Government and the Government of Canada retain overall responsibility for conservation and management of the fishery in the Zone.

Within the Zone, Labrador Inuit have the right to harvest those species of fish and marine mammals as outlined in their FSC licence for Inuit FSC purposes. If conservation requires that fishing by Inuit be limited, the limits are set by the federal minister based on a recommendation of the Nunatsiavut Government. Under the terms of the LILCA, the Inuit are to receive a percentage of new or additional commercial fishing licences for specified species within and in waters adjacent to the Zone. Innu Nation and NunatuKavut Community Council also hold FSC licences and fish in the area (Sections 9.4.2 and 9.4.3).

9.1.2 Data Sources

The Northwest Atlantic Ocean is divided into a series of NAFO Divisions / Subdivisions for the purposes of managing fisheries resources, which are further subdivided into associated NAFO Unit Areas. NAFO Divisions are divided into Numbers from 0-6 (e.g., Division 2), the specific NAFO Subdivision is indicated by a letter after the Division number (e.g., 2G), and the Unit Area is identified by a lowercase letter (e.g., 2Ga). The Labrador Shelf SEA Update Area overlaps with NAFO Subdivisions 2GHJ and its associated Unit Areas (Figure 9-1), and the data pertaining to these regions are used to help describe commercial fishing activity within the area. Note that small portions of the Labrador Shelf SEA Update Area also overlap with small portions of 0B, 4R and 3K. As the vast majority of the Labrador Shelf SEA Update Area overlaps with 2GHJ, inclusion of all catch data for 0B, 4R and 3K would provide results that are not most representative of fishing effort in the area.

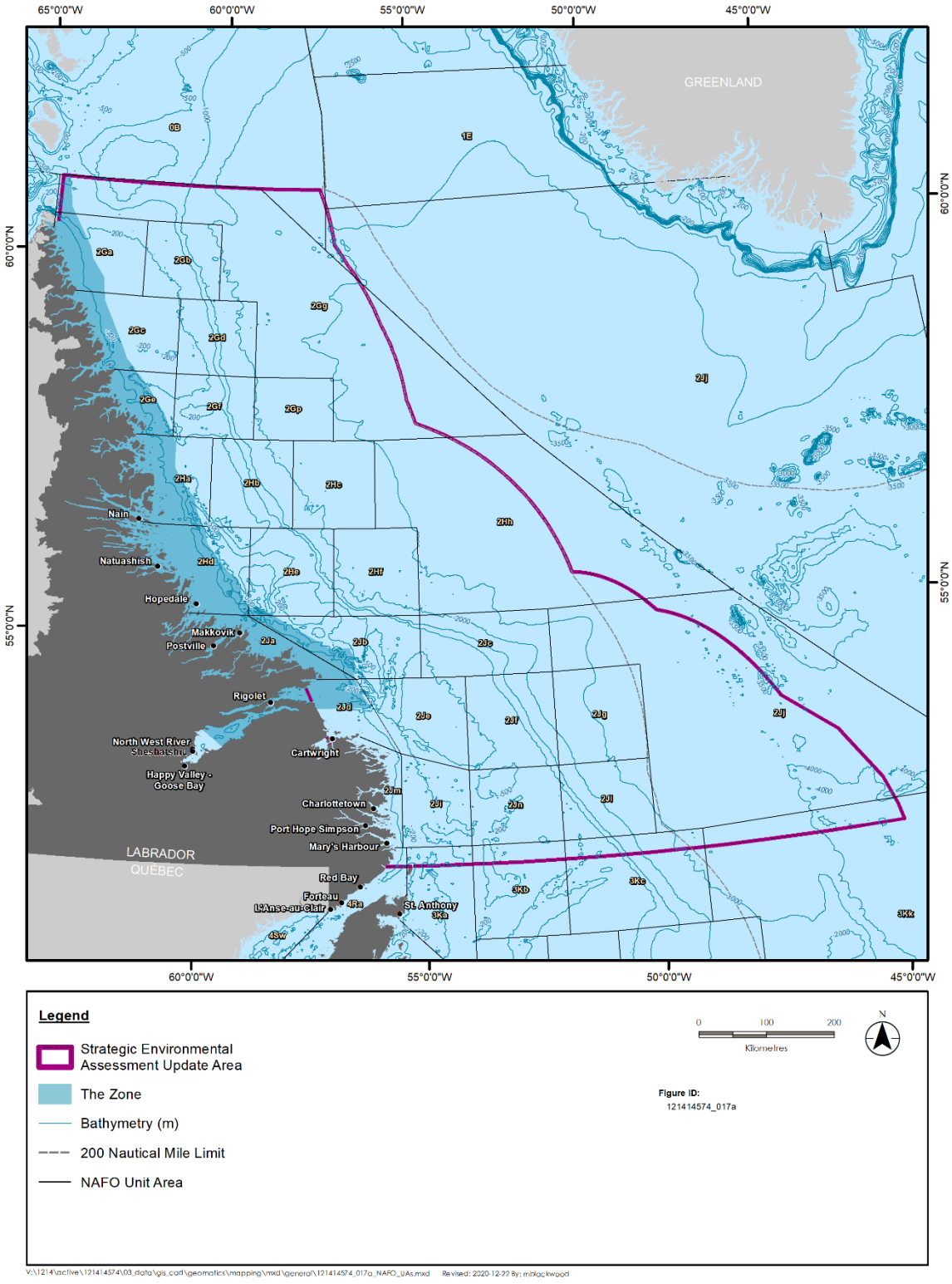


Figure 9-1 Labrador Shelf SEA Update Area and Associated NAFO Divisions and Unit Areas

The analysis of both historical and current domestic commercial fishing activity is done primarily using data provided by DFO on commercial fish landings information from 2007 to 2017 (the most recent year available at the time of writing). This includes data on landings numbers, provided in terms of weight landed (kg) and value landed (Canadian dollars), and also includes other variables such as gear type, and month of harvest. While these landings are described in kilograms, for the purposes of this update, they are presented in metric t. The landed value of commercial fisheries in the data that are provided by DFO are described as the catch “at the wharf” when it is sold. Therefore, it does not represent indirect or induced economic benefits, including value-added processes for fish products. To indicate activity and absolute or relative abundance, harvested weight is considered to be the most useful measure for year-to-year comparison. Value of the harvest may vary annually with species, negotiated prices, changes in exchange rates and fluctuating market conditions.

Along with datasets for domestic weight and value of commercial harvesting activity, DFO also provides georeferenced datasets that are used to illustrate domestic commercial fish harvesting locations in the Canada-NL Offshore Area. These datasets help provide a general indication of fishing activity for defined geographic areas. These areas are defined in a series of 6 nautical mile by 4 nautical mile grid squares that cover the Canada-NL Offshore Area. For this SEA Update, it includes those waters that fall within the Labrador Shelf SEA Update Area, out to the 200 nautical mile EEZ. These geo-referenced data are used to plot past harvesting locations and identify areas where fishing occurs over multiple years, and include variables, such as species, gear type, and month when harvesting occurs. In the original SEA Report (SEM 2008), these georeferenced data were based on the location given in the datasets recorded in the vessel's fishing log, which were reported by degree and minute of latitude and longitude. As a result, the position where the harvest occurred was accurate within approximately 0.9 km (0.5 nautical miles) of the reported coordinates. In 2010, DFO changed the reporting criteria by gridding the offshore environment. Therefore, if the harvest occurred in a particular 6 nautical mile x 4 nautical mile area, that would be the area highlighted. As a result, there is less accuracy in the new reporting format, but it can still provide a general interpretation of commercial fishing activity within the Labrador Shelf SEA Update Area.

Outside of the EEZ, data on international harvesting activity were obtained using the STATLANT 21A and 21B datasets from NAFO. These datasets present harvesting information in tonnes and are available up to 2017. This information captures information on harvesting activities for both Canadian and non-Canadian vessels actively fishing outside the EEZ and within the NRA.

While DFO and NAFO commercial fisheries datasets are the primary sources that are used to describe commercial fishing activity in the vicinity of the Project, other additional sources have been used to help further discuss commercial fishing in the Canada-NL Offshore Area. These include DFO species management plans, DFO and NAFO quota and stock status reports, and other research reports and studies, such as those of the Canadian Science Advisory Secretariat of DFO and those undertaken by the Torngat Joint Fisheries Board. Information regarding recreational fishing activities in the Labrador Shelf SEA Update Area were obtained from provincial government documents and discussions with stakeholders during engagement sessions. Information on Indigenous fishing were obtained from available public information and the incorporation of IK where applicable.

It must be stressed that the fishery is very dynamic, and operators will be required to consult with fisheries stakeholders for up-to-date information in their areas of interest.

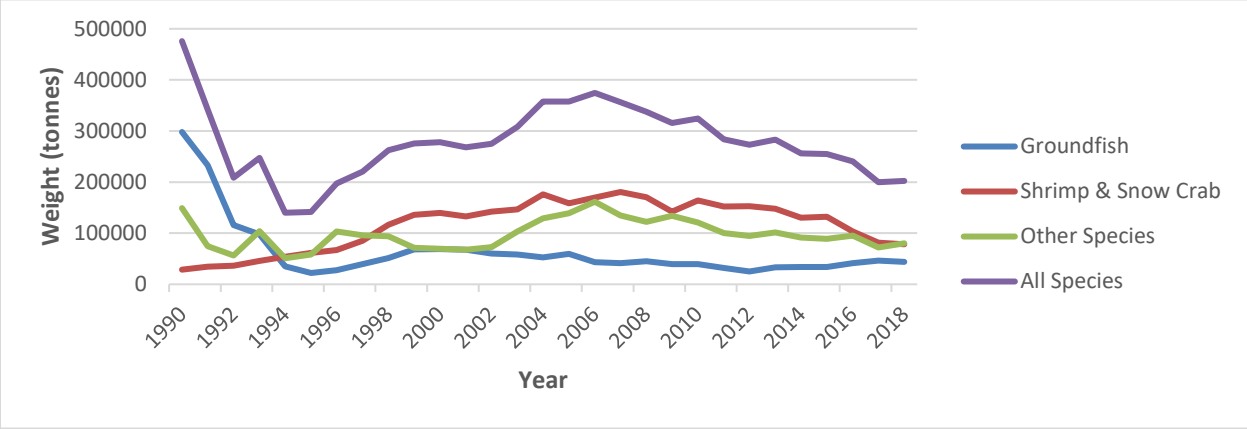
9.2 COMMERCIAL FISHING

9.2.1 Historical Overview

Commercial fish harvesting in NL has been and continues to be both an important economic and cultural activity in the province. Since NL was founded and colonized, fish harvesting activity has occurred in different capacities over time. Historically, most commercial fish harvesting was focused on groundfish species, such as Atlantic cod and American plaice. With the collapse of several groundfish stocks in 1992, including Atlantic cod, a moratorium on cod, American plaice, and other groundfish species was declared. Moratoria for some of these species remain and has not been removed. Fisheries currently occurring within the SEA Update Area include:

- snow crab (fixed gear)
- turbot (fixed gear)
- turbot (mobile trawl) - other groundfish as bycatch
- shrimp (mobile trawl)
- cod (combination of gear and mostly close to shore)
- pelagics (herring, mackerel) - close to shore
- whelk, scallop - in bays

Figure 9-2 outlines the changes that have occurred in commercial harvesting activity in NL since the collapse of groundfish stocks.



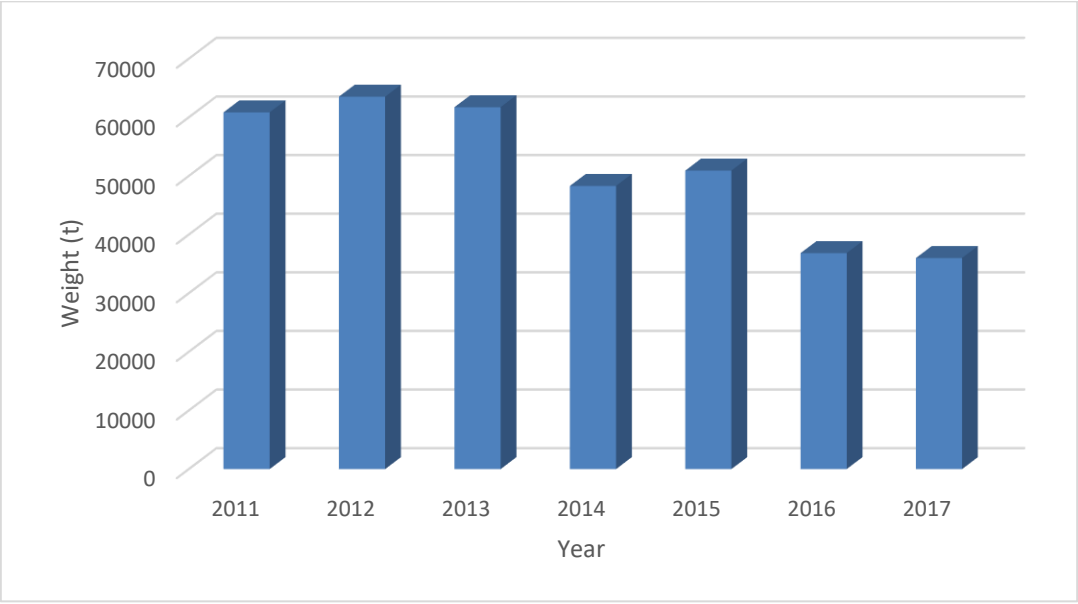
Source: DFO 2020a

Figure 9-2 Historic Overview of Commercial Fishing Activity in NL (1990 to 2018)

As mentioned in the original SEA Report (SEM 2008), with the collapse of groundfish stocks, commercial fisheries, including within the Labrador Shelf SEA Update Area, have shifted, with shellfish such as northern shrimp and snow crab becoming key species harvested offshore. Groundfish species still remain important, and Greenland halibut (turbot) have been highlighted as an important commercial species by fishers in Labrador (SEM 2008). Atlantic cod, rock cod, scallop, salmon, and Arctic char were also recognized as locally important species.

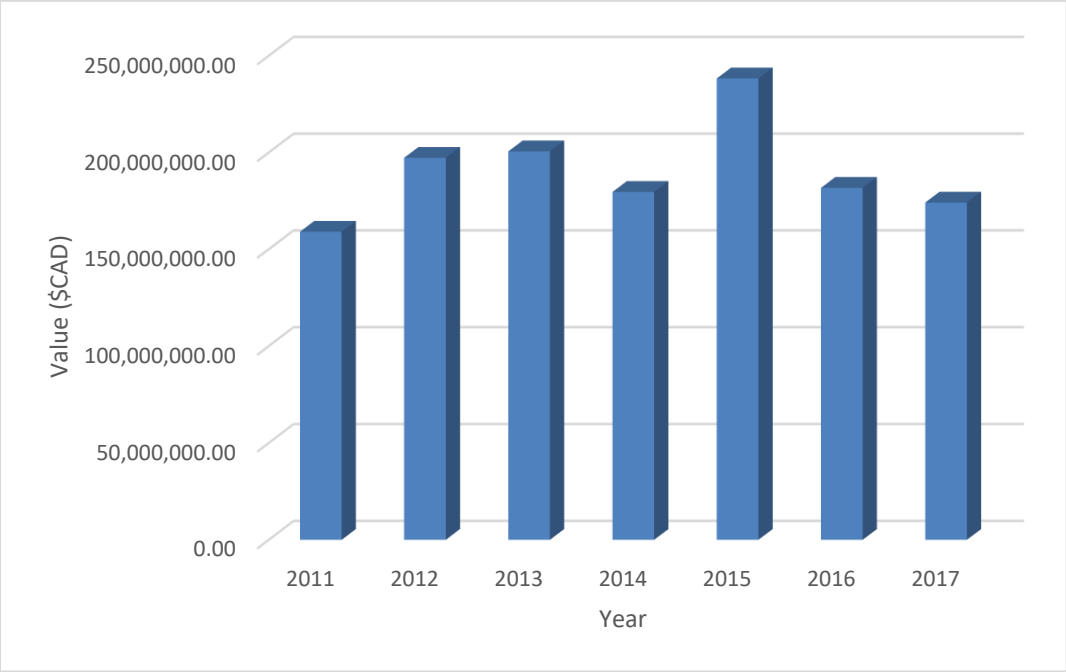
9.2.2 Current Domestic Fisheries

Current domestic fisheries are managed by DFO, which regulates and monitors commercial fishing activity for species under Canada's jurisdiction, including sedentary species outside of the 200 nautical mile EEZ. Commercial fishing information for NAFO Divisions 2GHJ from 2011 to 2017 are discussed below. These data were the most recent available at the time of writing. Due to DFO privacy and confidentiality policies, a large portion of commercial fishing information regarding landings weight and value of certain species has been withheld to protect the identity of individual fish harvesters and their enterprises. As a result, a large portion of the data available pertains to the main fisheries being undertaken offshore, that have multiple harvesters and larger landings. While this helps to highlight the main fisheries occurring in the Labrador Shelf SEA Update Area, there is less information on smaller fisheries for other species that may be undertaken alongside these larger fisheries. Using the data that are currently available from DFO, Figures 9-3 and 9-4 illustrate the changes in total weight and landings in the Labrador Shelf SEA Update Area from 2011 to 2017.



Source: DFO 2019

Figure 9-3 Quantity of Harvest by Year (t), Labrador Shelf SEA Update Area, 2011 to 2017



Source: DFO 2019

Figure 9-4 Value of Harvest by Year ($CAD), Labrador Shelf SEA Update Area, 2011 to 2017

Between 2011 and 2017, the total weight or landings within the Labrador Shelf SEA Update Area decreased from approximately 60,842 t in 2011, to approximately 36,000 t in 2017. This marks a decrease of approximately 41% over that time frame. The highest level of landings within this time series (63,518 t) was recorded in 2012. Value has also changed between 2011 and 2017. In 2011, total value from landings within the Labrador Shelf SEA Update Area was approximately $159,043,486, and in 2017 total value was approximately $174,155,728. This marks an overall increase of 9.5%. The highest total value for landings ($238,273,744) was recorded in 2015.

A full list of species harvested within the Labrador Shelf SEA Update Area are provided in Table 9.1. These include species with redacted data due to privacy and species caught as bycatch. Within the Labrador Shelf SEA Update Area, domestic commercial harvesting activity in offshore waters focuses primarily on northern shrimp, snow crab and Greenland halibut (turbot).

Table 9.1 Species Harvested within the Labrador Shelf SEA Update Area Through Directed Fishery or as Bycatch

Species	Group	Species	Group
Atlantic cod	Groundfish	Porbeagle shark	Pelagic
Haddock	Groundfish	Swordfish	Pelagic
Atlantic halibut	Groundfish	Albacore tuna	Pelagic
White hake	Groundfish	Mahi Mahi / dolphinfish	Pelagic
American plaice	Groundfish	Mako Shark	Pelagic

Table 9.1 Species Harvested within the Labrador Shelf SEA Update Area Through Directed Fishery or as Bycatch

Species	Group	Species	Group
Yellowtail flounder	Groundfish	Bluefin tuna	Pelagic
Cusk	Groundfish	Bigeye tuna	Pelagic
Roundnose grenadier	Groundfish	Capelin	Pelagic
Turbot / Greenland halibut	Groundfish	White marlin	Pelagic
Skate	Groundfish	Yellowfin tuna	Pelagic
Monkfish (American angler)	Groundfish	Atlantic herring	Pelagic
Catfish (Striped wolffish)	Groundfish	Fins, fish unspecified	Pelagic
Pollock	Groundfish	Argentine	Pelagic
Greysole / Witch flounder *	Groundfish	Shark, unspecified	Pelagic
Roughhead grenadier *	Groundfish	Mackerel	Pelagic
Redfish *	Groundfish	Northern shrimp, *Pandalus borealis*	Shellfish
Winter flounder	Groundfish	Queen / snow crab	Shellfish
Arctic skate	Groundfish	Whelk	Shellfish
Silver hake	Groundfish	Iceland scallop	Shellfish
Dogfish	Groundfish	Sea scallop	Shellfish
Roe, Lumpfish	Groundfish	Stimpson's surf clam	Shellfish
Flounder, unspecified	Groundfish	Cockle	Shellfish
Sculpin	Groundfish	Pink shrimp, *Pandalus montagui*	Shellfish
Groundfish, unspecified	Groundfish	Atlantic rock crab	Shellfish

Note:
* bycatch only, not an active fishery.

Tables 9.2 and 9.3 identify the top eight species (based on weight and value) harvested within the Labrador Shelf SEA Update Area from 2011 to 2017. Northern shrimp appear to be the dominant fishery, accounting for approximately 89% of total recorded landings, and 87% of total value of landings during that timeframe. Striped or pink shrimp is the second highest species by weight, accounting for approximately 4.3% of landings, followed by Greenland halibut (3.4%). Following Northern shrimp and pink shrimp, in terms of total value of landings, snow crab is the third highest, at approximately 4.1% and Greenland halibut is fourth, at approximately 4%. Other fisheries, such as those for whelk, Arctic char, and scallop, accounted for modest portions of overall fishing activity, but do still occur within the waters of offshore Labrador.

This information is based on landings information that is made public by DFO. Data for other fisheries were not available for analysis due to confidentiality policies in place to protect the identity of individual harvesters that may be operating in smaller fisheries in the area. While the list of species in Tables 9.2 and 9.3 are limited to the top eight species (based on weight and value), there were recorded data entries

for other species in the Labrador Shelf SEA Update Area, including groundfish species and some pelagic species (see Table 9.1).

Table 9.2 Species within the Labrador Shelf SEA Update Area, Domestic Harvest by Weight (t), 2011 to 2017

Species	2011	2012	2013	2014	2015	2016	2017	Total	Percent of Total
Northern shrimp, *Pandalus borealis*	54,454	54,503	54,654	43,348	45,557	33,463	32,381	318,360	88.2
Pink shrimp, *Pandalus montagui*	2,766	4,468	2,136	1,643	2,341	526	1,005	14,885	4.1
Turbot / Greenland halibut	1,532	2,797	3,308	1,465	1,037	859	809	11,807	3.2
Queen / Snow Crab	1,905	1,590	1,316	1,641	1,711	1,690	1,667	11,520	3.2
Atlantic Cod	42	57	109	97	133	205	27	670	0.2
Whelk	99	74	182	84	111	66	99	715	0.2
Arctic char	24	11	20	22	25	28	167	146	0.0
Iceland Scallop	19	16	-	-	-	-	-	N/A	0.0
Total	63,518	63,518	61,726	48,300	50,916	36,838	36,005	360,821	

Source: DFO 2019

Note: The information presented above is based on the data that have been publicly provided through DFO. Some data have been withheld by DFO due to internal privacy policies, and therefore may not reflect all fisheries taking place within the Labrador Shelf SEA Update Area.

Table 9.3 Species Within the Labrador Shelf SEA Update Area, Domestic Harvest by Value ($CAD), 2011 to 2017

Species	2011	2012	2013	2014	2015	2016	2017	Total	Percent of Total
Northern shrimp, *Pandalus borealis*	135,536,669	163,161,990	169,950,432	160,227,877	214,912,817	164,723,245	150,833,565	1,159,346,595	87.12
Queen / Snow crab	9,027,976	6,836,990	5,704,396	8,464,529	9,318,831	11,144,932	4,020,030	54,517,684	4.10
Turbot / Greenland halibut	6,638,027	14,247,876	16,849,216	4,286,970	4,626,533	3,239,868	3,044,698	52,933,188	3.98
Pink shrimp, *Pandalus montagui*	7,617,841	12,812,269	7,737,650	6,399,731	9,081,871	2,209,690	15,986,246	61,845,298	4.65
Atlantic Cod	50,294	67,693	114,392	109,035	155,286	266,669	39,427	802,796	0.06
Whelk	98,988	86,736	201,760	101,985	135,155	95,184	190,813	910,621	0.07
Arctic char	42,255	19,676	41,411	37,369	43,251	58,398	40,948	283,308	0.02
Iceland Scallop	31,437	30,704	-	-	-	-	-	N/A	0.00
Total	159,043,486	197,263,933	200,599,259	179,627,498	238,273,745	181,737,985	174,155,728	1,330,701,634	

Source: DFO 2019
Note: The information presented above is based on the data that have been publicly provided through DFO. Some data have been withheld by DFO due to internal privacy policies, and therefore may not reflect all fisheries taking place within the Labrador Shelf SEA Update Area.

9.2.2.1 Indigenous Communal-Commercial Fishing

There are three Indigenous Groups in Labrador that fish in the Labrador Shelf area – the Nunatsiavut Government, the NunatuKavut Community Council, and the Innu Nation. The Mik'maq groups from the Island of Newfoundland also have communal-commercial access to certain fish species in areas within the Labrador Shelf SEA Update Area. Indigenous groups are issued communal-commercial licences that allow them to harvest commercially to generate economic development for the community. These licences are managed by a fishing operation held by the group, or by designated fishing enterprises, to harvest on behalf of the group. The following sections provide the current knowledge of communal-commercial fishing activities being undertaken by the Indigenous groups of Labrador.

Communal-commercial harvesting occurs throughout the Labrador Shelf SEA Update Area for a number of species. Primarily, this includes northern shrimp, snow crab, and Greenland halibut. However, other fisheries for pelagic species and shellfish do occur at a smaller scale (Section 9.2.6).

Nunatsiavut Government

The Nunatsiavut Government hold a number of communal-commercial licences for groundfish, seal, scallop, snow crab, shrimp, and Arctic char. These include groundfish licences for NAFO areas 2GHJ3KL and communal Greenland halibut in NAFO Divisions 2GHJ. Snow crab licences are held for management areas 2HJn and 2Js. Snow crab is one of the most commercially important species to Nunatsiavut. Northern shrimp licences are held for SFA 4 and 5 (NAFO Divisions 2G and 2H) and scallop licenses are held for Scallop Management Area 1 (Cape Rouge – Cape Chidley). Seal licences are held for Sealing Areas 4 through 33 (Chevron Canada 2020). Although whelk is not commercially harvested in Nunatsiavut, historical exploratory fisheries have discovered the resource Nunatsiavut-wide.

Nunatsiavut Government (2018) reported that the commercial char fishery has been ongoing since the late 1970s. There are three commercial fishing zones: the Okak area, Nain Bay area, and the Voisey Bay area. During the late 1980s and 1990s, when the salmon fishery was still open, the majority of fishers fished in the Okak area because they harvested both char and salmon. However, during this time, char was considered mostly bycatch and salmon was the main target. This made travelling longer distances to obtain the fish financially feasible. After the closure of the salmon fishery, most fishers stayed closer to Nain due to the cost of fuel and the lower value of char (Nunatsiavut Government 2018). Nunatsiavut Government reports that presently, 99% to 100% of char caught in the commercial fishery is in the Nain Bay area (Nunatsiavut Government 2018). A popular location for the char fishery in the past was Saltwater Pond; however, it has been reported to have declined char abundances, and is therefore no longer used for char fishing (Nunatsiavut Government 2018).

Nunatsiavut Government (2018) also reported that during the late 1970s and early 1980s, the commercial fishery put a huge strain on the fish populations in Nain Bay. There were no size restrictions on the nets and fish of all sizes were being caught. This led to smaller fish over time (Nunatsiavut Government 2018). Many Labrador Inuit worried that without the moratorium, Nain Bay would not have recovered, which would have had major negative effects on many people in the community because Nain Bay is heavily relied on as a source of food (Nunatsiavut Government 2018).

Nunatsiavut Government observed a decline in salmon stock during the commercial salmon fishery but has since seen a substantial recovery in many locations throughout Labrador (Nunatsiavut Government 2018). Over-fishing of salmon, prior to the moratorium, also led to the collapse of the seal fishery, which many people depended on as a source of income (Nunatsiavut Government 2018). However, the seal population has also recovered (Nunatsiavut Government 2018).

Many Labrador Inuit were commercial fishers before the moratorium (Nunatsiavut Government 2018). In addition to providing an income to many commercial fishers, the fishery also provided jobs for those working in the fish plant (Nunatsiavut Government 2018). Presently, many individuals that fish for recreational or FSC purposes, gained fishing experience by assisting with or taking part in the commercial fishery in the past (Nunatsiavut Government 2018).

Innu Nation

The Innu Nation holds several communal-commercial licences for groundfish, mackerel, capelin, shrimp, and halibut. The Innu Nation holds licences for groundfish in NAFO Divisions 0, 2GHJ, 3KLMNO, mackerel and capelin in Fishing Areas 1 to 11, and shrimp in SFAs 4-6. Ueushuk Fisheries Limited, a 100% Innu-owned business, holds a mid-shore groundfish licence for various areas for harvesting of a variety of species (including Greenland halibut, skates, white hake, Atlantic halibut, and haddock), covering a wide range of NAFO areas, and a shrimp licence for SFAs 6 and 7 (Chevron Canada 2020).

NunatuKavut Community Council

NunatuKavut Community Council holds several communal-commercial licences (either directly or through NDC Fisheries, owned by NunatuKavut Community Council) for groundfish, shrimp, snow crab, capelin, herring, seal, scallops, and toad crab. NDC Fisheries also holds several communal-commercial licences and operates enterprises for groundfish in NAFO 2GHJ, 3KL, and 4RS, scallop in Scallop Areas 1 and 2, shrimp in SFA 4 and 6, as well as for whelk, snow crab, capelin, herring, and toad crab in southern Labrador. The NunatuKavut Community Council also holds two seal harvesting licences in Seal Fishing Areas 4 to 33 (Atlantic-wide) (Chevron Canada 2020). In 2017, the NunatuKavut Community Council partnered with the Labrador Fishermen's Union Shrimp Company Ltd to form Imakpik Fisheries Inc., which has a share of the SFA5 shrimp allocation. Atlantic salmon fisheries are also an integral part of NunatuKavut way of life, and as provincial fisheries and wildlife officials regulate and enforce the netting of salmon, the federal government has established a Communal Fishing Licence for NunatuKavut members under the *Fisheries Act*, with a limit of six Atlantic salmon per net allowed (Martin 2009, cited in Nalcor Energy 2010).

Several NunatuKavut Community Council members currently have, or previously had, commercial fishing licences for various marine species, including cod, salmon, crab, shrimp, mussels, herring and mackerel (NunatuKavut Community Council 2019). Some fishing activity mapped as FSC fishing may also include commercial fishing areas that were not specified as commercial.

9.2.3 Location and Timing of Harvest

Location and seasonality of domestic harvesting of commercial fish species coincides with times of the year when species are present and/or most active. Figure 9-5 illustrates the locations of domestic harvesting locations in the Labrador Shelf SEA Update Area for all species from 2012 to 2017. The colours depicted in the figures represent a certain year of fishing activity, with one colour representing an area that has been historically fished over multiple years, as is common in the Canada-NL Offshore Area. While it does not indicate that a certain area has been fished consistently from year to year, it allows for the interpretation of historically popular areas that contain commercial fishing activity. As illustrated in the figure, fishing effort is generally concentrated along the continental shelf. This includes the slopes along the Labrador Shelf. Fishing concentrations are larger in the more southerly portions of the Labrador Shelf SEA Update Area. This can be attributed to species distributions, and that some species are not present farther north due to colder water temperatures. Figure 9-6 looks at domestic harvesting locations from 2007 to 2017, to further illustrate trends that have taken place over a longer period of time.

Figure 9-7 further illustrates location of fish harvesting by comparing the total weight of landings throughout NAFO Subdivisions 2GHJ. Based on the publicly available statistics regarding weight of landings, 2J is where the majority of domestic harvesting has taken place between 2011 and 2017, accounting for approximately 39% of total weight.

Figure 9-8 illustrates the trends in seasonality for domestic harvesting between 2011 and 2017 for the Labrador Shelf SEA Update Area. The majority of commercial harvesting activity takes place during the summer months (June to August), with September and October also having moderate harvesting activity. This is when species are most abundant due to warming water temperatures and species migrations. It also overlaps with seasonal fisheries, such as those for snow crab.

Figures 9-9 to 9-11 further break down and show the seasonality of commercial harvesting of shellfish, groundfish, and pelagic species, respectively. This is done quarterly, so that trends can be identified in the seasonality of these fisheries. Shellfish tend to have activity year-round, with July to September appearing to have the highest level of activity. Groundfish are also a year-round species, but July to September have higher levels of activity than the months during the winter and spring. Figure 9-11 shows that there is little commercial harvesting activity for pelagic species. The months of July to December show some level of activity consistently occurring in the southerly portions of the Labrador Shelf SEA Update Area.

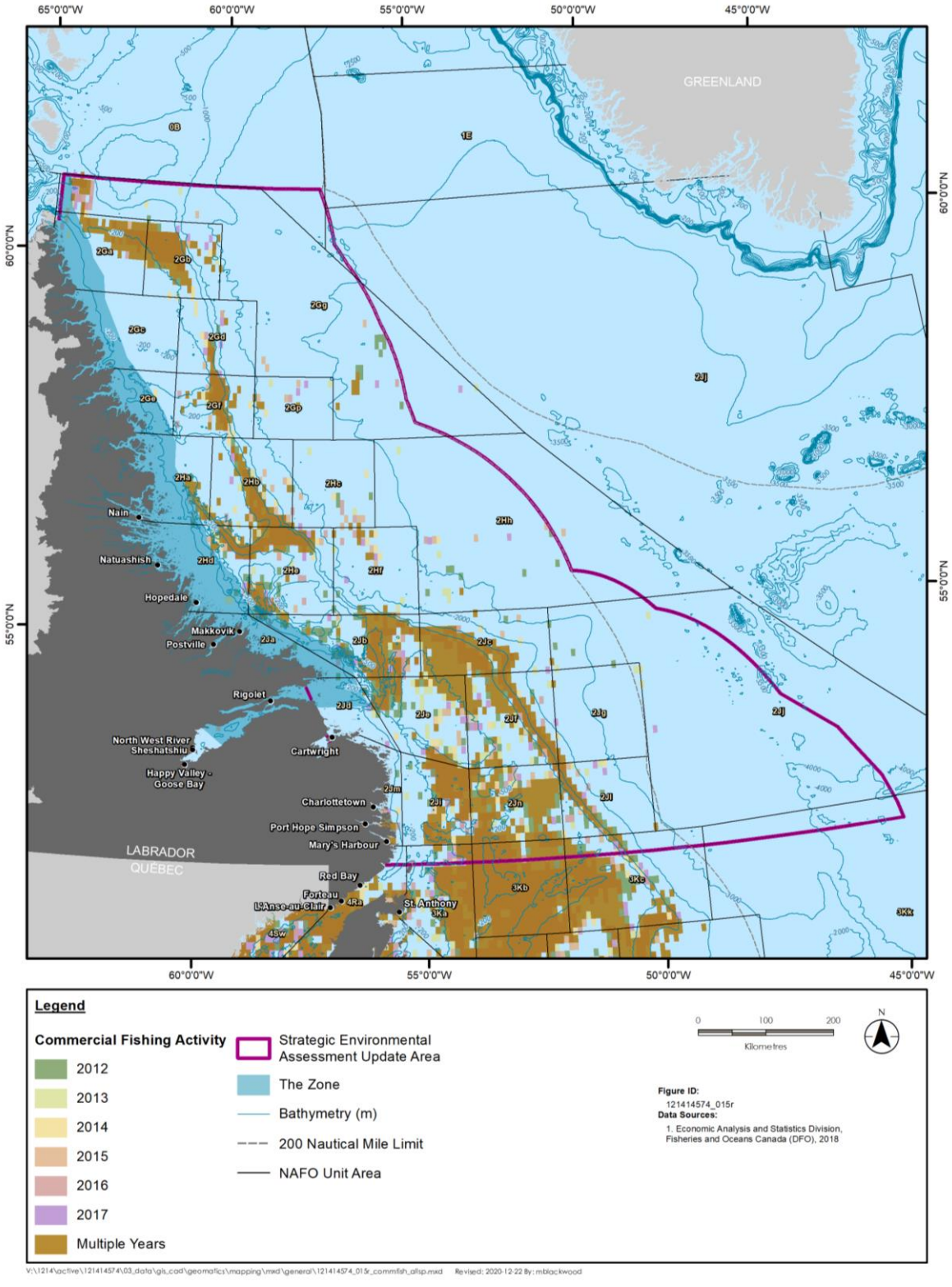


Figure 9-5 Domestic Harvesting Locations, All species, All Months, 2012 to 2017

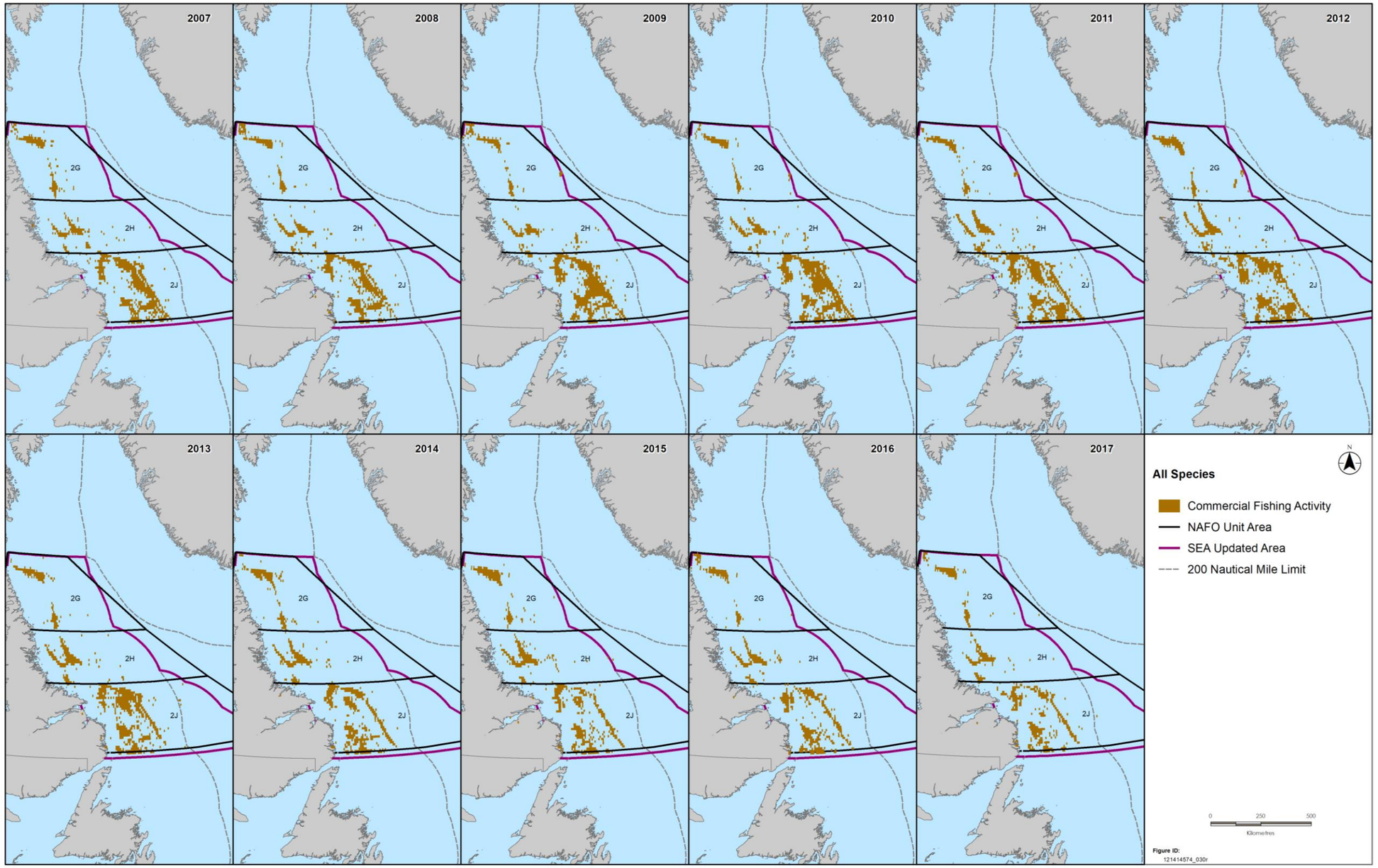
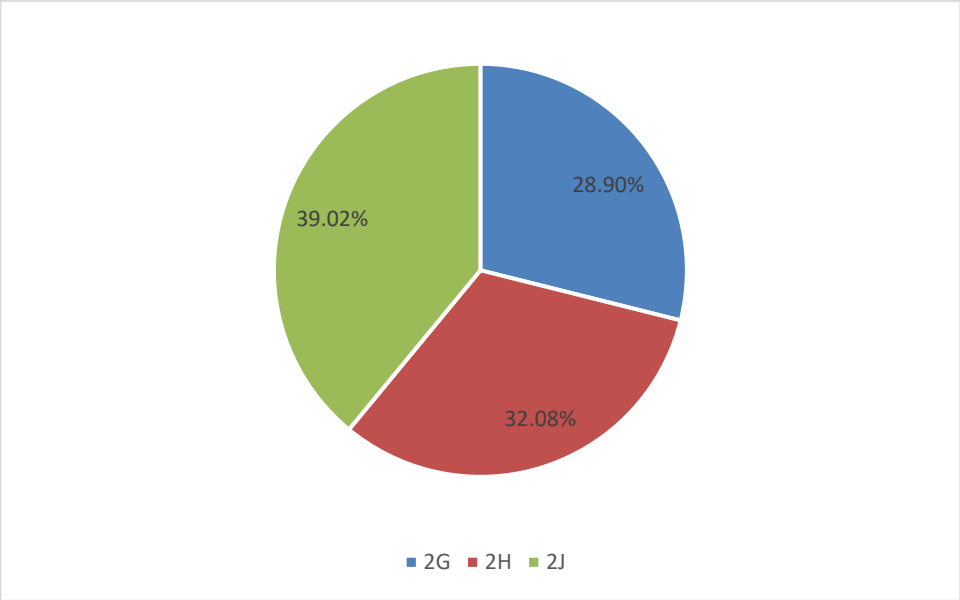
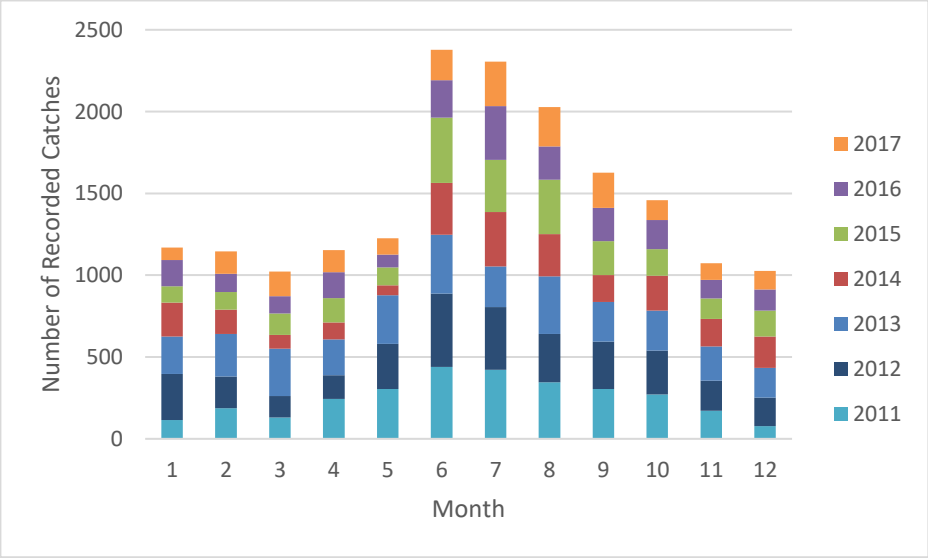


Figure 9-6 Domestic Harvesting Locations, All Species, 2007 to 2017



Source: DFO 2019

Figure 9-7 Total Domestic Harvest, by Weight (t), NAFO Subdivisions 2GHJ, 2011 to 2017



Source: DFO 2019
Note: Recorded catch in this context refers to the geospatial data and indicates when a catch for a species was recorded in a defined 6nm x 4nm grid square, regardless of species.

Figure 9-8 Seasonality of Domestic Harvesting within the Labrador Shelf SEA Update Area, 2011 to 2017

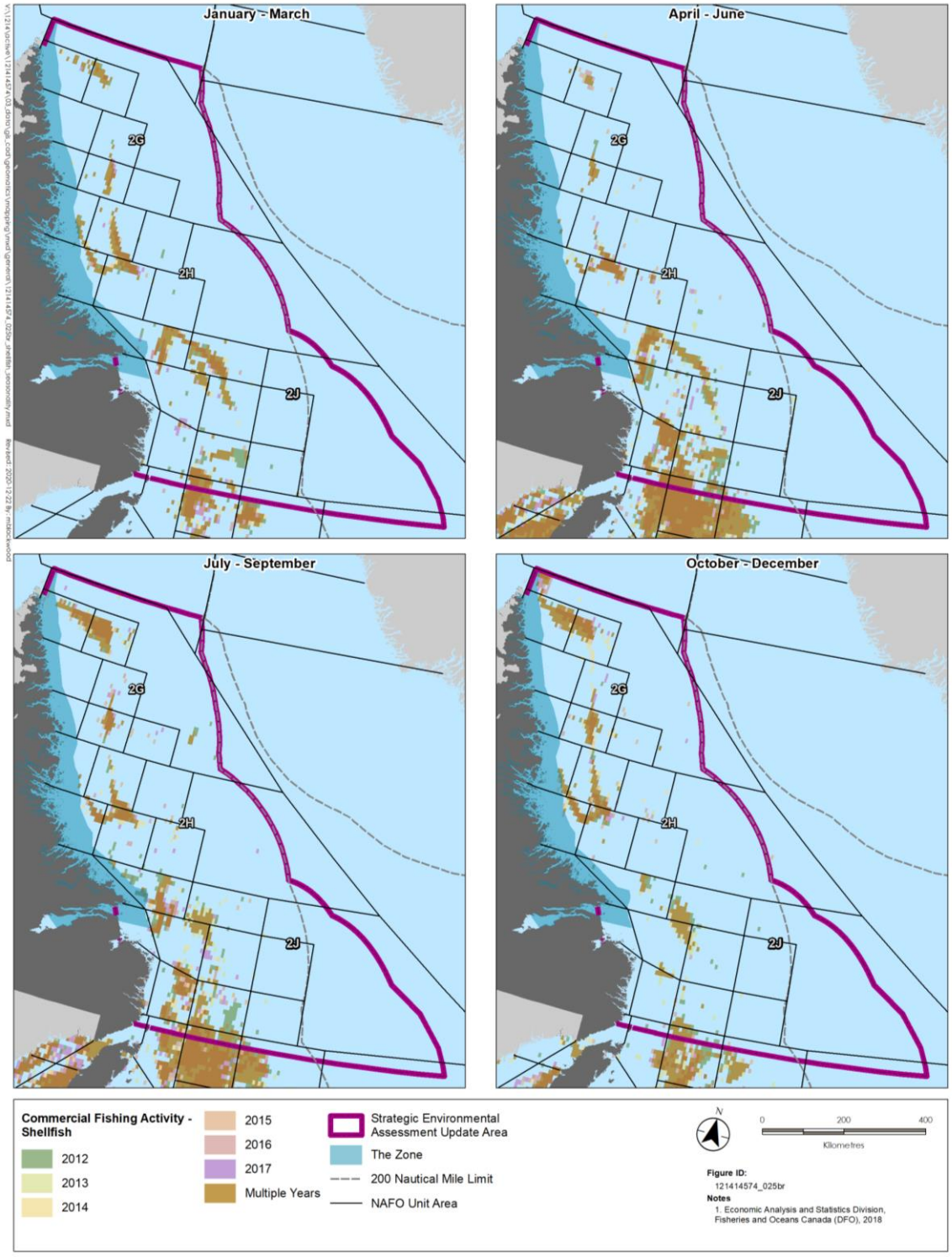


Figure 9-9 Seasonality of Domestic Harvesting, Quarterly, Shellfish, 2012 to 2017

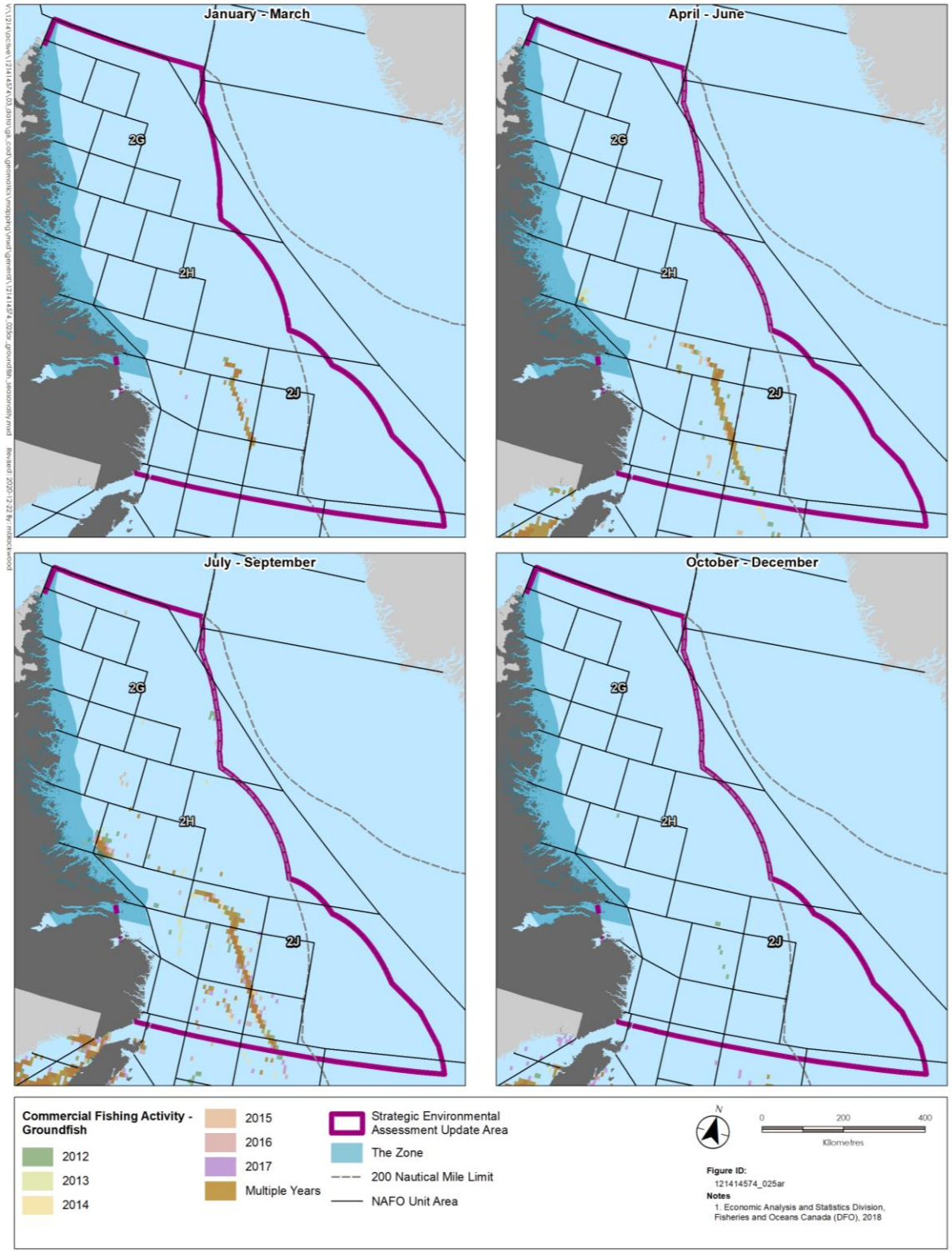


Figure 9-10 Seasonality of Domestic Harvesting, Quarterly, Groundfish, 2012 to 2017

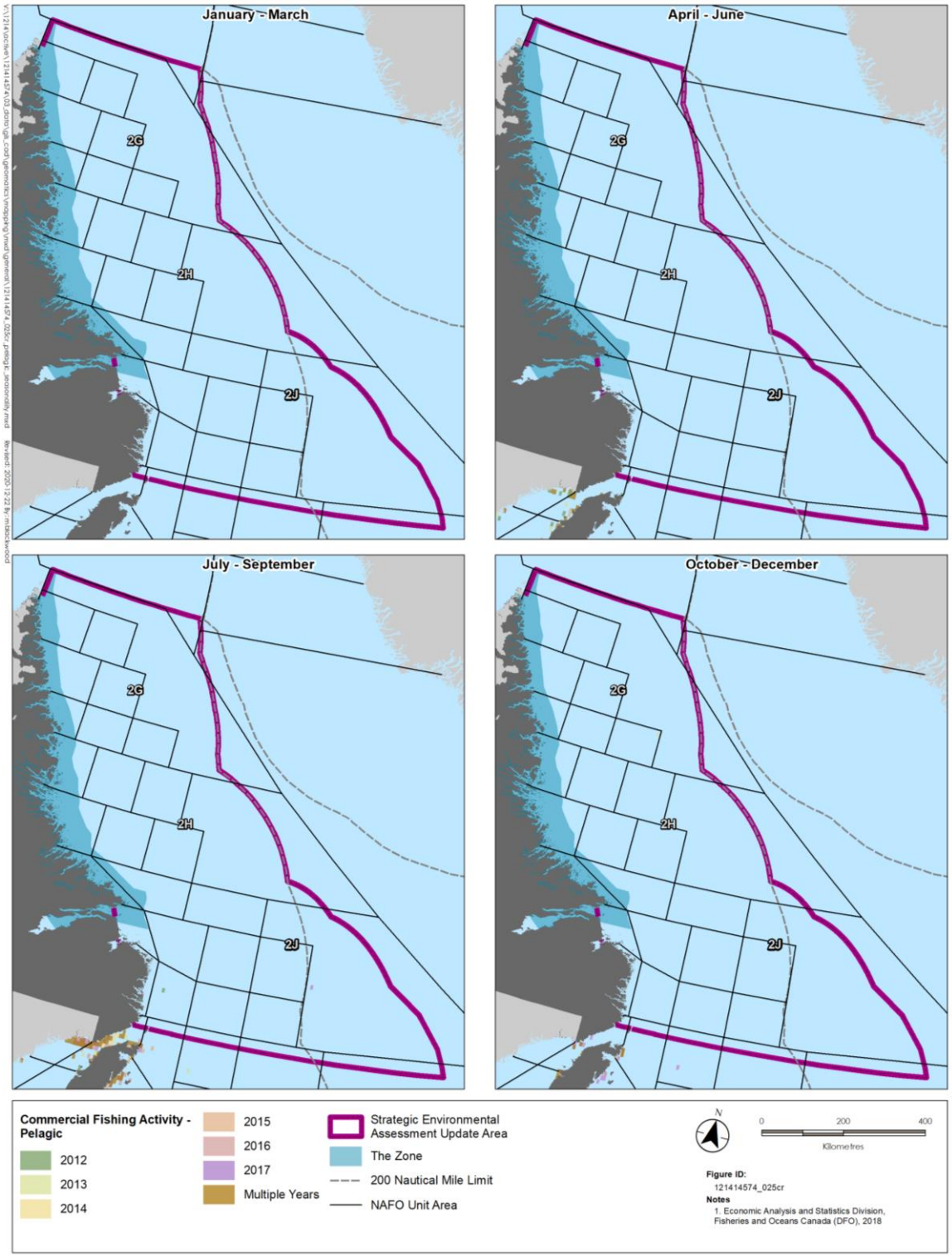


Figure 9-11 Labrador Shelf Seasonality of Domestic Harvesting, Quarterly, Pelagic, 2012 to 2017

9.2.4 Fishing Gear

Within the commercial fishing industry in the Canada-NL Offshore Area, a variety of fishing gear is used to capture target species. This can include the use of fixed gear, such as crab pots and variations of gill nets and fish traps, as well as the use of mobile gear, such as seines, nets, longlines, dredges, and trawls. The snow crab fishery uses crab pots set in fixed locations to collect species, while the fishery for northern shrimp uses modified stern otter trawls to capture shrimp and reduce the amount of bycatch. Groundfish harvesting uses a wide variety of nets, traps, and trawls, based on the target species and water depth. Dredges can be used to harvest deep-sea clams and bivalves, and pelagic fisheries can use longlines, seines, nets, and traps to harvest target species. Locations of commercial harvesting activity are shown in Figures 9-12 and 9-13 for fixed gear and mobile gear within the Labrador Shelf SEA Update Area, respectively. Fixed gear locations are most present in the southern portion of the Labrador Shelf SEA Update Area and are not common in the northern portions. This is likely due to the lack of harvesting activity for snow crab in that area. Mobile gear locations are present throughout the Labrador Shelf SEA Update Area, primarily due to the distribution of northern shrimp throughout the Labrador Shelf SEA Update Area, along with groundfish species.

A breakdown of common fishing gear used within the Canada-NL Offshore Area, including within the Labrador Shelf SEA Update Area is provided below.

9.2.4.1 Stern Otter Trawls

This mobile gear is used for a variety of groundfish species in the area. It consists of a large cone-shaped net towed along the ocean bottom. Large rectangular "doors" (otterboards) are attached to cables between the ship and the net to keep the net open (horizontally) while being towed. Floats on top and weights at the bottom maintain the vertical opening in the otter trawl. The net is pulled along the seabed on wheel-like "bobbins". Fish enter through the large opening and are funneled to the end of the net, a bag-like section called the "cod end". The size of the mesh in the net allows smaller fish to escape.

9.2.4.2 Shrimp Trawls

Shrimp trawls are modified otter trawls that encompass a range of designs and sizes. Shrimp trawls typically have relatively small meshes, with 20 to 60 mm in the code while the mesh size in the belly part of the trawls seldom exceeds 80 mm. The vertical opening of shrimp trawls typically range from less than 1 to 20 m.

9.2.4.3 Gillnets

This fishing gear is used for several groundfish species (primarily turbot) in the area. Fixed or set gillnets are anchored to the seabed to keep the gear stationary, and have buoys on each end which float on the surface. The net itself is kept open or full with weights attached to the bottom of the net. A highflyer buoy usually marks one end of the set gillnet (typically the north end), although not always. There may be 50 nets in a fleet; each net is approximately 91 m (300 feet) long, for a length of 4,550 m (15,000 feet) per fleet. Fishers may fish 8 to 10 fleets at once. The nets are typically constructed of monofilament netting.

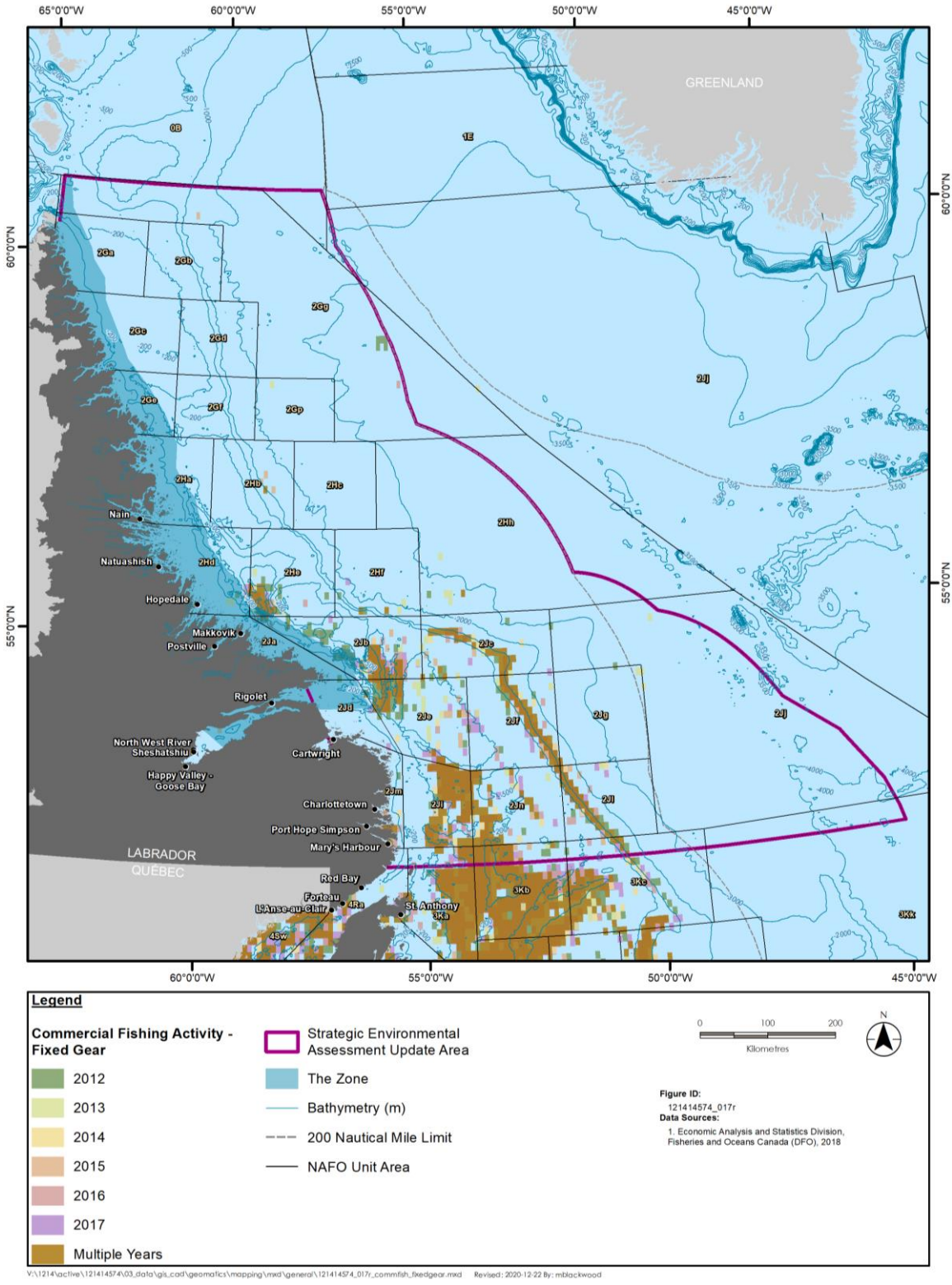


Figure 9-12 Fixed Gear Domestic Harvesting Locations, All Species, 2012 to 2017

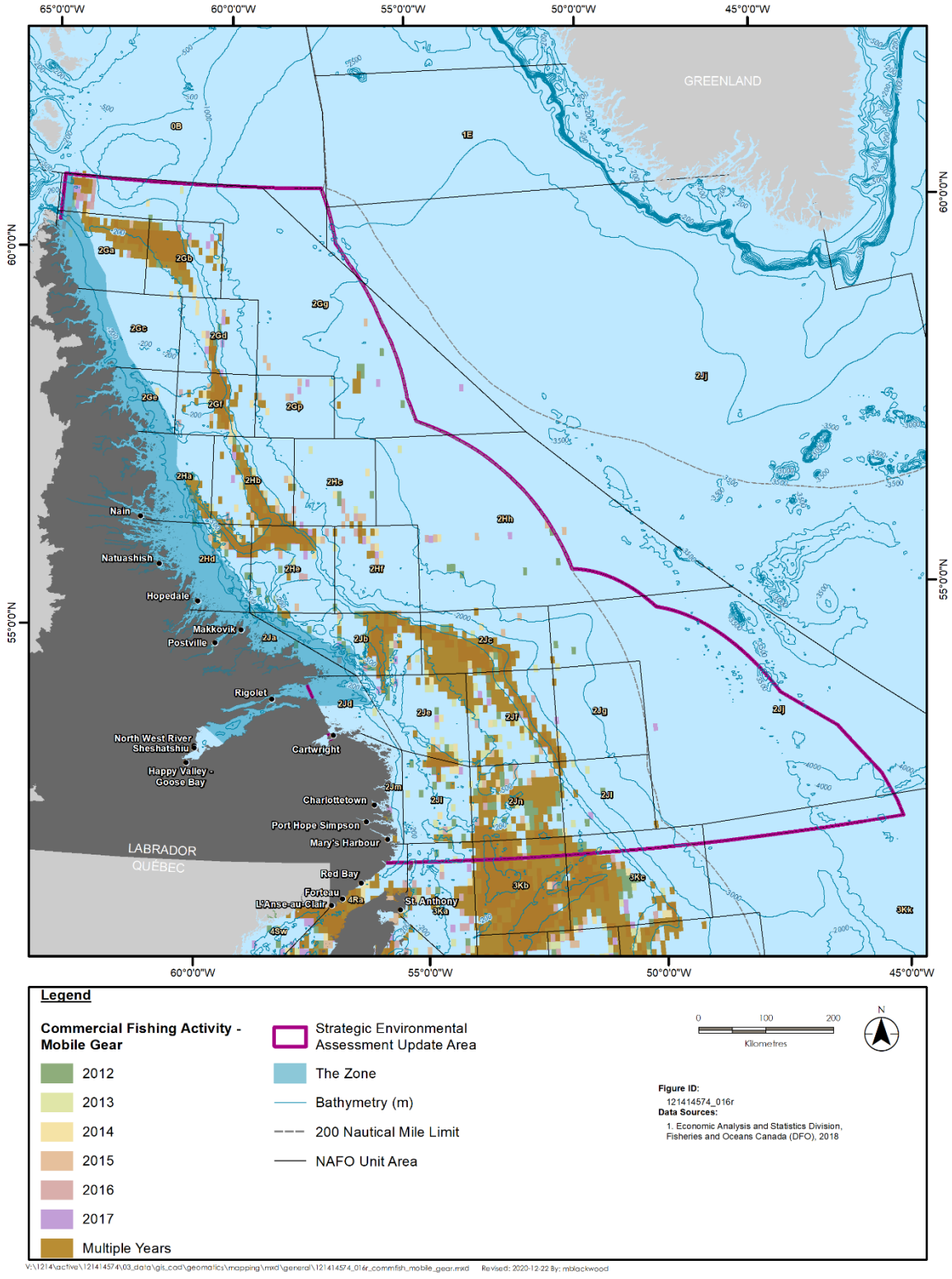


Figure 9-13 Mobile Gear Domestic Harvesting Locations, All Species, 2012 to 2017

9.2.4.4 Longlines

Groundfish longlines (also known as baited trawls) consist of a buoyed line from which a series of fishhooks are suspended. Larger buoys are generally attached to each end of the longline. Longlines may be anchored and buoyed. The gear is set out behind the vessel and left to fish. It is then hauled in to retrieve the catch, re-baited and set again. However, in some cases, longlines are not anchored but simply set to drift for a time and are suspended by buoys at either end (when longlines are set in this way, it is referred to by some fishers as "fly and set"). The length of the longline will vary according to the fisher's preference or other factors.

9.2.4.5 Dredges

Dredges, which are typically used to harvest shellfish species, such as scallops and clams, are typically operated by mid-sized vessels designed to pull the heavy equipment along the sea floor (e.g., on scallop beds). The dredges have a frame mouth, which leads to a large bag or net made of metal rings or mesh. Vessels may pull one or more dredges behind the vessel and/or from side-rigged booms.

9.2.4.6 Crab Pots

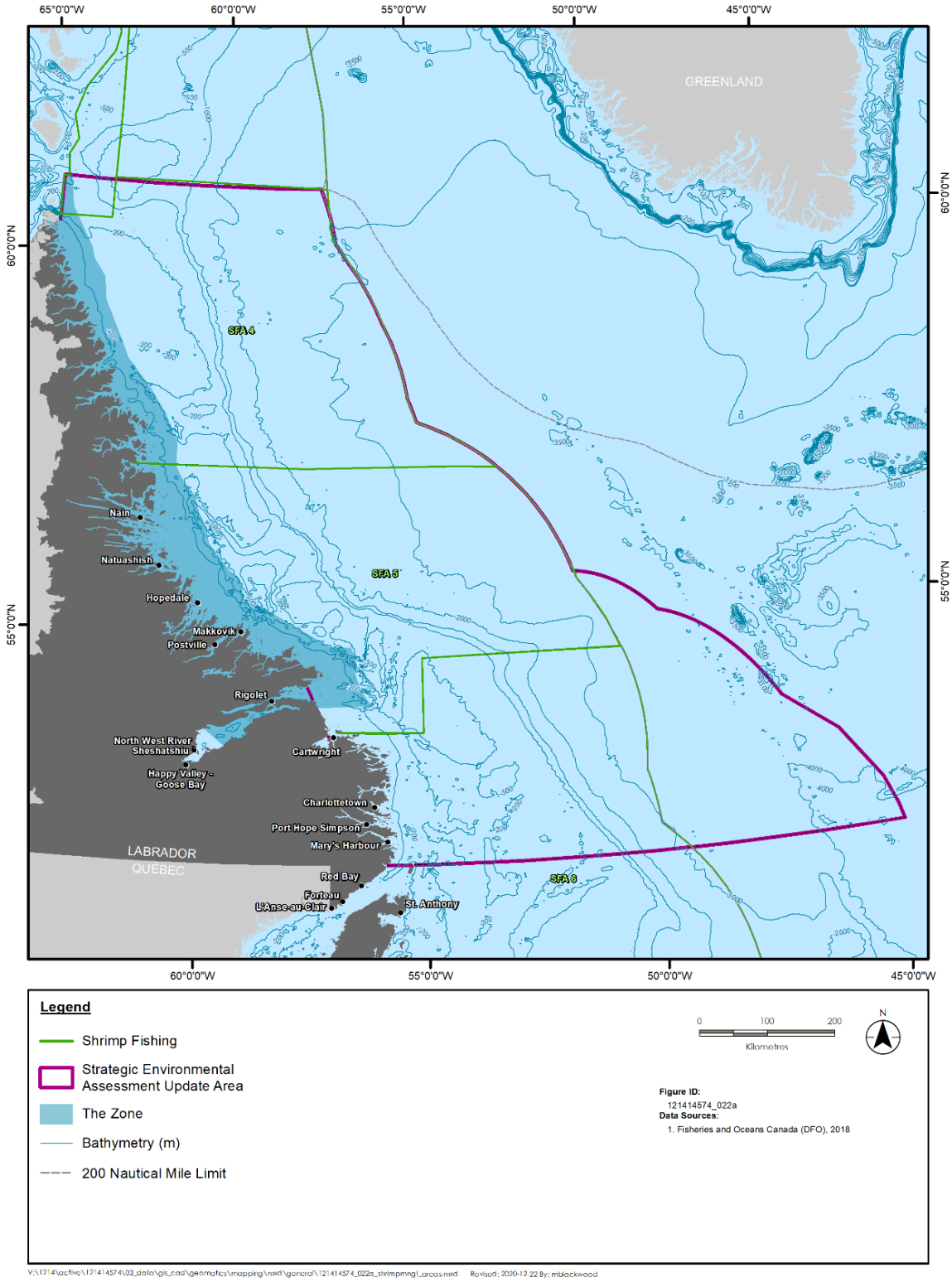
The amount of gear fishers are permitted to use varies by licence category, and by the area in which a licence holder may be fishing. Crab pots are set on the seabed in strings buoyed at the surface. Crab gear generally has a highflyer (radar reflector) at one end and a large buoy at the other. Some fishers use highflyers at both ends. Depending on weather, they may be left unattended for several days at a time, or frequently longer.

Fishers typically try to leave approximately 36.5 m (20 fathoms (120 feet)) on the seabed between each pot, thus allowing slack for the anchor ropes on either end of the string to extend upwards at an angle. The distance between the typical highflyer and end-buoy of a 50- to 60-pot string of crab gear for example, would be 6,000 feet to 7,500 feet, or approximately 1.8 to 2.3 km.

9.2.5 Description of Key Fisheries by Species

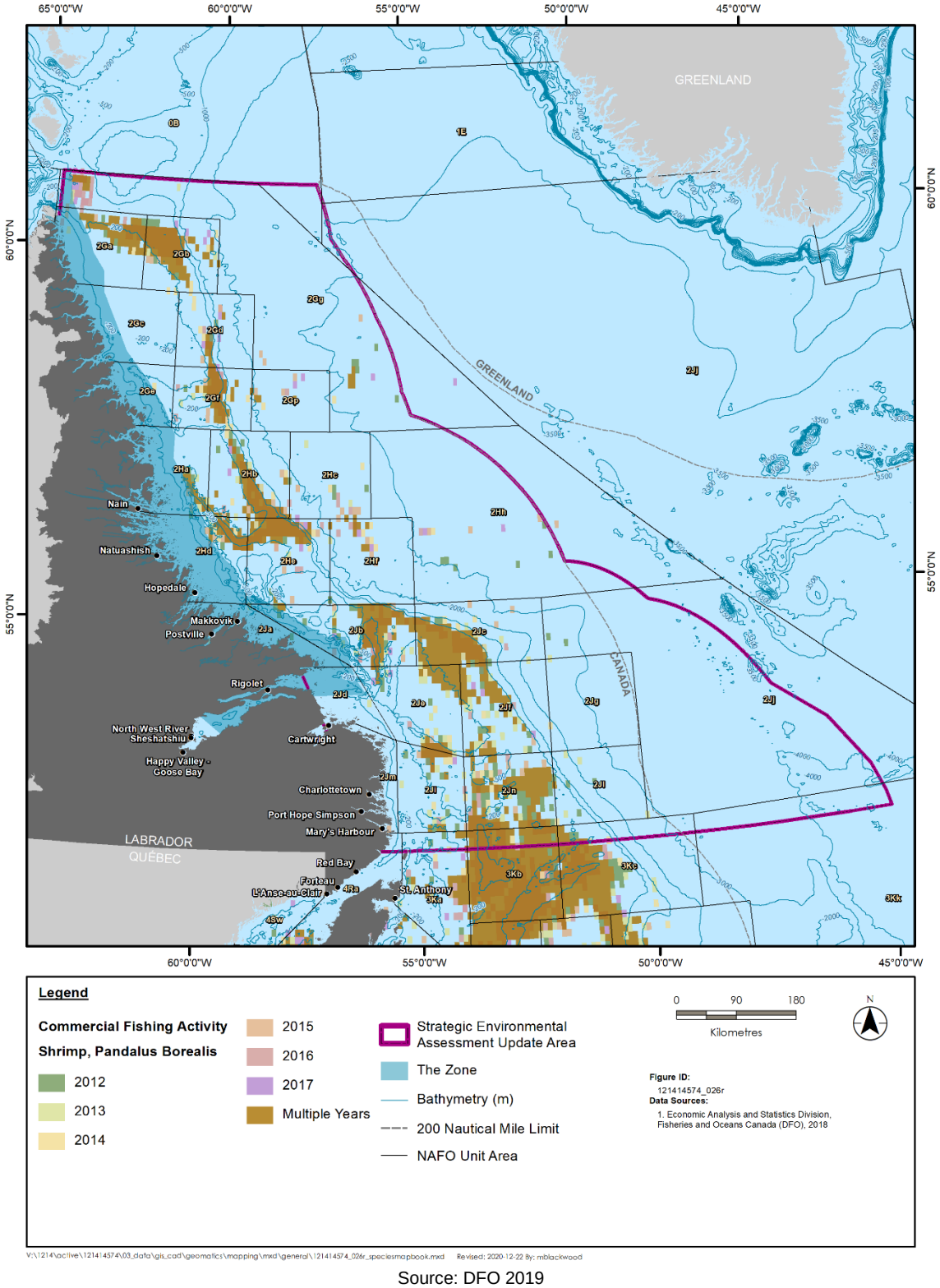
9.2.5.1 Northern Shrimp

The northern shrimp fishery began off the coast of Labrador in the 1970s. This fishery still occurs today, and since the collapse of groundfish stocks in the 1990s, has become one of the primary fisheries that occurs in the Canada-NL Offshore Area. The domestic fishery for northern shrimp involves both an inshore and offshore fleet, and commercial fishing activity is carried out in designated SFAs (Figure 9-14). The Labrador Shelf SEA Update Area overlaps with SFAs 4, 5, and 6. These areas are managed by DFO, which sets quotas for each SFA for fishing seasons. The Labrador Shelf SEA Update Area also overlaps the Davis Strait Eastern Assessment Zone Northern Shrimp Fishing Management Unit. This Fishing Management Unit is open year-round, from April 1 to March 31, subject to total allowable catch limits specified by DFO (DFO 2021a). Northern shrimp are primarily harvested using modified trawls, designed to reduce bycatch of other species. Locations of domestic northern shrimp fishing activity from 2012 to 2017 within the Labrador Shelf SEA Update Area are shown in Figure 9-15.



Source: DFO 2018a

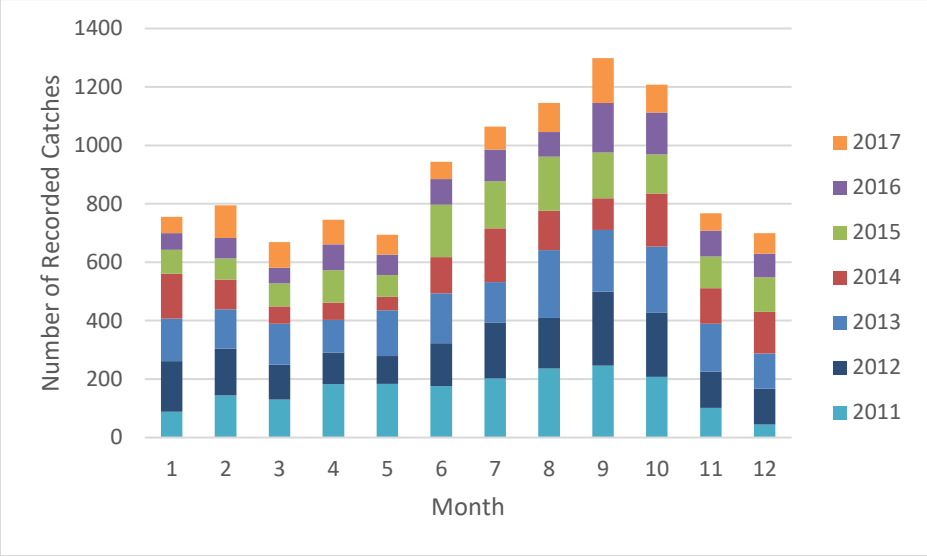
Figure 9-14 Shrimp Fishing Areas within the Labrador Shelf SEA Update Area



Source: DFO 2019

Figure 9-15 Domestic Harvesting Locations, Northern Shrimp, 2012 to 2017

Figure 9-16 shows northern shrimp harvest activity by month between 2011 and 2017. Northern shrimp are typically harvested year-round in the Canada-NL Offshore Area by larger trawlers, but the summer and fall months (July, August, September, and October) are typically when harvesting levels are highest.



Source: DFO 2019
Note: Recorded catch is generalized to a 6nm by 4nm grid cell for privacy reasons, so one catch may indicate activity from multiple fishing vessels.

Figure 9-16 Northern Shrimp Harvest within the Labrador Shelf SEA Update Area, by Month, 2011 to 2017

Figure 9-17 illustrates the level of commercial fishing activity for northern shrimp between 2007 and 2017, to identify trends that may exist regarding harvesting levels or locations. Overall, harvesting patterns for northern shrimp have remained relatively consistent over time in NAFO Subdivisions 2GH. It appears that in recent years, the harvesting level in NAFO Subdivision 2J has decreased; this decline is also noted on Figure 9-18.

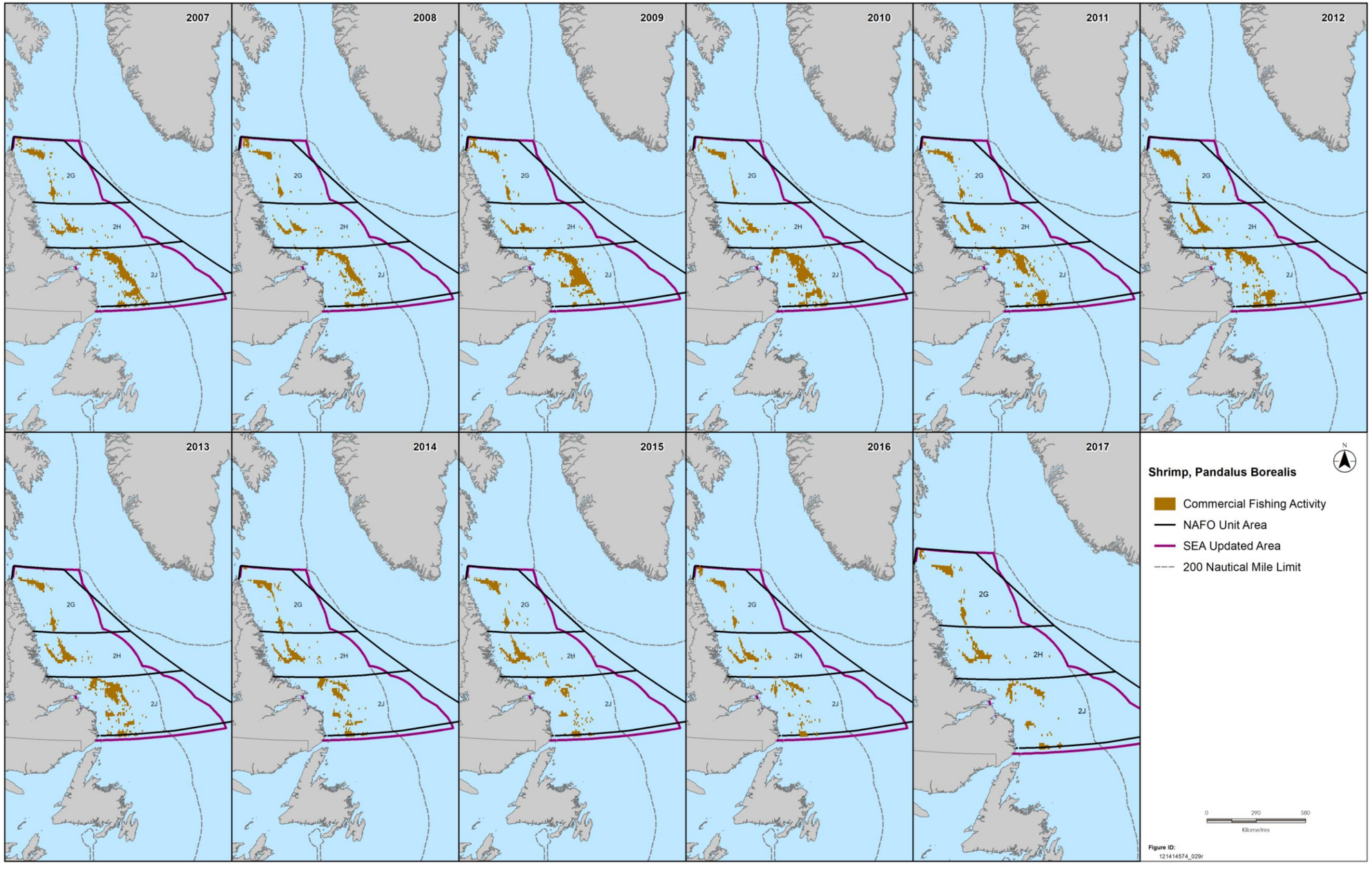
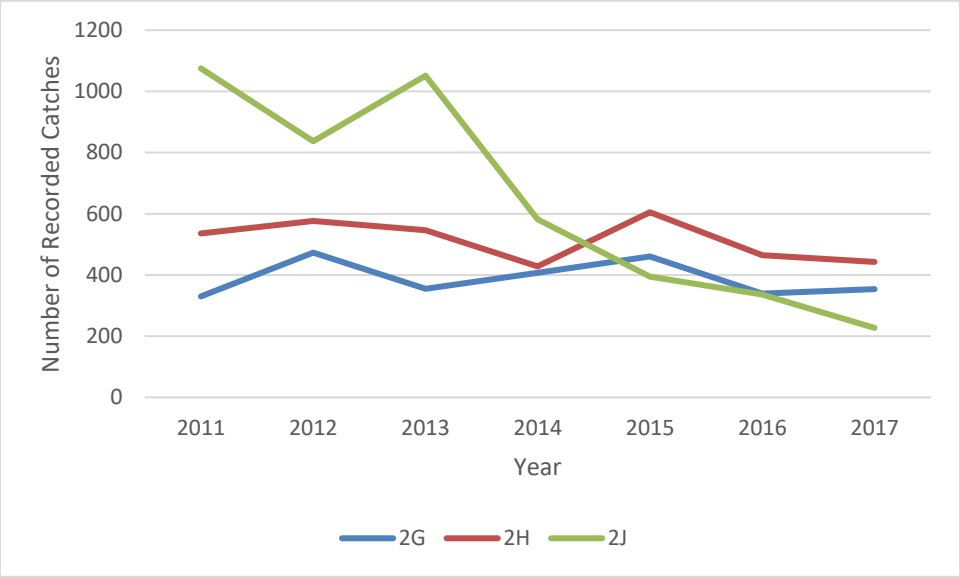


Figure 9-17 Domestic Harvesting Locations, Northern Shrimp, 2007 to 2017



Source: DFO 2019

Figure 9-18 Recorded Catches of Northern Shrimp within the Labrador Shelf SEA Update Area, 2011 to 2017

Since the writing of the original SEA Report, northern shrimp stocks have undergone changes as a result of changing health and stability of stocks in the Canada-NL Offshore Area. Northern shrimp stocks have been in decline since 2010, with DFO (2018b) assessment of northern shrimp in SFAs 4, 5, and 6 showing varying trends. In SFA 6, where a large amount of commercial fishing activity for northern shrimp occurs, the fishable biomass in SFA 6 declined 8% from 2018 to 82,900 t in 2019. This was the lowest observed levels between 1996 and 2019, where the total fishable biomass averaged 380,000 t (DFO 2021b). Likewise, the female spawning stock biomass also declined 25% from 2018 to 49,000 t in 2019. This was also the lowest observed levels from 1996 to 2019, where the average female spawning stock biomass averaged 238,000 t (DFO 2021b). This puts the female stock spawning biomass within DFO's "critical zone".

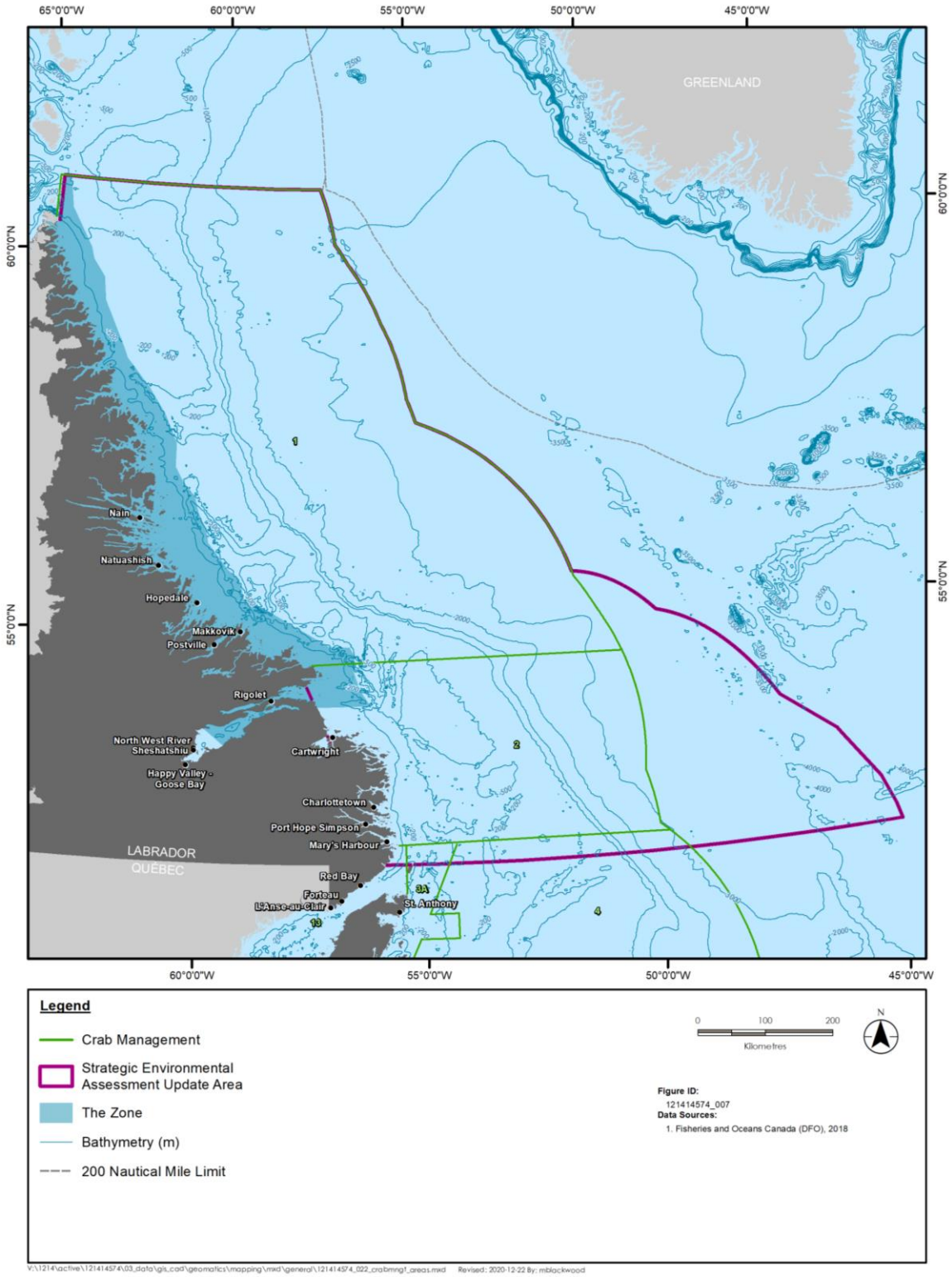
Within SFAs 4 and 5, shrimp stocks have been relatively healthy. Total fishable biomass in SFA 5 decreased by 20% from 2018 to 129,000 t in 2019, and the female spawning stock biomass increased by 3% from 2018 to 44,500 t in 2019 (DFO 2021b). Within SFA 4, the total fishable biomass increased by 29% from 2018 to 54,100 t in 2019, while the total female spawning stock biomass increased 23% 2018 to 39,600 in 2019. Both the female spawning stock biomass for SFAs 4 and 5 were listed within the "healthy zone" (DFO 2021b).

As a result of these changes in northern shrimp health, fishing TACs and quotas for northern shrimp have also changed over time. The TAC for SFA4 was increased by 15% to 9,957 t for the 2020 / 2021 season for northern shrimp (DFO 2020b). The bycatch limit for pink shrimp remained the same at 4,033 t. In SFA 5 for the 2020 / 2021 season, the TAC increased by 11.3% to 16,080 t (DFO 2020b) Within SFA 6, the most recent decision by DFO set the TAC at 27,825 t for the 2016 / 2017 fishing season. This TAC was cut again, approximately 63% to 10,400 t for the 2017 / 2018 fishery and has since been further reduced to 8,730 t for the 2018 / 2019 fishing season (DFO 2018c). During the 2020 / 2021 season, the TAC increased by 15% to 9,534 t (DFO 2020b). Because of these changes in TAC, shrimp harvesting efforts may be less intense in areas such as SFA 6, where commercial harvesting has historically been most active.

9.2.5.2 Snow Crab

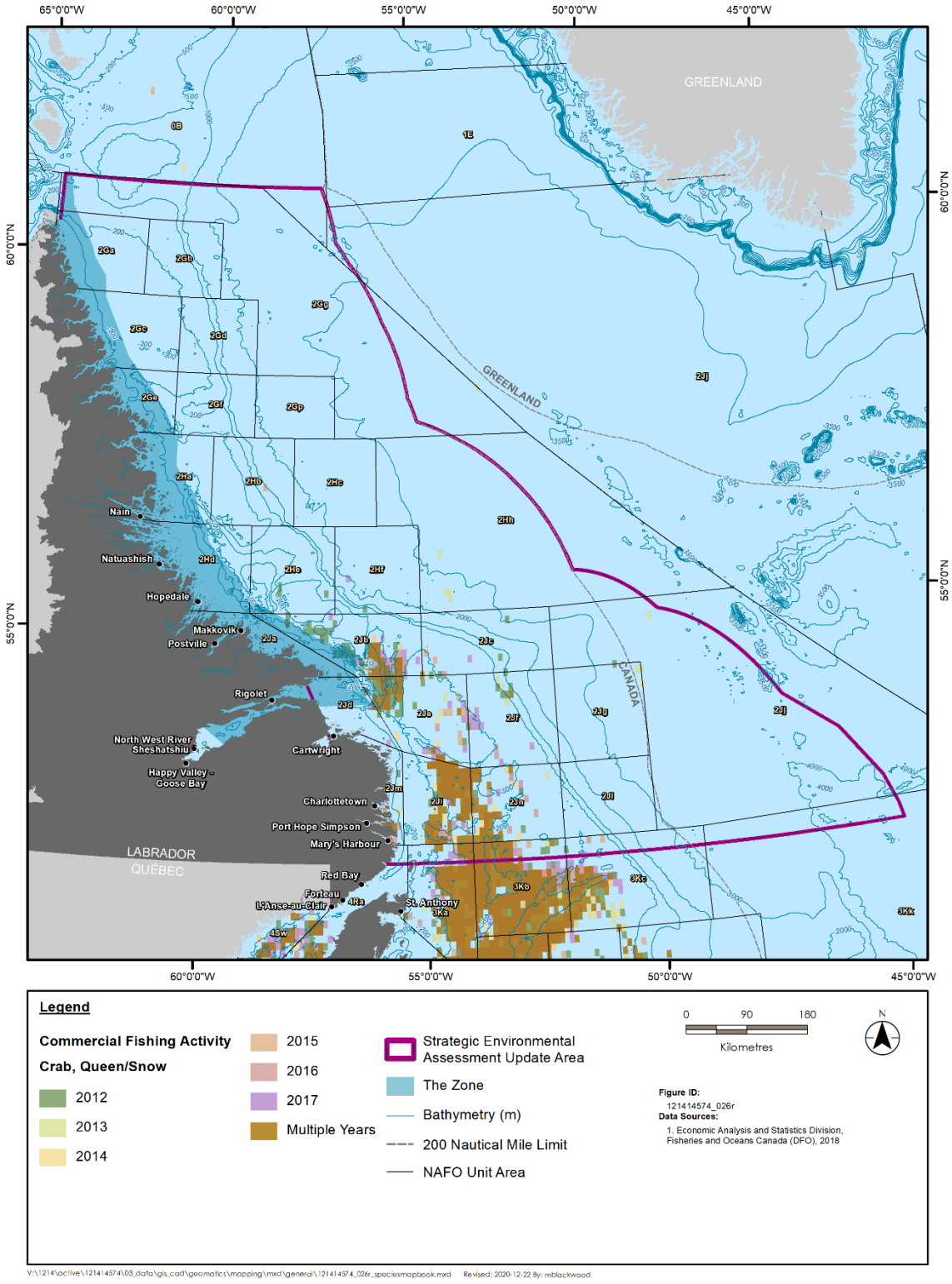
Similar to that of northern shrimp, after the collapse of groundfish stocks in the 1990s snow crab became and still is a major fishery in NL. Harvesting for this species accounts for a large portion of landings by both weight and value from harvesting efforts.

Snow crab are harvested using crab pots, which are set along the seabed using buoys and markers to indicate its location to vessels. The fishery uses a quota system, and the offshore environment is broken out into CMAs (Figure 9-19) for management of quotas. Within each NAFO Division there are multiple CMAs, each with its own fleet sectors based on vessel size, quotas, and start and end dates for the season. The Government of Canada maintains jurisdiction over commercial fish species within Canada's 200 nautical mile EEZ, and all sedentary species that occur across the extent of Canada's continental shelf. This includes the management of snow crab stocks both within and outside of the EEZ. Harvesting locations for snow crab from 2012 to 2017 are illustrated in Figure 9-20. The seasonality of snow crab within the Labrador Shelf SEA Update Area is shown on Figure 9-21. Snow crab is a seasonal fishery and spans primarily from May to August.



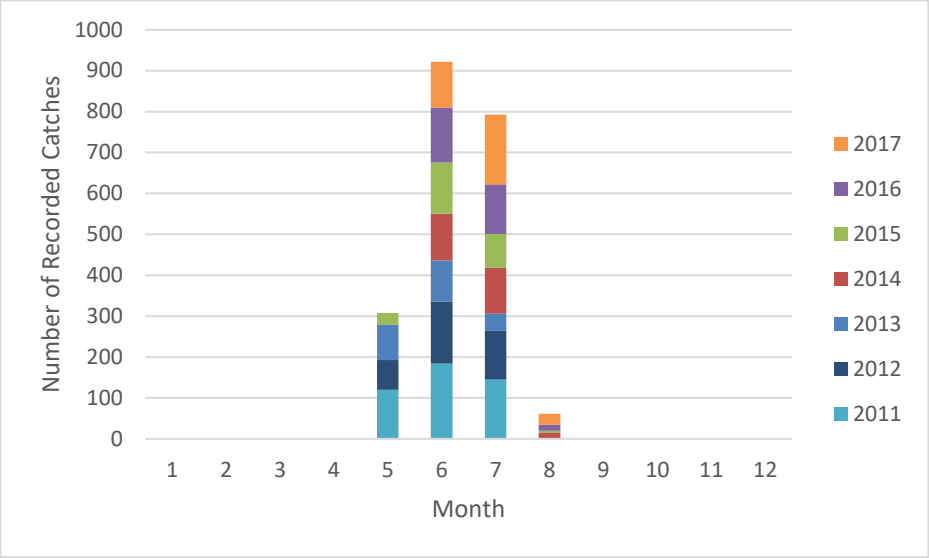
Source: DFO 2019

Figure 9-19 Crab Management Areas Within the Labrador Shelf SEA Update Area



Source: DFO 2019

Figure 9-20 Harvesting Locations, Snow Crab, 2012 to 2017



Source: DFO 2019
Note: Recorded catch is generalized to a 6nm by 4nm grid cell for privacy reasons, so one catch may indicate activity from multiple fishing vessels.

Figure 9-21 Snow Crab Harvest by Month, 2011 to 2017

Figure 9-22 illustrates the commercial fishing locations for snow crab between 2007 and 2017, to identify trends that may exist regarding harvesting levels or locations. Overall, harvesting patterns for snow crab have remained relatively consistent over time. It appears that NAFO Subdivision 2H had some level of activity for snow crab harvesting from 2007 to 2011, but now harvesting activity for the species occurs almost exclusively in 2J. This trend is also noted on Figure 9-23. Although commercial operations for harvesting snow crab are primarily carried out in a concentrated area, the total distribution of snow crab is not known and commercial exploratory fisheries occur annually.

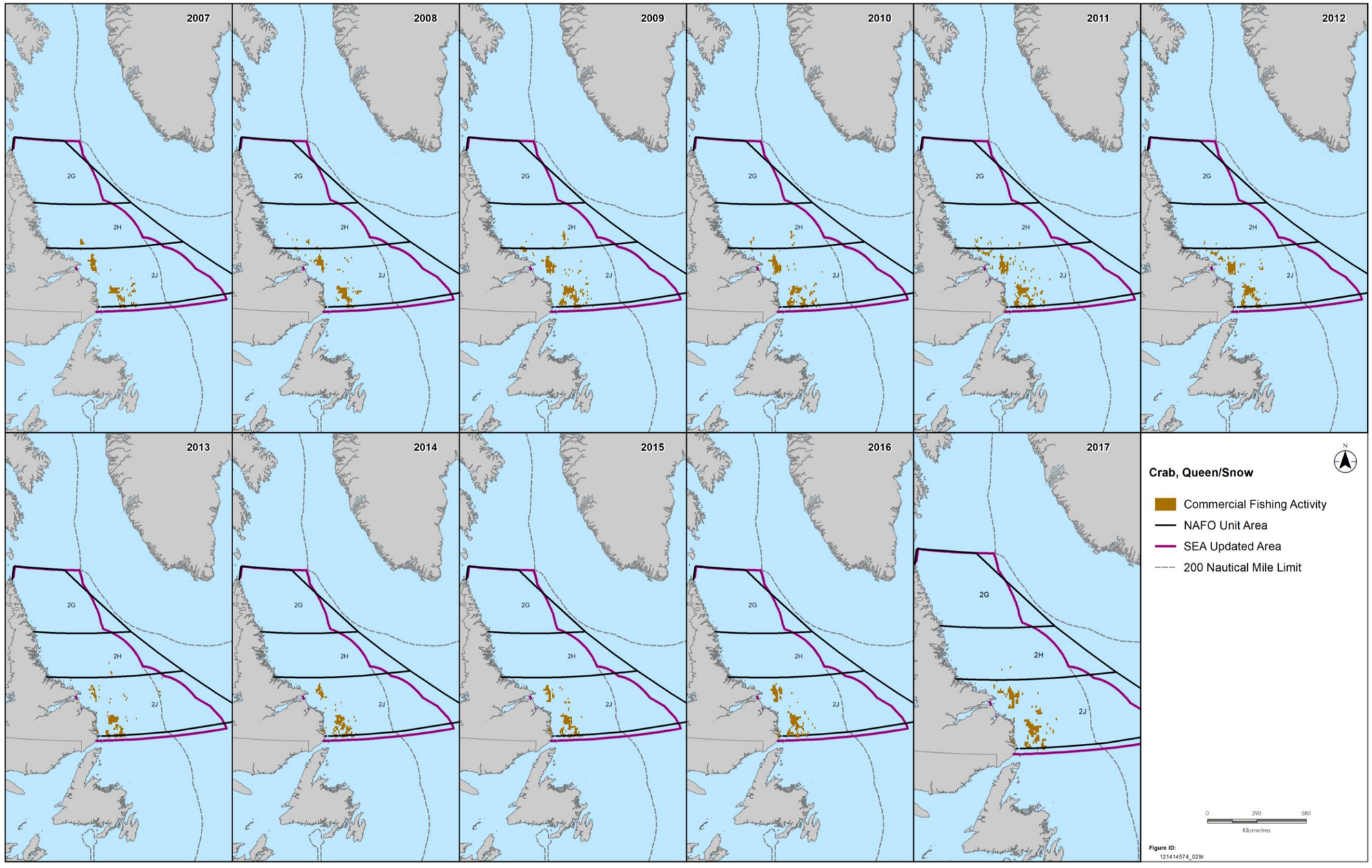
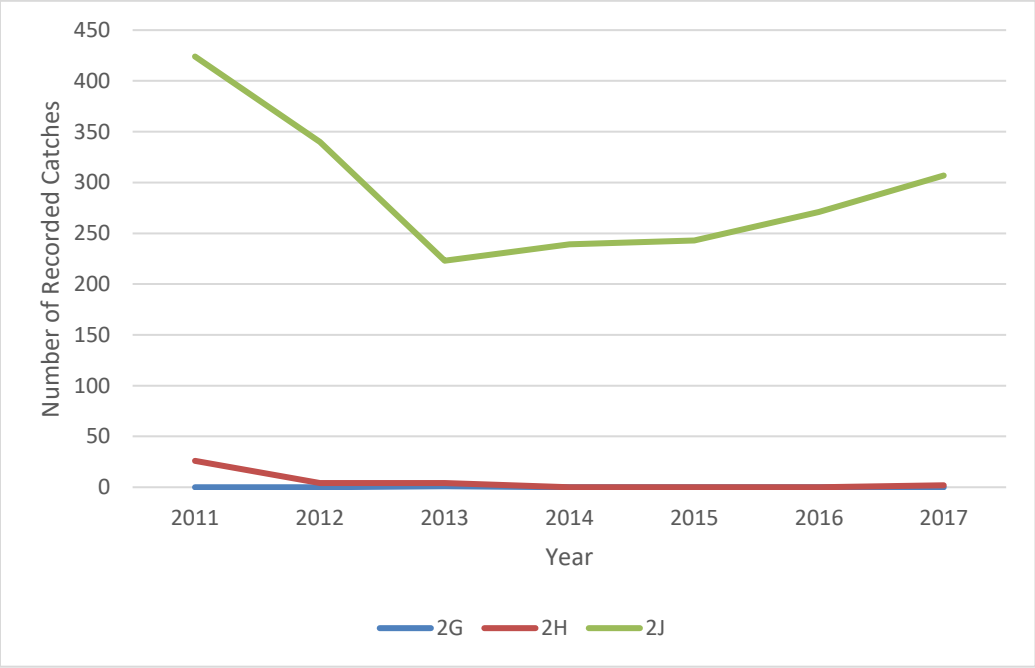


Figure 9-22 Domestic Harvesting Location, Snow Crab, 2007 to 2017



Source: DFO 2019

Figure 9-23 Recorded Catches of Snow Crab within the Labrador Shelf SEA Update Area, 2011 to 2017

Much like northern shrimp, snow crab have also undergone changes in terms of health and sustainability of the species. In the most recent assessment of snow crab, it discusses that total landings of snow crab in the Canada-NL Offshore Area (2HJ3KLNOP4R) peaked in 2009 at 53,500 t, and then declined to 34,000 t in 2017. The total exploitable biomass of snow crab has been in decline since 2013 and is now at its lowest observed levels (DFO 2018d). Landings in NAFO Divisions 2HJ have remained low, at less than 2,000 t for the previous four years, and its lowest levels in two decades (DFO 2018c), which can partially be explained by the natural range and distribution of snow crab. However, the total mortality in exploitable crab has been at or near its highest levels in recent years (DFO2018c).

Because of these changes in biomass in certain areas, TACs and quotas have changed as well. In 2016, the TAC for the NL snow crab fishery in areas 2HJ, 3KLNO, 3Ps, and 4R3Pn was approximately 45,667 t. That number was reduced by 22% in 2017 to 35,419 t, and by 17% in 2018 to 29,390 (DFO 2018c). The quota for snow crab harvesters in NAFO Subdivisions 2GHJ for the 2018 season was set at 1,865 t by DFO (DFO 2018c). This was the same number as the 2017 fishing season.

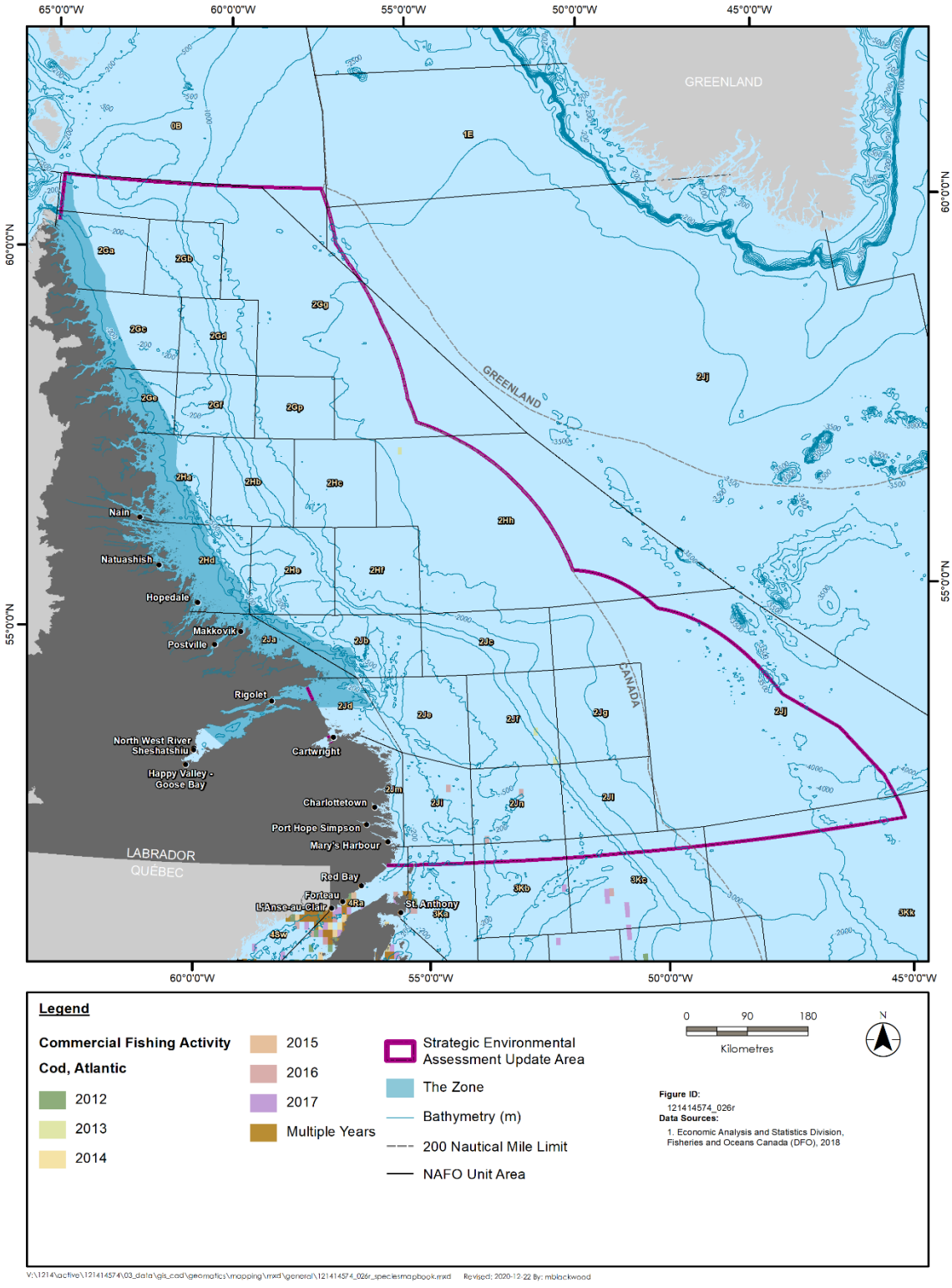
9.2.5.3 Groundfish Species

Since the collapse of groundfish stocks in the 1990s, and subsequent moratoria that were implemented for certain species, groundfish harvesting in the Canada-NL Offshore Area has historically made up modest amounts of landings in terms of weight and value. Most groundfish species are either associated with a limited directed fishery or are caught as bycatch as part of other fisheries. Historically, Atlantic cod was the primary species harvested, along with others such as American plaice. Since the collapse of stocks, Greenland halibut and redfish (a bycatch species) have comprised the majority of groundfish landings in offshore waters. Atlantic cod is still considered a key species due to its cultural and historic value to NL, and efforts have been made to try and rebuild the stocks to support a commercial harvest.

Internationally, groundfish species are the primary species managed by NAFO, and groundfish landings have comprised a larger portion of landings internationally. NAFO manages groundfish stocks using a similar quota system to that used by DFO, allocating portions of TACs to member nations, including Canada.

Domestic harvesting locations for groundfish species from 2012 to 2017, as well as locations from 2007 to 2017 are shown in Figures 9-24 to 9-37 (note, these are collected as bycatch, not in a directed fishery). These species were selected based on the species noted in Table 9.1. Most groundfish landings are located along the slope of the continental shelf, where upwelling provides a productive marine environment, and where many species can be located.

As illustrated on the figures, the spatial extent of fishing activity for groundfish within the Labrador Shelf SEA Update Area is low compared to other areas of the Canada-NL Offshore Area, and other species like snow crab or northern shrimp. Figure 9-38 summarizes the timing of groundfish harvests for from 2011 to 2017. While fisheries for crab are generally confined to the summer months, shrimp and groundfish harvesting effort are spread out throughout the year.



Source: DFO 2019

Figure 9-24 Domestic Harvesting Locations, Atlantic Cod, 2012 to 2017

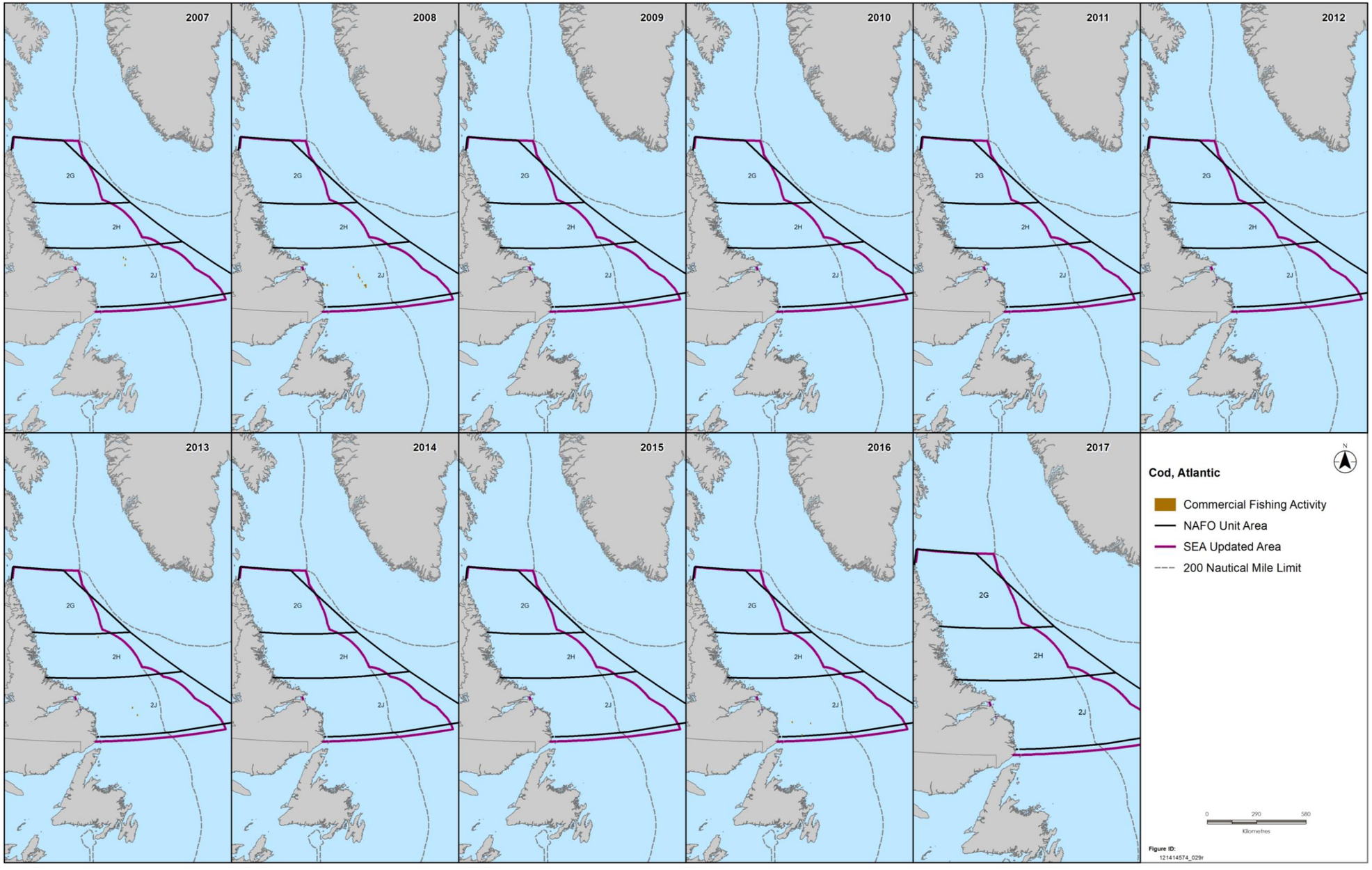
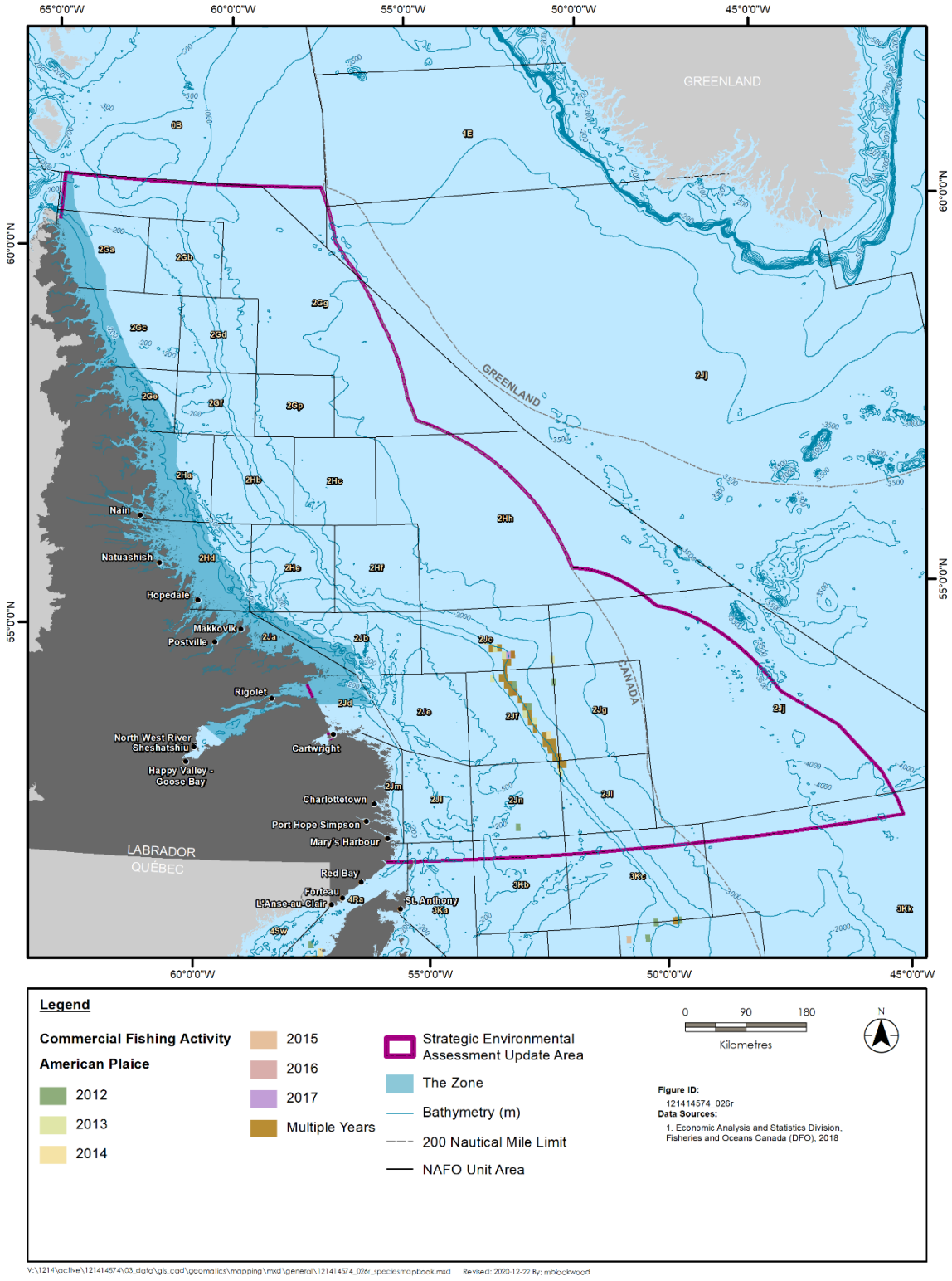


Figure 9-25 Domestic Harvesting Locations, Atlantic Cod, 2007 to 2017



Source: DFO 2019

Figure 9-26 Domestic Harvesting Locations, American Plaice, 2012 to 2017

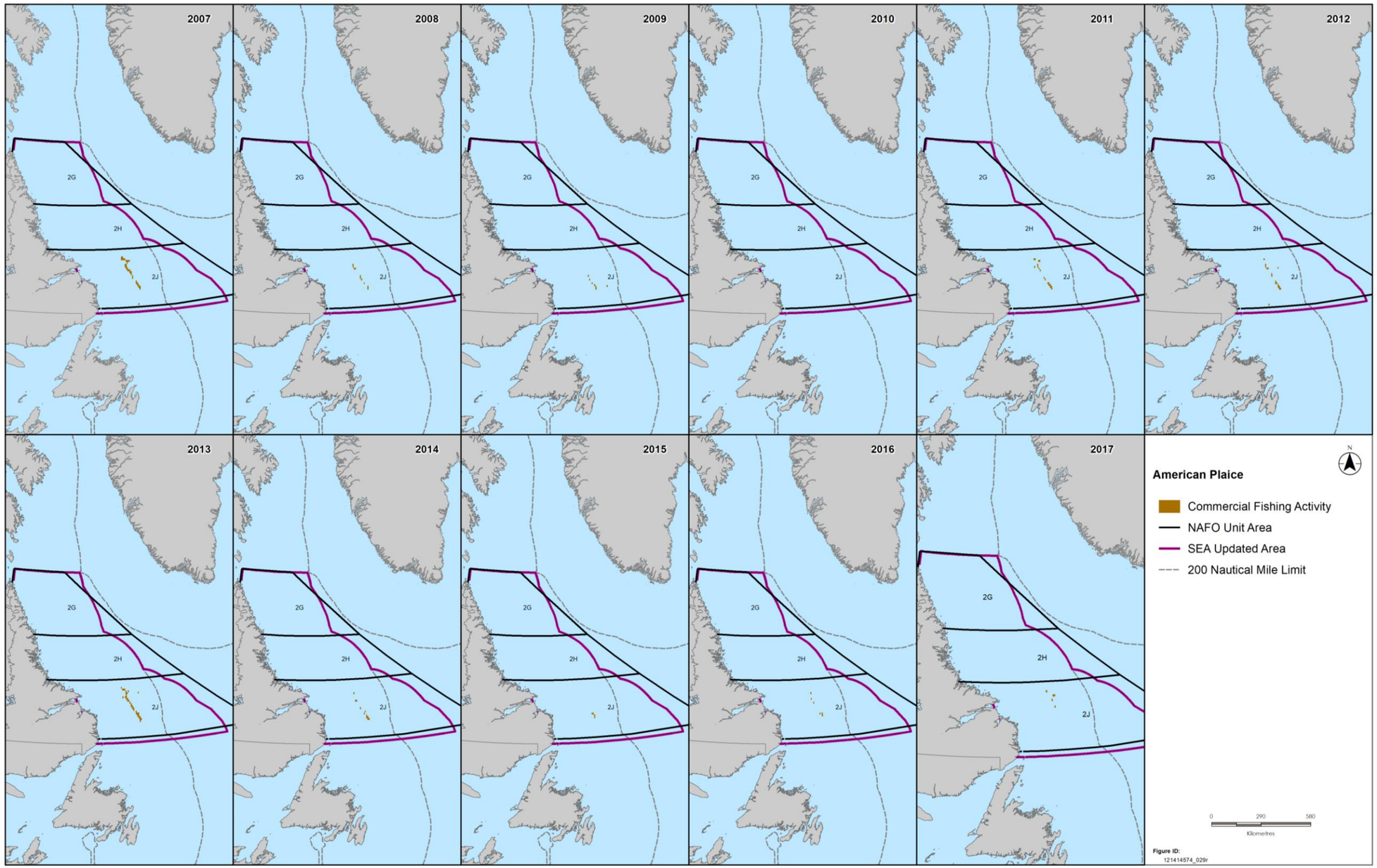
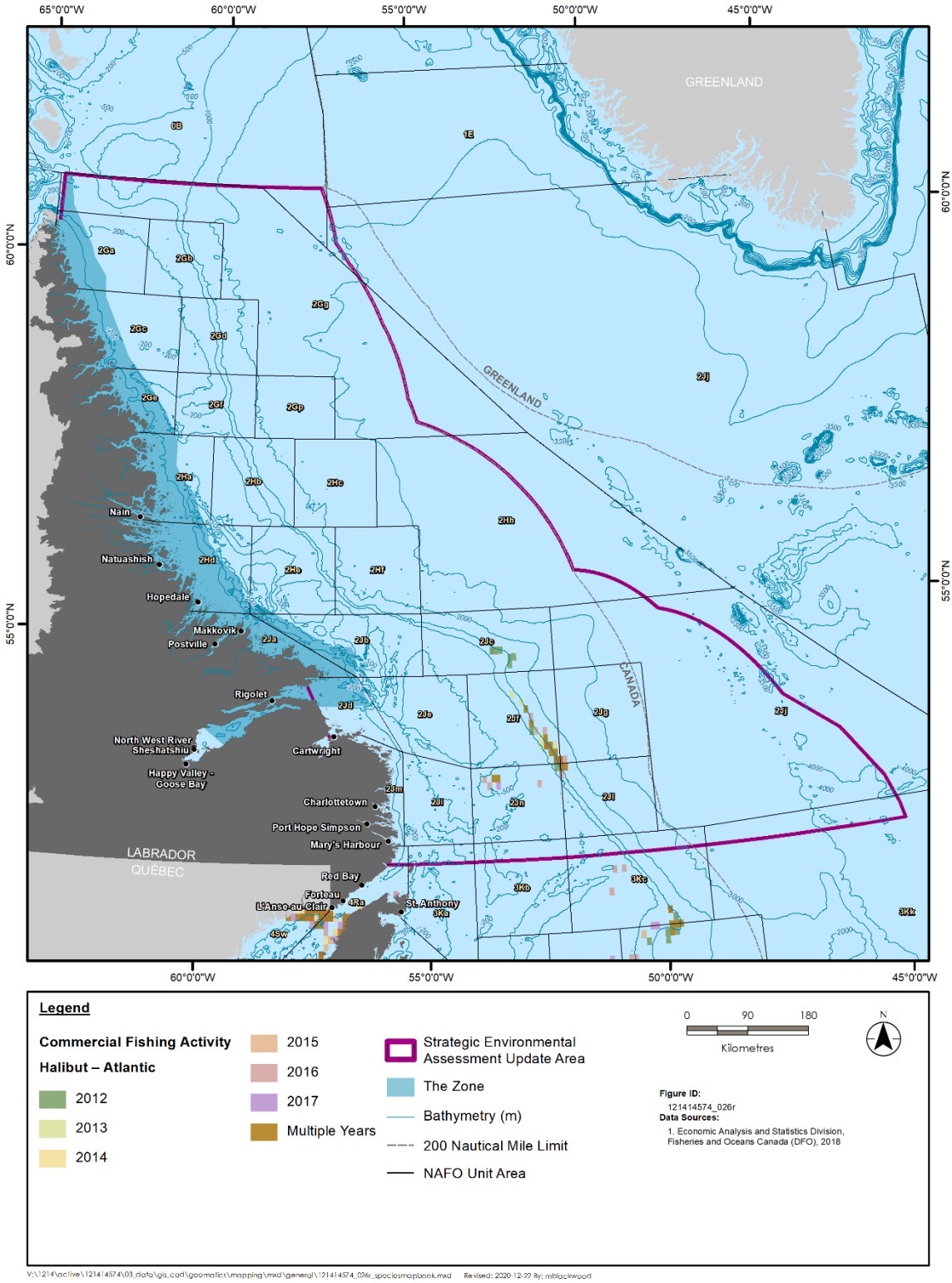


Figure 9-27 Domestic Harvesting Locations, American Plaice, 2007 to 2017



Source: DFO 2019

Figure 9-28 Domestic Harvesting Locations, Atlantic Halibut, 2012 to 2017

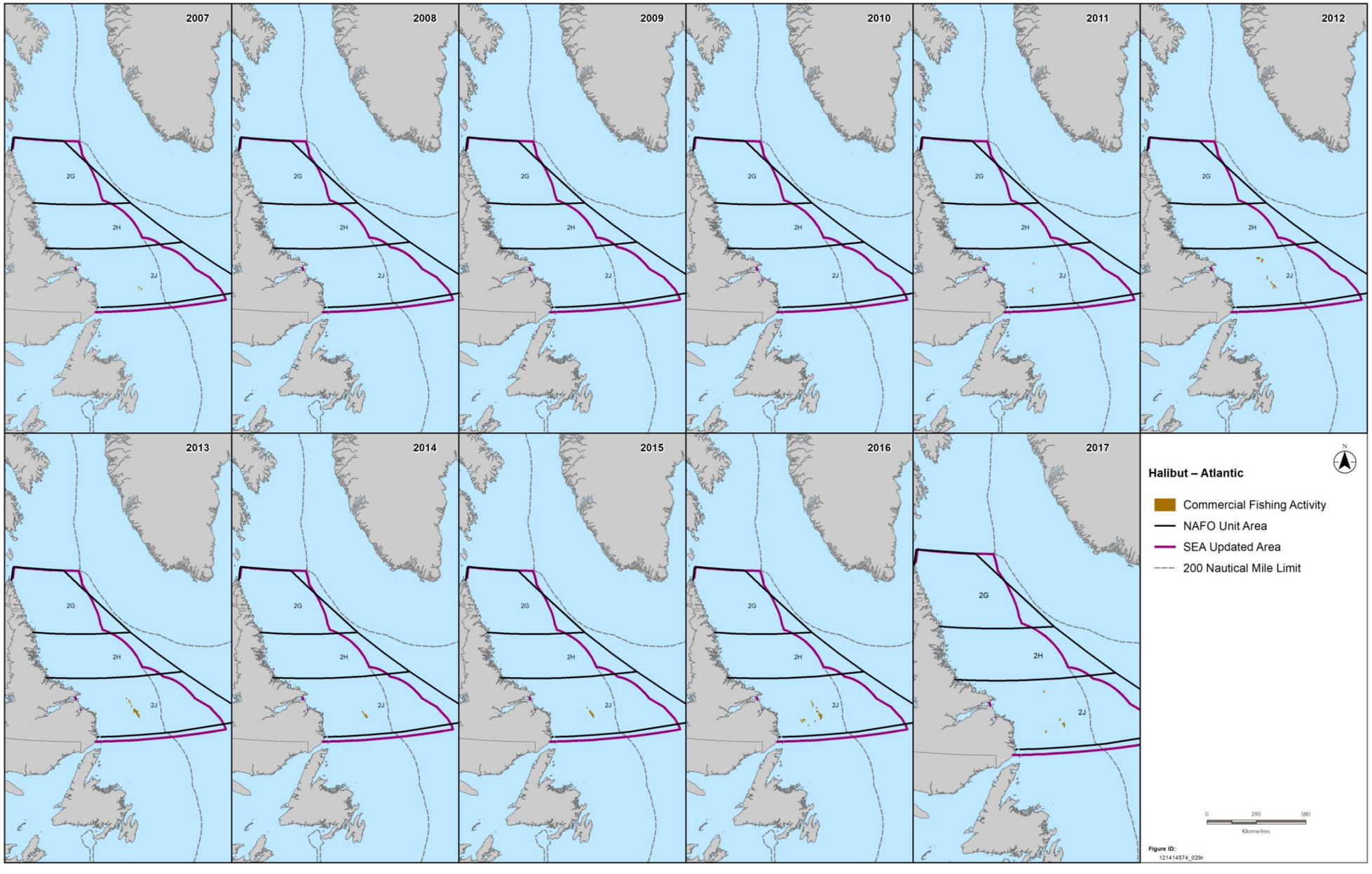
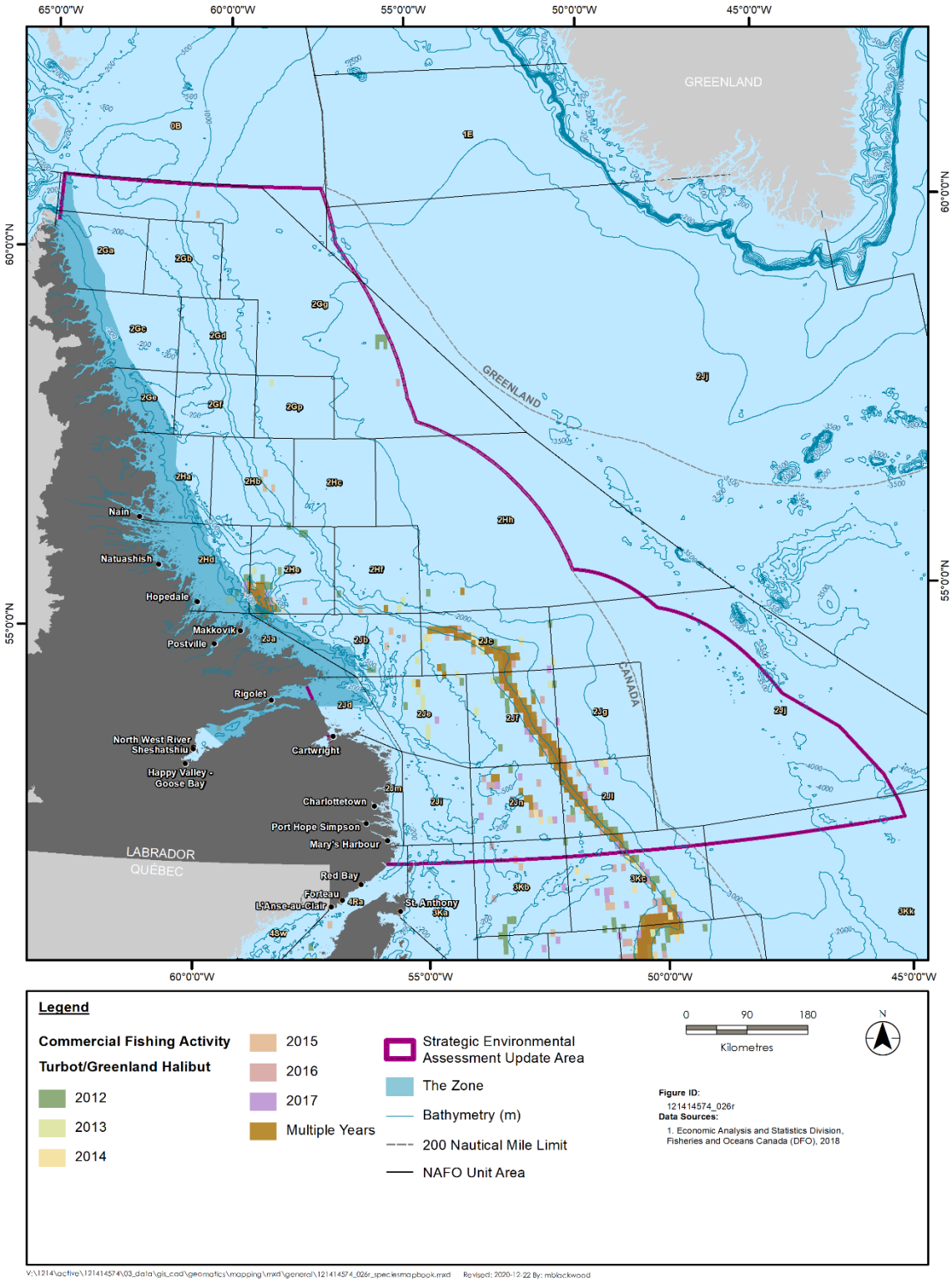


Figure 9-29 Domestic Harvesting Locations, Atlantic Halibut, 2007 to 2017



Source: DFO 2019

Figure 9-30 Domestic Harvesting Locations, Greenland Halibut, 2012 to 2017

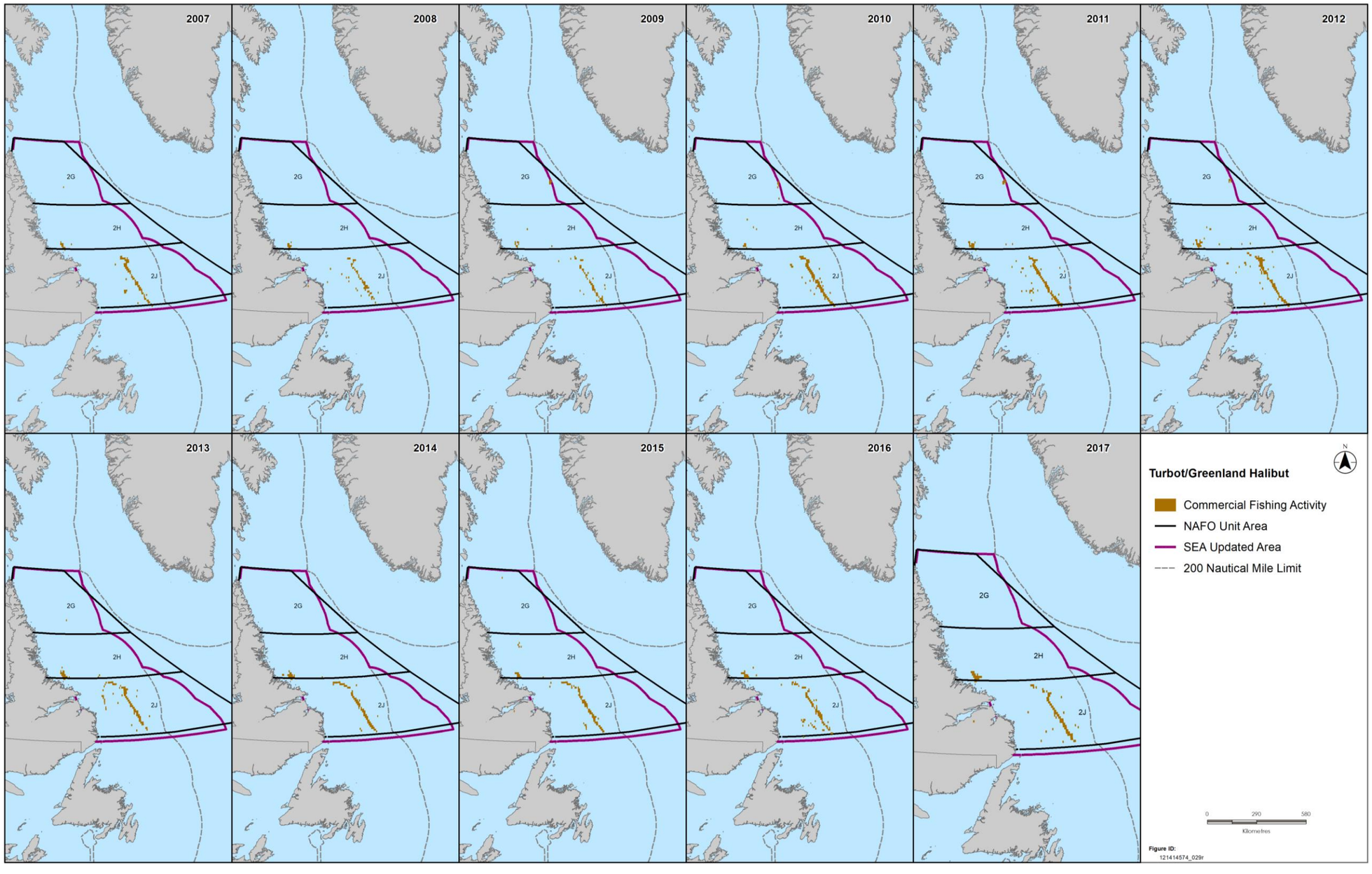
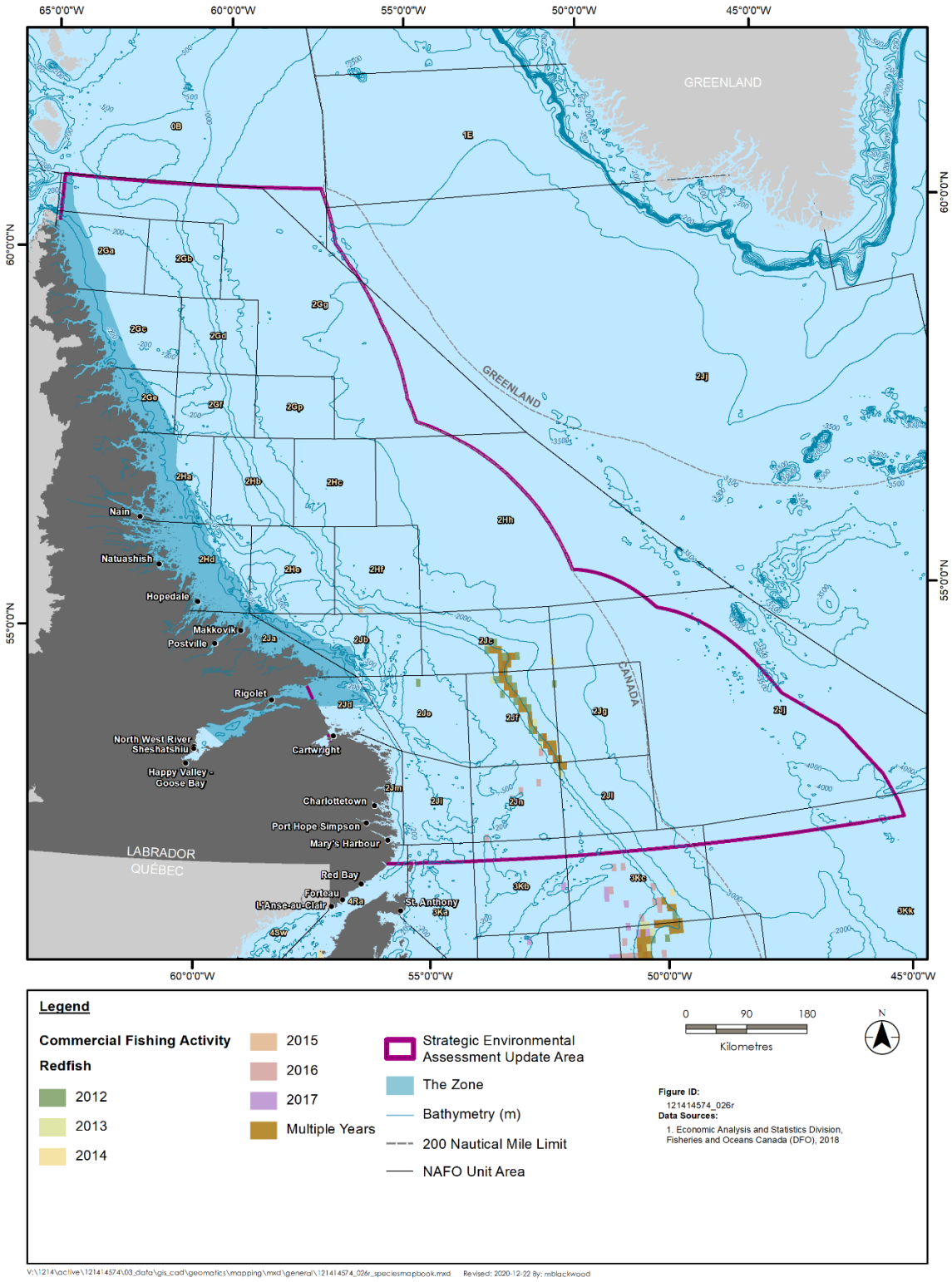


Figure 9-31 Domestic Harvesting Locations, Greenland Halibut, 2007 to 2017



Source: DFO 2019

Figure 9-32 Domestic Harvesting Locations, Redfish, 2012 to 2017

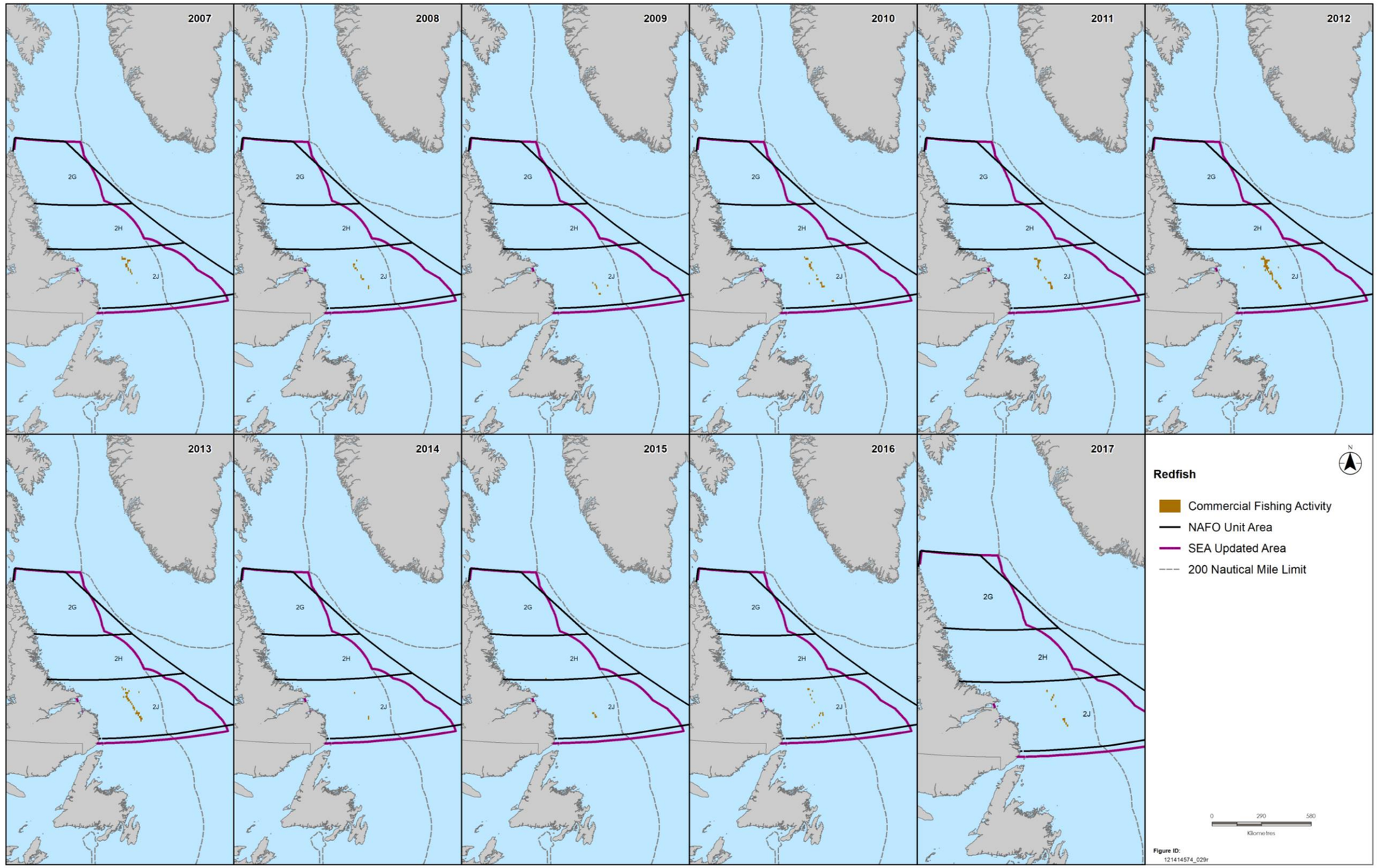
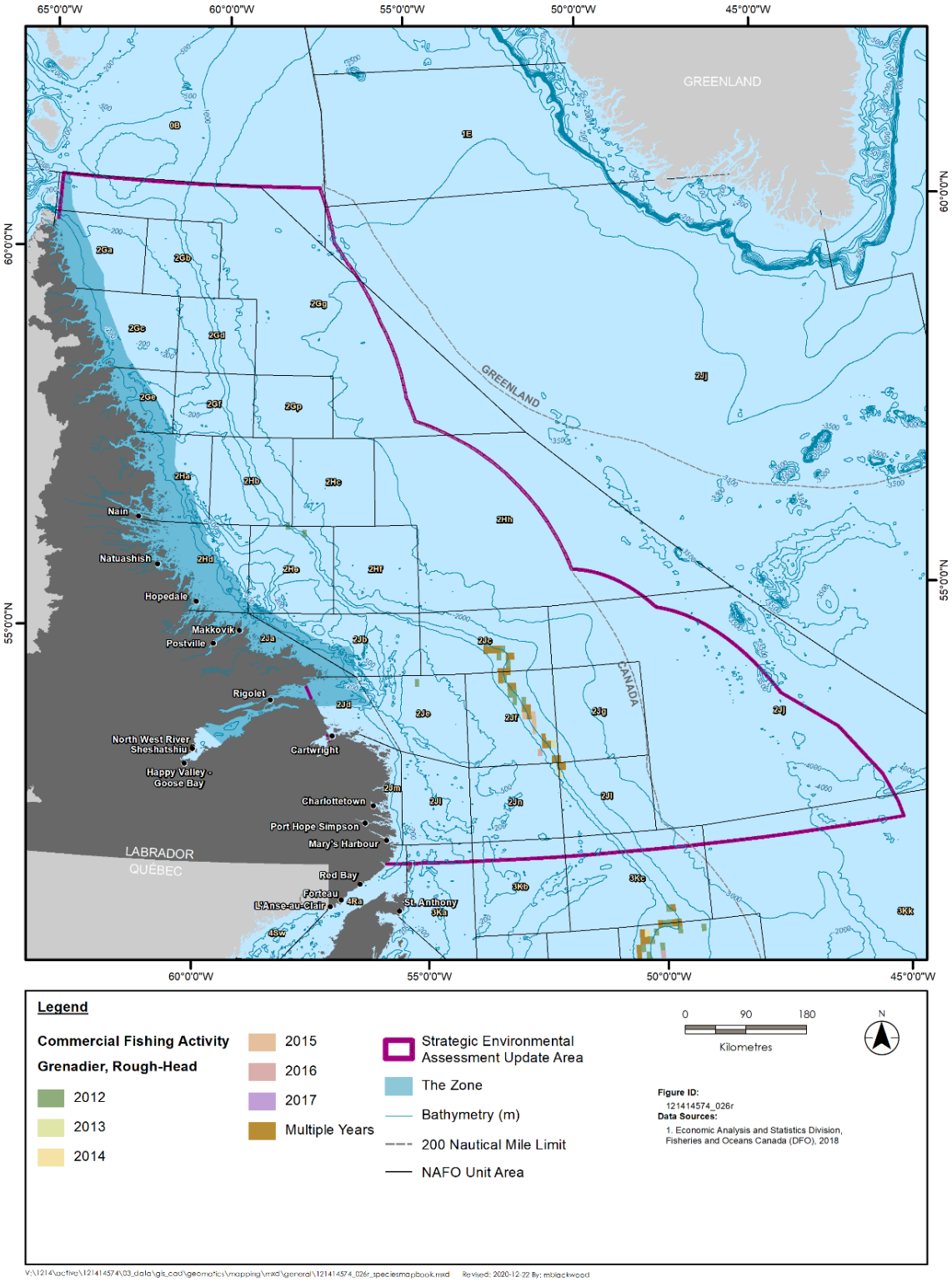


Figure 9-33 Domestic Harvesting Location, Redfish, 2007 to 2017



Source: DFO 2019

Figure 9-34 Domestic Harvesting Locations, Roughhead Grenadier, 2012 to 2017

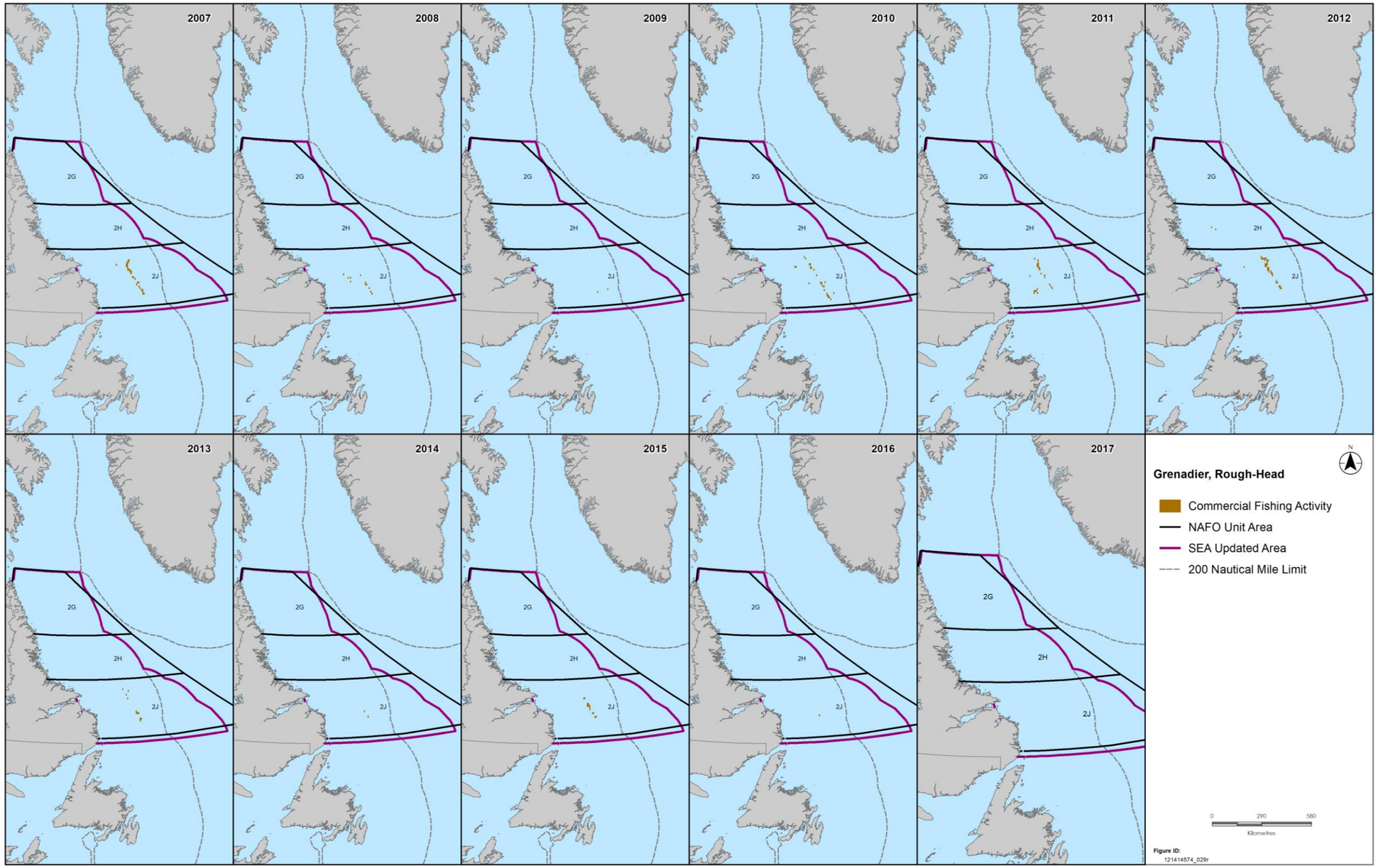
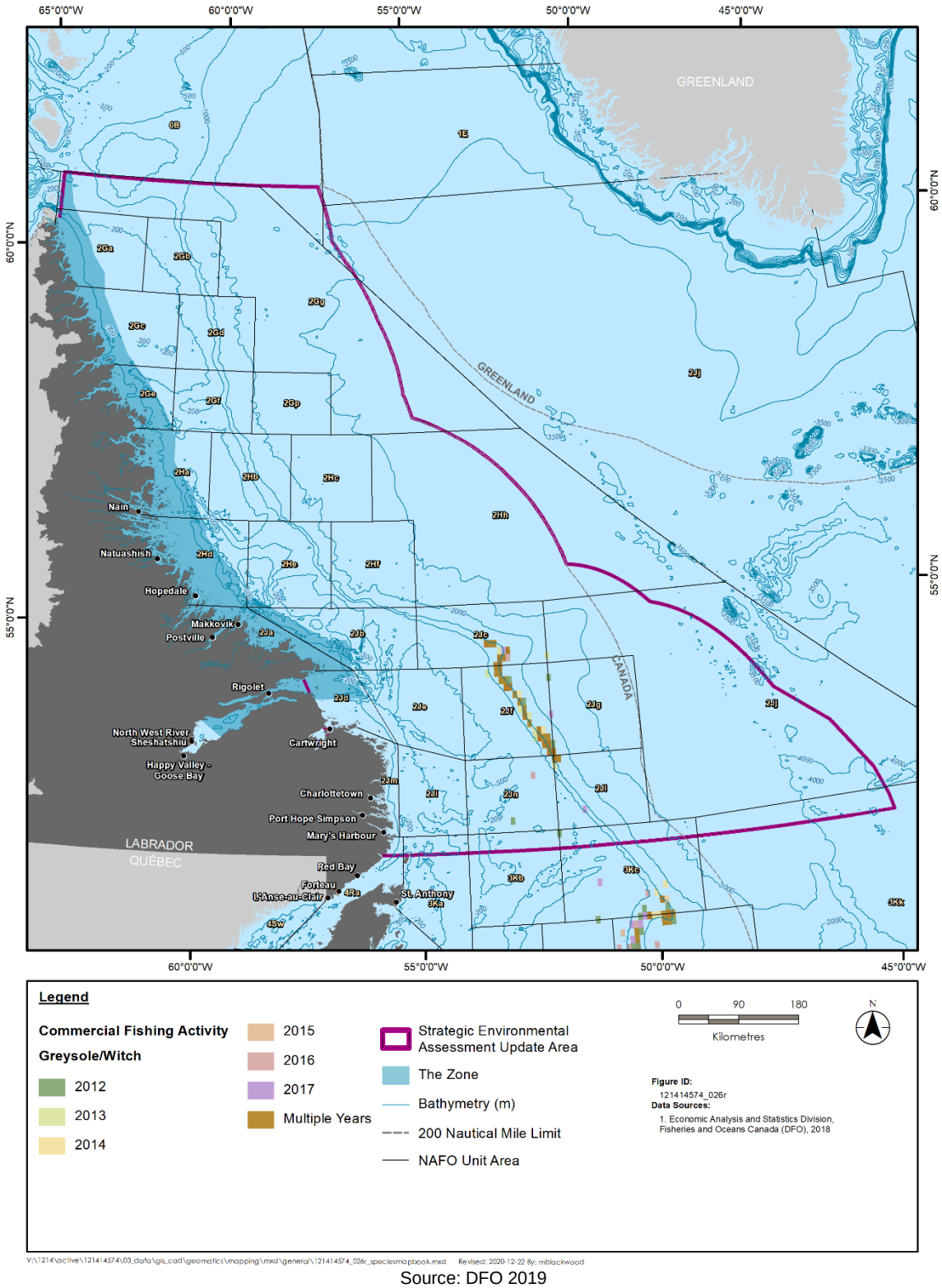


Figure 9-35 Domestic Harvesting Locations, Roughhead Grenadier, 2007 to 2017



Source: DFO 2019

Figure 9-36 Domestic Harvesting Locations, Witch / Greysole Flounder, 2012 to 2017

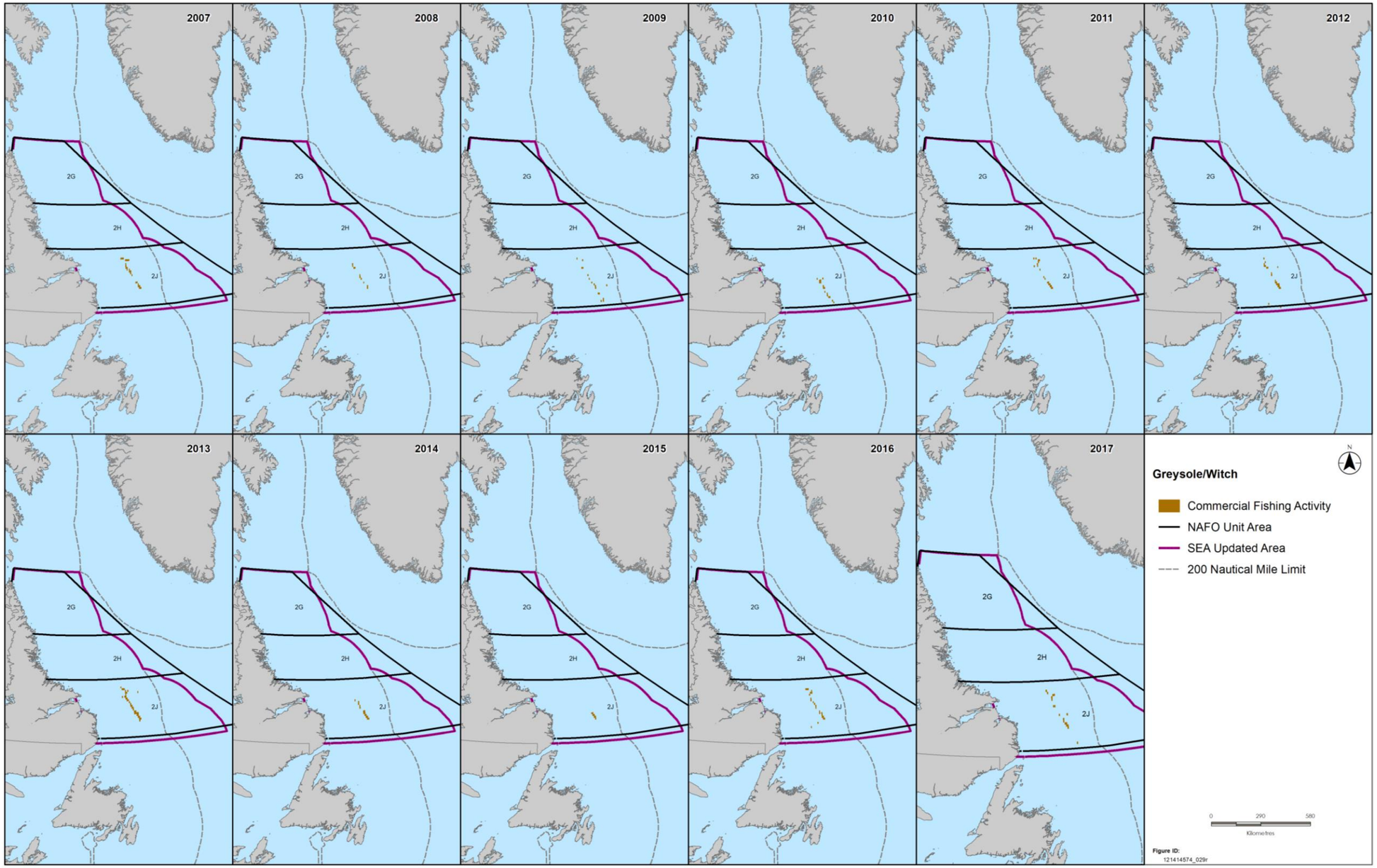
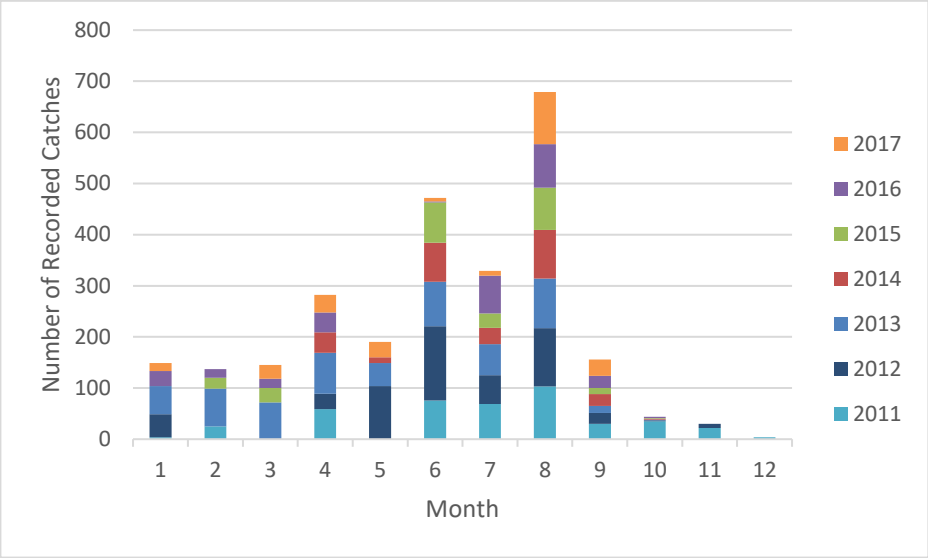


Figure 9-37 Domestic Harvesting Locations, Greysole / Witch Flounder, 2007 to 2017



Source: DFO 2019
Note: Recorded catch is generalized to a 6 nautical mile by 4 nautical mile grid cell for privacy reasons, so one catch may indicate activity from multiple fishing vessels.

Figure 9-38 Groundfish Harvest by Month, 2011 to 2017

American plaice have been under a moratorium on directed commercial fishing since the collapse of groundfish stocks in the 1990s. Domestically, there is no directed commercial fishery for the species, and catches of American plaice are typically recorded as bycatch from fishing activities for other groundfish species.

Atlantic cod have also been under a moratorium in Canada since the collapse of the groundfish stocks in the early 1990s. The most recent assessment of NAFO Divisions 2J3KL Atlantic cod stock by DFO indicates that while the stock has increased over the past decade, it remains within the critical recovery zone (DFO 2018e). There is still uncertainty surrounding the stock recovery and whether a commercial fishery will be reinstated for the species. Domestically, there is a commercial fishery for groundfish in NAFO Division 3Ps, with a quota of 5,980 t for Atlantic cod. There is also a northern cod stewardship fishery in Divisions 2J+3KL. In the latest decision by DFO, the TAC for the 2018 fishery was announced at 9,500 t, a 25% decrease from the 2017 TAC (DFO 2018c).

Atlantic halibut is managed by DFO as a single stock that spans the Scotian Shelf and Southern Grand Bank (3NOPs4VWX5Zc). The most recent stock assessment was carried out in 2014 by DFO and indicated that Atlantic halibut was in a healthy state. Recovery of the stock over time has allowed for increased access by domestic and international fleets (DFO 2015). NAFO does not manage Atlantic halibut stocks. Harvesting for Atlantic halibut within the Labrador Shelf SEA Update Area appears to be located near the southern portion of the area, and in a small concentration along the shelf break.

Greenland halibut is managed by DFO and NAFO for stocks in Divisions 2+3KLMNO. In 2010, NAFO adopted a Management Strategy Evaluation for the fishery, which looked at a survey-based harvest control rule (assessed annually) to set quotas for the species. The TAC for 2017 was 10,966 t. However, during NAFOs 39th annual meeting, NAFO members agreed on a TAC for Greenland halibut

in 2+3KLMNO of approximately 16,500 t for 2018, representing an 11% increase (NAFO 2017). Of that amount, approximately 12,227 t (74%) was allocated to fisheries in 3LMNO. Commercial harvesting for Greenland halibut appears to be the most active of groundfish species (Figure 9-32 and 9-33), extending along the continental shelf.

Three species of redfish (Acadian, golden, and deepwater) occur in the waters of the Canada-NL Offshore Area and are managed together as a single unit in each management area. Redfish are typically located at water depths below 200 m and are found along the continental shelf break. NAFO collectively manages the stocks of the three species of redfish in Divisions 3KLMNO. The stock in Division 3K is jointly managed with the Northeast Atlantic Fisheries Commission (NAFO 2018). Commercial fishing for redfish in NAFO Subarea 2 and Division 3K has been under moratorium since 1997, and so there is little information available on landings other than bycatch recordings. At the time of writing, this moratorium is still in place.

Directed fishing for roughhead grenadier in Canadian waters has been under a moratorium since 1997. Grenadier are caught as bycatch for other fisheries, primarily Greenland halibut. Figures 9-35 and 9-36 illustrates domestic harvesting location of roughhead grenadier. The distribution of harvesting shows that it follows the shelf break and has been consistent annually.

Witch flounder are partly managed by NAFO and they are comprised of two separate stocks, one stock in subdivisions 3NO, and one widely distributed stock in subdivisions 2J+3KL. A moratorium was placed on both witch flounder stocks in 1995 due to low catch numbers, and landings of witch flounder have primarily been as bycatch in other fisheries. The moratorium was lifted for witch flounder in 3NO in 2015, with an initial quota of 1,000 t. The most recent stock assessment for witch flounder in 2J+3KL was in 2016 and recommended that the moratorium remain in place for a commercial witch flounder fishery from 2017 to 2019 (NAFO 2018).

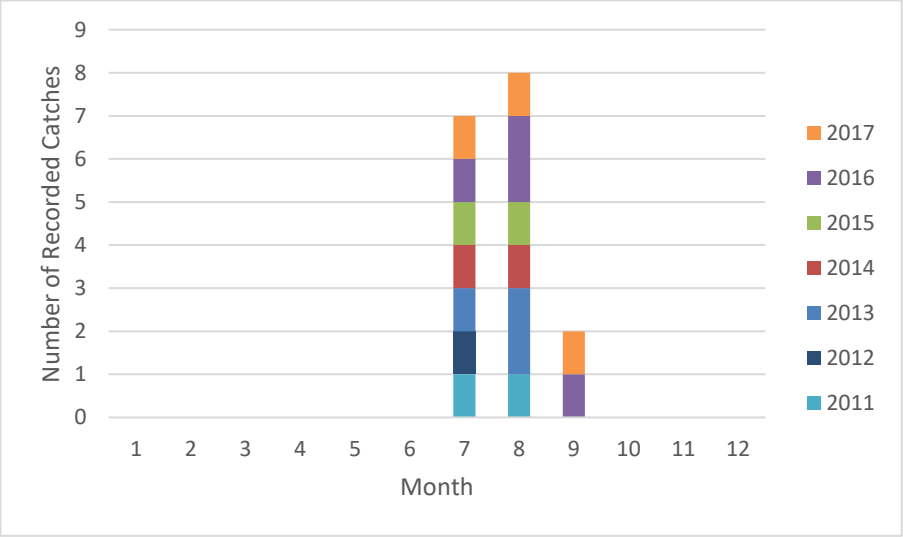
9.2.5.4 Arctic Char

Arctic char have been highlighted an important species both culturally, recreationally, and commercially for local residents of Labrador, and was highlighted as such in the original SEA Report. There has been limited information on Arctic char available since the writing of the original SEA Report. Table 9.4 illustrates the landings that have been recorded for commercial harvests of Arctic char from 2011 to 2017. The majority of harvesting appears to take place within NAFO Subdivision 2H, and is conducted using primarily gillnets. The harvest typically takes place during the summer.

Table 9.4 Recorded Landings of Arctic Char, 2011 to 2017

Year	NAFO Subdivision	Gear Type	Weight (t)	Value ($CAD)
2011	2H	Gillnet (set or fixed)	24	42,255
2012	2H	Gillnet (set or fixed)	11	19,676
2013	2H	Gillnet (set or fixed)	20	41,411
2014	2H	Gillnet (set or fixed)	22	37,369
2015	2H	Gillnet (set or fixed)	25	43,251
2016	2H,2G	Gillnet (set or fixed)	28	58,398
2017	2H,2G	Gillnet (set or fixed)	16	40,947
Source: DFO 2019				

While Arctic char is harvested commercially, it is also harvested for subsistent purposes along the entire Labrador coast. For example, there are harvests of Arctic char in the Sandwich Bay and Black Tickle areas (SEM 2008). This fishery is communal-commercial. A licence is negotiated and issued annually to the Nunatsiavut Government under the Aboriginal Communal Fishing Licence Regulations. Figure 9-39 outlines the seasonal distribution for harvest of Arctic char.



Source: DFO 2019
Note: Recorded catch is generalized to a 6 nautical mile by 4 nautical mile grid cell for privacy reasons, so one catch may indicate activity from multiple fishing vessels.

Figure 9-39 Domestic Harvest of Arctic Char, by Month, 2011 to 2017

9.2.5.5 Whelk

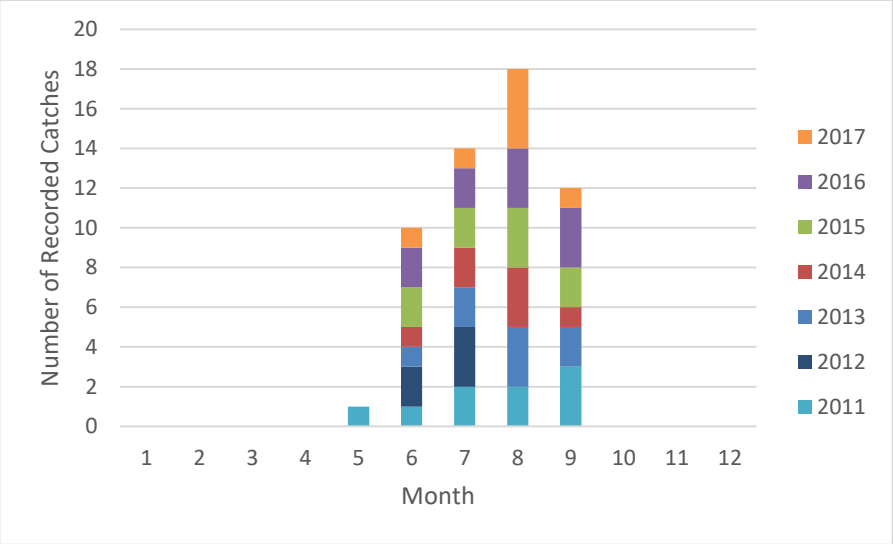
Whelk were identified in the original SEA Report as an emerging fishery, and that there had been fishing activity for whelk occurring along the Labrador coast since the 1990s. There has been little information on commercial harvesting activity for whelk provided since the original SEA Report, and Table 9.5 illustrates the landings for whelk from 2011 to 2017. Harvesting appears to take place within NAFO Subdivision 2J, and harvesting is done using pots.

Table 9.5 Recorded Landings of Whelk, 2011 to 2017

Year	NAFO Subdivision	Species	Gear Type	Weight	Value ($CAD)
2011	2J	Whelk	Pot	-	
2011	2J	Whelk	Pot	99	98,988
2012	2J	Whelk	Pot	22	29,433
2012	2J	Whelk	Pot	52	57,303
2013	2J	Whelk	Pot	-	-
2013	2J	Whelk	Pot	182	201,760
2014	2J	Whelk	Pot	-	-
2014	2J	Whelk	Pot	84	101,985
2015	2J	Whelk	Pot	22	26,368
2015	2J	Whelk	Pot	89	108,787
2016	2J	Whelk	Pot	-	-
2016	2J	Whelk	Pot	66	95,184
2017	2J	Whelk	Pot	99	190813

Source: DFO 2019
Note: - indicates that numbers have been withheld due to DFO confidentiality policies

Figure 9-40 illustrates the seasonality of whelk harvest within the Labrador Shelf SEA Update Area and indicates that the largest majority of whelk harvesting occurs in summer. This seems to follow the same seasonality of fisheries for snow crab, which also use pots to harvest species.



Source: DFO 2019
Note: Recorded catch is generalized to a 6 nautical mile by 4 nautical mile grid cell for privacy reasons, so one catch may indicate activity from multiple fishing vessels.

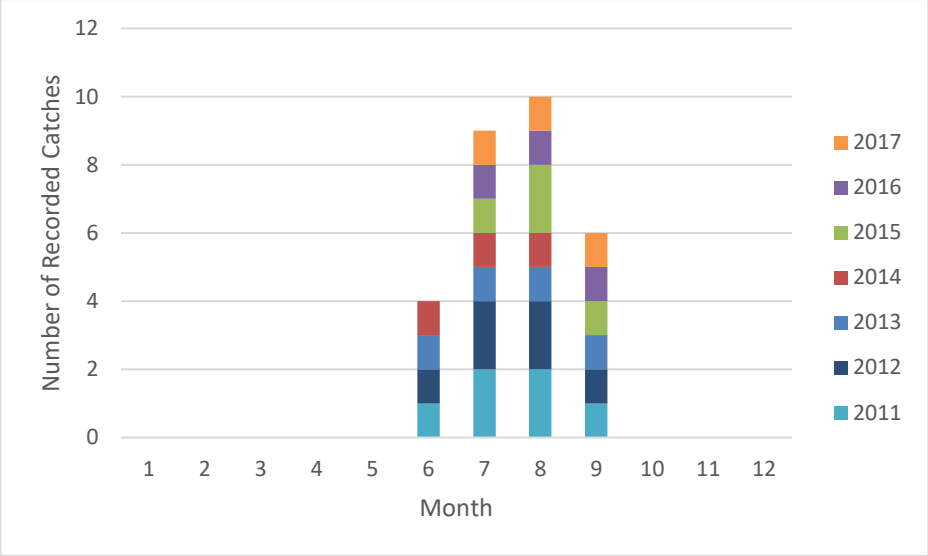
Figure 9-40 Domestic Harvest for Whelk, by Month, 2011 to 2017

9.2.5.6 Iceland Scallop

Iceland scallop was identified in the original SEA Report as a species that was harvested commercially, and some highlighted locations for harvesting included areas from Big Bay to Saglek Bay and Shoal Tickle. The recorded harvests for Iceland scallops from 2011 to 2017 were recorded in NAFO Division 2J and were harvested via the use of a dredge from a boat (Table 9.6), and not all weight and value data were available from DFO. In terms of seasonality, the available information from the original SEA Report and the data provided from DFO indicate that June to September are the primary months when Iceland scallop is harvested (Figure 9-41).

Table 9.6 Gear Type Used for Domestic Harvest for Iceland Scallop, Labrador Shelf SEA Update Area, 2011 to 2017

Species	NAFO Division	Gear	Weight	Value
2011	2J	Dredge (boat)	18739	31437
2012	2J	Dredge (boat)	16017	30704
2013	2J	Dredge (boat)	x	x
2014	2J	Dredge (boat)	x	x
2015	2J	Dredge (boat)	x	x
2016	2J	Dredge (boat)	x	x
2017	2J	Dredge (boat)	x	x
Source: DFO 2019				



Source: DFO 2019
Note: Recorded catch is generalized to a 6 nautical mile by 4 nautical mile grid cell for privacy reasons, so one catch may indicate activity from multiple fishing vessels.

Figure 9-41 Domestic Harvesting, Iceland Scallop, Monthly, 2011 to 2017

While some scallop beds have been identified in Nunatsiavut, their potential abundance is not well-understood. However, it is known that there are scallop beds in Hopedale and Rigolet areas that have the potential to be fished commercially.

9.2.6 Potential Commercial Fisheries

In terms of fisheries that have the potential to occur in the future, the most likely would be the return of groundfish stocks, like Atlantic cod and American plaice. These are stocks that were placed under moratorium after the collapse of groundfish stocks in the 1990s, and these fisheries have been limited or prohibited since. While the latest stock assessment for Atlantic cod in NAFO Divisions 2J+3KL found that the stock has increased considerably over the last decade, the species still remains below pre-moratoria levels and is still within the critical recovery zone (DFO 2021c). Industry representatives are also cautious about the return of a commercial fishery for Atlantic cod, indicating that while the stock has increased, the species still needs further recovery before consideration can be given for a commercial fishery (CBC 2016). The most recent stock assessment for Atlantic Cod occurred in March 2021 (DFO 2021c). These assessments will continue annually for five years, in an effort to more closely monitor the recovery and status of the species and determine whether a future commercial fishery for the species is viable.

Potential effects of climate change on the marine environment (e.g., warming waters) may influence the species that may be harvested commercially in the future. Warming temperatures could result in more abundance and presence of larger migratory fish, such as tuna and swordfish. Changes in temperatures could also cause fish species to change distribution, and some fisheries may decrease or increase as a result. This may change what species are harvested, where they are harvested, and the seasonality of the harvest. These changes have the potential to take place within the Labrador Shelf SEA Update Area.

The addition of new marine refuge areas within the Canada-NL Offshore Area, including areas that overlap with the Labrador Shelf SEA Update Area, may also influence how commercial fisheries are conducted in the future. For example, new marine refuges, such as the Northeast Newfoundland Slope Closure, currently prohibit bottom fishing activities within their boundaries. Closure areas may result in relocation of fishers to other areas that would support such fisheries. As a result, fisheries using bottom contact gear, such as pots or trawls, will have to move elsewhere to fish. While this may not affect the overall mix of species fished, it may force fishers to move to new areas to harvest target species, and, in the extreme event, motivate fishers to target other species that they would not typically harvest.

Porcupine crab is not currently commercially harvested by Nunatsiavut communities. However, exploratory fisheries have identified porcupine crab in Nunatsiavut waters, with concentrations in the more northern areas.

Although whelk is not commercially harvested in Nunatsiavut, historical exploratory fisheries have discovered the resource Nunatsiavut-wide. Whelk and toad crab were two species identified in the original SEA Report as potential emerging fisheries. Emerging fisheries are carried out under DFO's Emerging Fisheries Policy (DFO 2008). Under this policy, emerging fisheries are determined through an application process and taken through three stages. These stages include a feasibility stage to determine if harvestable quantities of the species / stock in question exist in certain areas offshore. The second stage is an exploratory stage, where the objective is to determine whether a species can sustain a

commercially viable fishing operation, and to gather data to begin to build a database on stock abundance and distribution. The final stage is commercial, when it has been determined that a species can sustain a commercial fishing operation. Once this stage is reached, a formal integrated fisheries management plan is introduced for the quota management of the fishery.

An exploratory survey for snow crab in NAFO Subdivision 2H was carried out by the Torngat Wildlife, Plants, and Fisheries Secretariat in 2009 and 2010, as part of the exploratory fishery process to determine the potential viability of a commercial stock in the area (Brothers et al. 2012). While snow crab were harvested in the area, the quantity was not large enough to declare that a potential commercial stock may exist in the area (Brothers et al. 2012).

In the same year, Whalen et al. (2012) also undertook and exploratory survey for Greenland halibut, to determine the potential for presences of halibut within The Zone, and a potential opportunity of economic development to local Inuit fishers (Whalen et al. 2012). The results of the survey did provide information that Greenland halibut were present within the waters of The Zone, particularly in the Rigolet regions, and recommended that further surveys take place to determine the abundance of halibut within the region (Brothers et al. 2012).

There are currently no emerging fisheries in NAFO 2GH. There has been an emerging fishery for sea cucumber in 4R (Northern Peninsula) and in Crab Fishing Area 3A (in NAFO 3K) (DFO pers. comm., 2021). Changing world markets, declines in harvest of traditional species, and price fluctuation can play a role in what fisheries could emerge in the future within the Labrador Shelf SEA Update Area.

9.2.7 Sealing

Sealing occurs commercially in NL, including within the Labrador Shelf SEA Update Area. The species primarily targeted during the seal harvest include harp and hooded seals, and the commercial fishery is typically open from January to December, with most harvesting occurring in the spring when ice conditions are favourable (April to May); however, harvesting is closed during the pupping and nursing periods. Closure periods are outlined in Schedule IV of the *Marine Mammal Regulations* and are dependent on the species of seal, including mid-February to mid-March and mid-June to mid-November for harp and hooded seals. In 2016, there were approximately 9,710 commercial seal licence holders, and it is estimated that less than 1,000 of these licence holders were actively fishing. Fishing takes place along the coast of NL, and harp seals are the primary species targeted. Section 6(3) of the *Marine Mammal Regulations* allows any person who resides immediately adjacent to Seal Fishing Areas 1-4 to hunt seals without a license for food purposes. Additionally, there is an Indigenous harvest in Seal Fishing Areas 4 and 5, which specifically cover the coast of Labrador. These hunts may occur at any time of the year. A breakdown of seal harvest from 2007 to 2017 is provided in Table 9.7.

Table 9.7 Commercial Seal Harvest Totals in NL, 2007 to 2017

Year	Harp Seals	Grey Seals	Hooded Seals
2017	80,924	1,417	
2016	66,800	1,612	
2015	35,000	1,145	
2014	60,000	82	
2013	98,000	111	
2012	71,000	8	1
2011	38,000	195	0
2010	69,000	7	10
2009	77,000	254	
2008	218,000	1,472	<400
2007	242,745	887	<400
Source: DFO 2016; Harpseals.org 2021			

The TAC for the commercial fishery for hooded seal in Atlantic Canada in 2016 was 8,200 animals, and the quota for harp seals was 400,000 animals (DFO 2018c).

Harp, grey, hooded, and ringed seals are harvested by Indigenous groups in NL. The ringed seal is the primary seal species harvested by the Inuit (DFO 2011); it is not fished commercially.

9.2.8 Aquaculture

Aquaculture is a growing industry in NL and has, in the past, has become an important contributor to the province's fisheries sector and economy. The industry experienced a decline in 2017, with production totaling approximately 21,700 t. This was a decrease of approximately 24% from 28,600 t in 2016. The market value also experienced a decline, declining approximately 20% from $276 million in 2016 to $221 million in 2017 (NL Department of Finance 2018). The main species for the aquaculture industry in the province includes Atlantic salmon, steelhead trout, and blue mussels. Operations on the east coast of Newfoundland (outside the Labrador Shelf SEA Update Area), include farms for blue mussels, Atlantic cod, trout, and oysters. Currently, there are no operating or approved aquaculture sites within the Labrador Shelf SEA Update Area (NLDFA pers. comm., 2018).

9.3 RECREATIONAL FISHING ACTIVITY

Recreational fishing activity takes place throughout the coastal and inland waters of NL, including the coastal waters of the Labrador Shelf SEA Update Area. During the designated times in summer and fall, individuals may participate in a recreational fishery for Atlantic cod. Licences or tags are currently not a requirement for this fishery, but commercial fishing operations are not allowed to participate, and the catch from the recreational fishery is not permitted to be sold (DFO 2018c). The 2021 Eastern Newfoundland recreational groundfish fishery is summarized in Table 9.8.

Table 9.8 Recreational Groundfish Harvesting Dates, 2021

Season	Dates (2021)	Retention Limit	Restrictions
Summer	July 03 to July 05	• Five groundfish (including Atlantic cod) per individual • Retention limit per boat, if more than three people fishing, is 15 groundfish • Tour boat operators will be eligible to apply for a licence to seek an increased trip limit. This licence will have harvest reporting requirements	• Retention of Atlantic halibut, spotted and northern wolffish, and shark species is prohibited • Only angling gear and handlines with a maximum of three hooks are permitted. Handlines include artificial lures, baited hooks, and feathered hooks. Artificial lures with treble hooks weighing less than five ounces or 142 grams are acceptable. Traditional jiggers are not permitted unless they are modified and have only one single hook • Fishing is only permitted from one hour before sunrise until one hour after sunset
	July 10 to July 12		
	July 17 to July 19		
	July 24 to July 26		
	July 31 to August 02		
	August 07 to August 09		
	August 14 to August 16		
	August 21 to August 23		
	August 28 to August 30		
	September 4 to September 6		
Fall	September 25 to October 03		
Source: DFO 2021c			

Recreational fishing occurs in NL for other species as well, including smelt, Atlantic salmon, and trout. Angling for smelt in coastal waters is allowed year-round, and there is no set bag limit for an individual fisher. Recreational fishing for salmon and trout are permitted during certain times of the year, depending on the location of the river, and time of year. NL has approximately 186 scheduled salmon rivers, divided into different classes and/or zones. These different zones/classes have specific fishing regulations and requirements associated with them, including bag limits and fishing seasons (DFO 2018e). Historically, anglers have been allowed to retain a certain number of individuals during the recreational Atlantic salmon fishery in NL.

9.4 INDIGENOUS FOOD, SOCIAL, AND CEREMONIAL FISHING ACTIVITY

The following section provides an overview of Indigenous FSC fishing activity that may take place within the Labrador Shelf SEA Update Area. There are a number of species that are harvested by Indigenous groups in Labrador for FSC purposes. These species, and the act of harvesting these species, is an important social and cultural activity for Indigenous people, to maintain a connection to the land and to enjoy their traditional ways of life. The sections below will provide an overview of the FSC licences currently held by the three Indigenous communities in Labrador. Indigenous groups can harvest seals throughout the year for FSC purposes.

9.4.1 Nunatsiavut Government

The Nunatsiavut Government hold two FSC licences including for trout, salmon, Arctic char, seal, and smelt (Table 7.10 in Equinor Canada 2020). These species may be harvested in the Upper Lake Melville Area and in the Labrador Inuit Settlement Area (LISA). As per the LILCA (Chapter 13 – Fisheries Chapter of the Agreement), beneficiaries have the right to harvest within the LISA throughout the year for fish or

aquatic plant, up to the quantity needed for their FSC purposes. In addition, despite the commercial salmon fishery being closed in Labrador, there is a communal fishery for Atlantic salmon (Table 7.10 in Equinor Canada 2020). The Nunatsiavut Government holds FSC licences for species that may migrate throughout the LISA, and within the Labrador Shelf SEA Update Area. Salmon fishing licences permit a quota of seven salmon per household (Nunatsiavut Government 2018). Nunatsiavut Government reported that it often takes less than 24 hours before salmon nets are filled to their quotas (Nunatsiavut Government 2018).

York et al. (2015) conducted interviews with Inuit hunters in northern Labrador, who noted that areas between Makkovik and Rigolet have been and continue to be popular areas for seal hunting among Labrador Inuit. Details regarding seal hunting, including seal harvest maps, are provided in Section 10.2. Nunatsiavut members indicated that Atlantic salmon, Arctic char, and brook trout are fished in the areas of West Bay and Fish Cove (SEM 2008). Other areas, such as Sandwich Bay, Georges Island, Groswater Bay, Big Bay, Saglek Bay, Shoal Tickle, Horse Rocks, Muskrat Falls, the area below the Churchill Falls tailrace, Gull Island, Mud Lake, the mouth of Churchill River, the Kenamu, Kenemich and Traverspine rivers, and Wilson and Grand Lakes, Hamilton Inlet, Lake Melville, Fish Point, Winter's Cove, Three Sisters Islands, Fly Cove, Main River, English River, Back Bay, West Bay, Double Mer, Ivilik, and Aillik Banks have been popular areas for fishing activity, as well as many other ponds, lakes, rivers, and coastal locations throughout Labrador (SEM 2008; Nalcor Energy 2010; Nunatsiavut Government 2018; Brice-Bennett 1977). Many islands off the coast of Labrador have also been documented as areas used for fishing activity, including Smokey and Cut Throat (SEM 2008; Nunatsiavut Government 2018). Ice fishing is a common activity through winter and spring and include fishing arctic char (primarily), speckled trout, lake trout, smelt and rock cod (Williamson and LIA 1997; Nunatsiavut Government 2018).

Cod fishing was identified as being harvested within the Horse Rocks and Aillik Banks areas (SEM 2008). Rock cod are important to the Inuit diet and is also a traditional (and current) source of feed for dog-sled teams. Atlantic cod is a very important species to Labrador Inuit for cultural and subsistence purposes.

Atlantic salmon, trout, and char were identified as being harvested within the West Bay, Fish Cove area (SEM 2008). Char fishing also occurs on the south side of Groswater Bay, around Kunnocks Cove, and around the Crandford Head area, and in the spring, ice fishing camps can be found at the head of Anaktalak Bay (SEM 2008; VBNC 1997). Groundfish harvesting areas identified by Nunatsiavut Government (2018) are summarized in Figure 9-42 and pelagic fishing areas identified by Nunatsiavut Government (2018) are summarized in Figure 9-43.

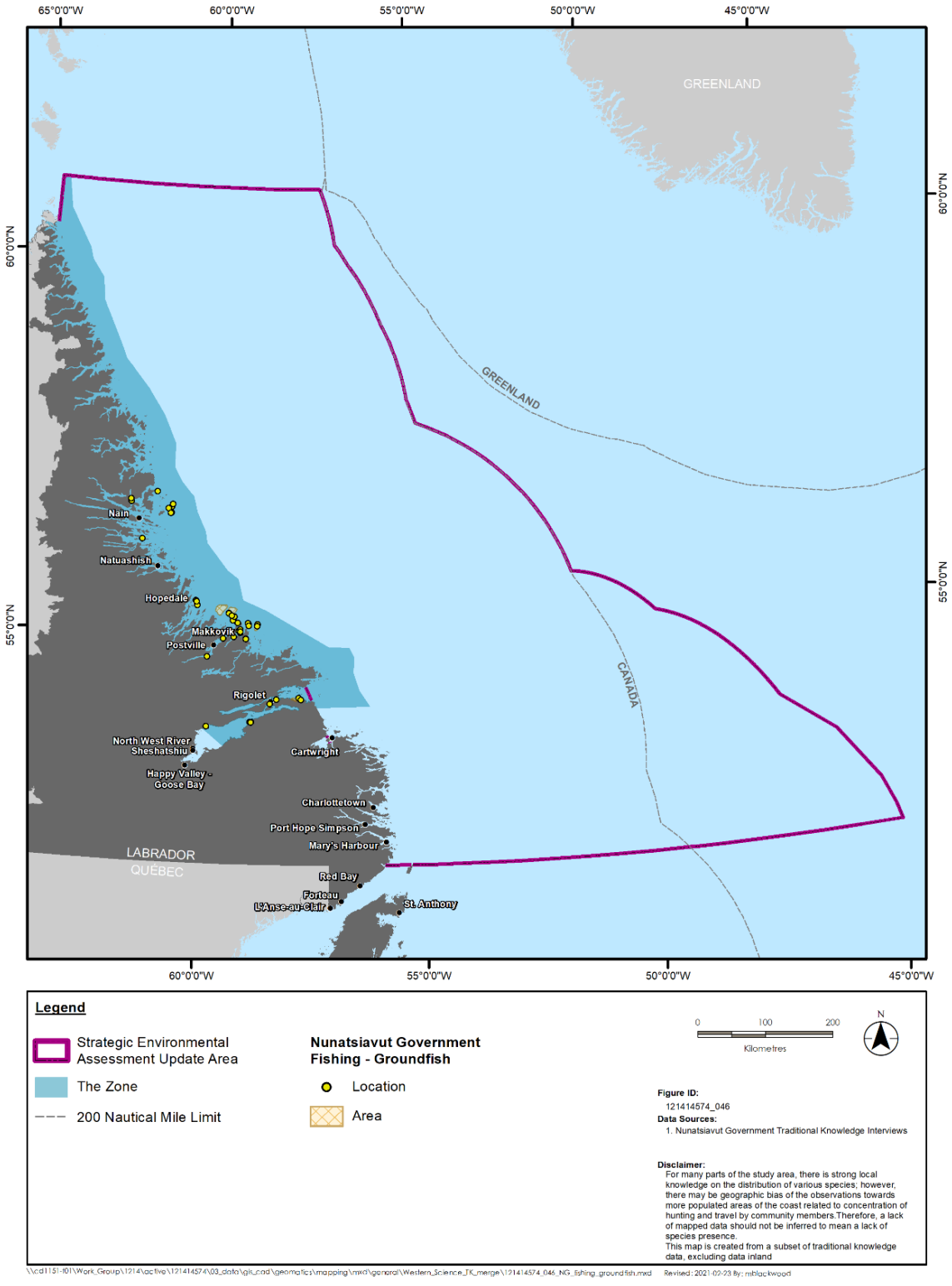


Figure 9-42 Nunatsiavut Groundfish Harvesting Areas

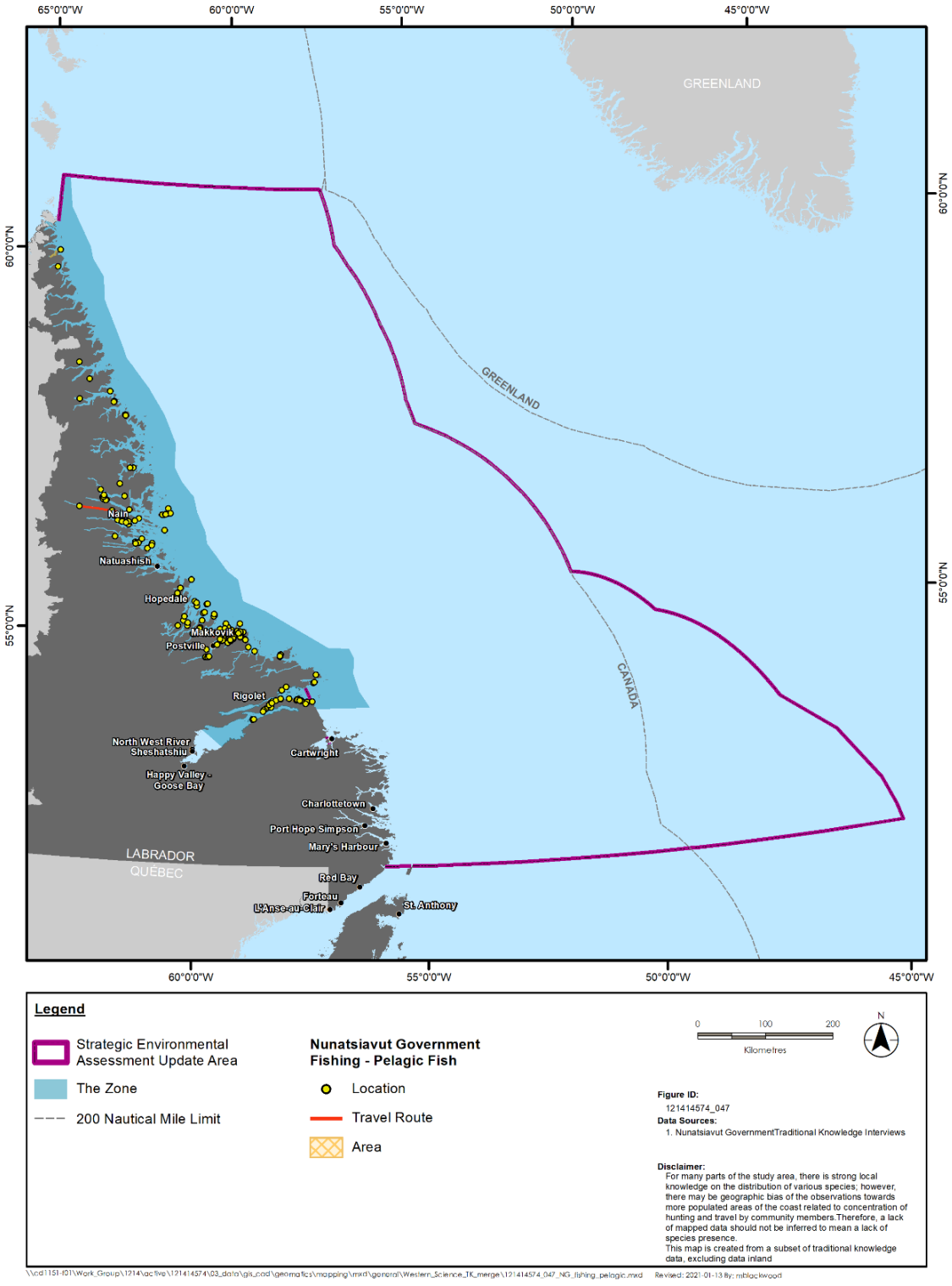


Figure 9-43 Nunatsiavut Pelagic Fish Harvesting Areas

Traditionally, char were speared as they migrated up rivers but were also, and currently are, caught by net along the coast (as is salmon). Many residents return to the same fishing grounds year after year and acknowledge / respect areas used by others in the community (Nunatsiavut Government 2018). However, some locations once used may no longer be available due to conservation measures (Nunatsiavut Government 2018). For example, some trout fishing areas may now be off limits as they have been designated as scheduled salmon rivers that require a licence (Nunatsiavut Government 2018).

Individuals will often fish for others in their communities who are unable to fish themselves, and there are community freezers in many communities for families to get their salmon (Nunatsiavut Government 2018). Individuals are contracted to harvest fish for the community freezers (Nunatsiavut Government 2018).

Nunatsiavut Government have expressed concern about reports of overfishing, noting that the lack of enforcement on fish quotas is likely the reason for depleting stocks, and that more education and community sharing is needed (Nunatsiavut Government 2018). Overfishing of char during char spawning activity has also been reported (Nunatsiavut Government 2018). Increased access (e.g., motorboats and snowmobiles) has also been reported as a potential reason for depleting stocks in some locations (Nunatsiavut Government 2018).

All fish species harvesting areas are summarized in Figure 9-44; seal harvesting is summarized in Figure 10-11, Section 10.2.3.4.

9.4.2 Innu Nation

Innu Nation holds several FSC licences for Sheshatshiu and Natuashish for salmon, Arctic char, and trout (Table 7.10 in Equinor Canada 2020). The Natuashish fishing area includes tidal waters of Labrador extending north and east from Cape Harrigan and south and east of Anaktalik Bay. The licence is restricted to these areas and within the 12-nm limit. The Sheshatshiu fishing area includes tidal waters of Labrador extending from Fish Cove Point, north to Cape Harrison, including Lake Melville and the inland waters of Little Lake and Grand Lake in Upper Lake Melville. The licence is also restricted to these areas and within the 12-nm limit. Despite the commercial salmon fishery being closed in Labrador, there is an Indigenous traditional fishery for Atlantic salmon (Table 7.10 in Equinor Canada 2020).

Innu Nation members interviewed for the original SEA Report (SEM 2008) indicated that they hunted and fished as far north as Nutak and around the Okak Islands, and to the south within Adlatok Bay. This includes areas and islands along the coast between these places.

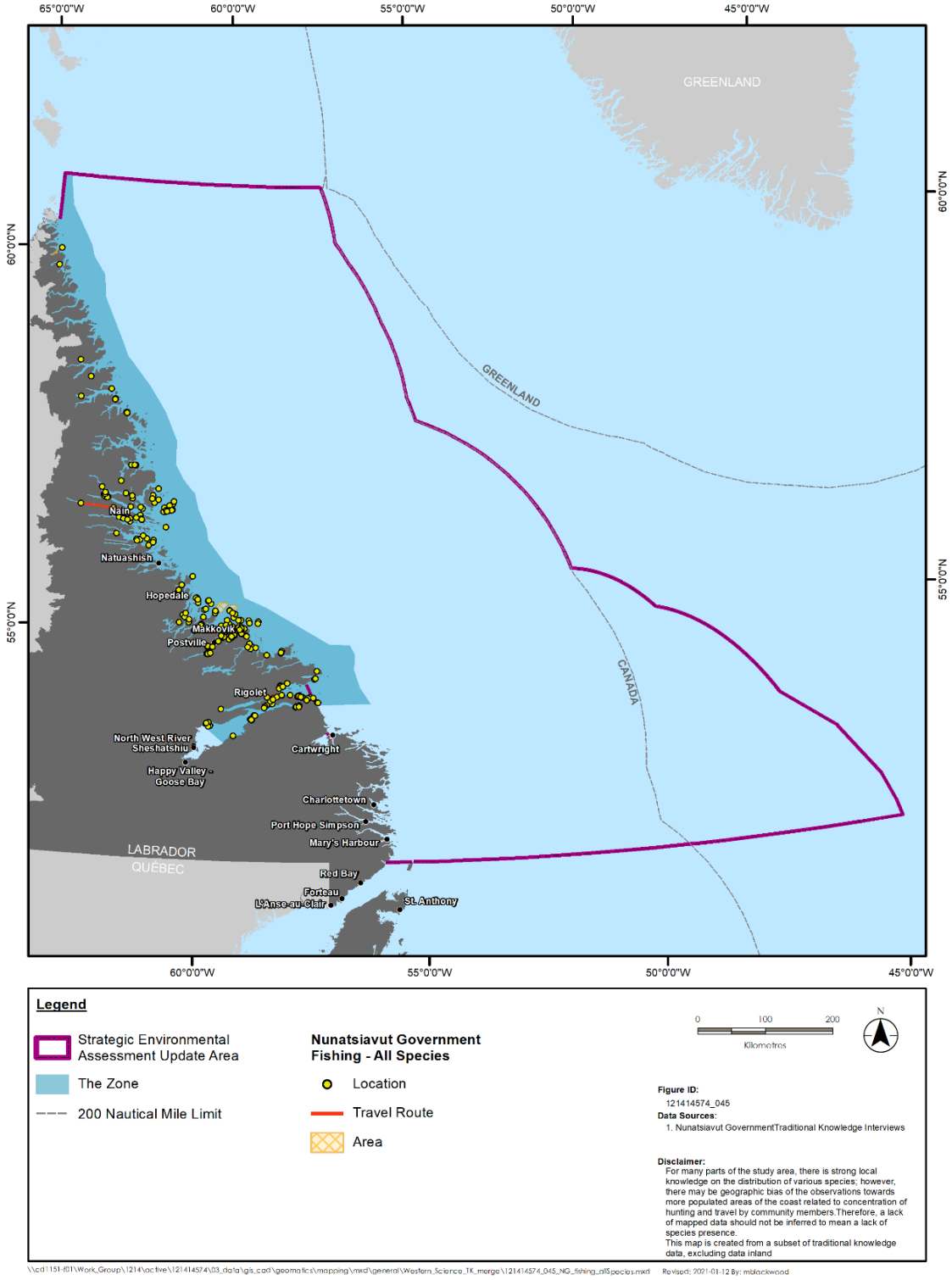


Figure 9-44 Nunatsiavut Fish Harvesting Areas - All Species

9.4.3 NunatuKavut Community Council

NunatuKavut Community Council holds several FSC licences including those for salmon, trout, Arctic char, Atlantic cod, rock cod, herring, scallop, whelk, smelt, and seal (Table 7.10 in Equinor Canada 2020). Fishing areas are Fish Cove Point and Cape Charles in Labrador and Upper Lake Melville but is restricted to these areas and within the 12 nautical mile limit. NunatuKavut Community Council members also fish throughout central and southeastern Labrador, Happy Valley-Goose Bay, Grand Lake and its tributaries, Sebaskachu Bay and Sebaskachu River, Mud Lake, Traverspine River, the mouths of Caroline Brook, McKenzie River, and lakes south of the Churchill River for Atlantic salmon. Despite the commercial salmon fishery being closed in Labrador, there is still an Indigenous traditional fishery for Atlantic salmon (Table 7.10 in Equinor Canada 2020).

NunatuKavut Community Council members who were interviewed for the original SEA Report (SEM 2008) indicated that preferred fishing grounds included Lake Melville in general, Rabbit Island, Bob's Brook, Traverspine River, Mud Lake, Metchin River, Muskrat Falls, and Gull Island (NunatuKavut Community Council) (Minaskuat 2009 as cited in Nalcor Energy 2010). Species fished in these areas include Atlantic salmon, trout, char, smelt, cod, capelin, crab, herring, mackerel, and molluscs (Minaskuat 2009 in Nalcor Energy 2010; NunatuKavut Community Council 2019). Atlantic salmon fishing is integral to the NunatuKavut way of life. NunatuKavut Community Council members also fish in Grand Lake and its tributaries, Sebaskachu Bay and Sebaskachu River, the mouths of Caroline Brook, McKenzie River, and lakes south of the Churchill River including Annie Marie Lake, Minipi Lake, and Dominion Lake, and many bays, coves and harbours along the coast of southern Labrador (Nalcor Energy 2010; NunatuKavut Community Council 2019). In addition, fishing occurs along the Goose River and in several lakes along the road to the head of Grand Lake (Nalcor Energy 2010). Members also fish in streams and lakes along the Trans-Labrador Highway (TLH) (Nalcor Energy 2010).

Fishing techniques used historically and currently include gill nets, seines, traps, trawling, jigging or rod fishing (including ice fishing), (NunatuKavut Community Council 2019). Many NunatuKavut Community Council members have shared their concerns of overfishing, stating that overfishing in the past has led to the environmental protections in place today and some areas that were popular in the past have not recovered (NunatuKavut Community Council 2019).

Data presented by the NunatuKavut Community Council (2019) indicate that its members fish shellfish, groundfish, and pelagic fish throughout the south coast and central Labrador (Figures 9-45, 9-46, and 9-47, respectively).

Figure 9-48 summarizes harvesting areas for all species fished by NunatuKavut Community Council.

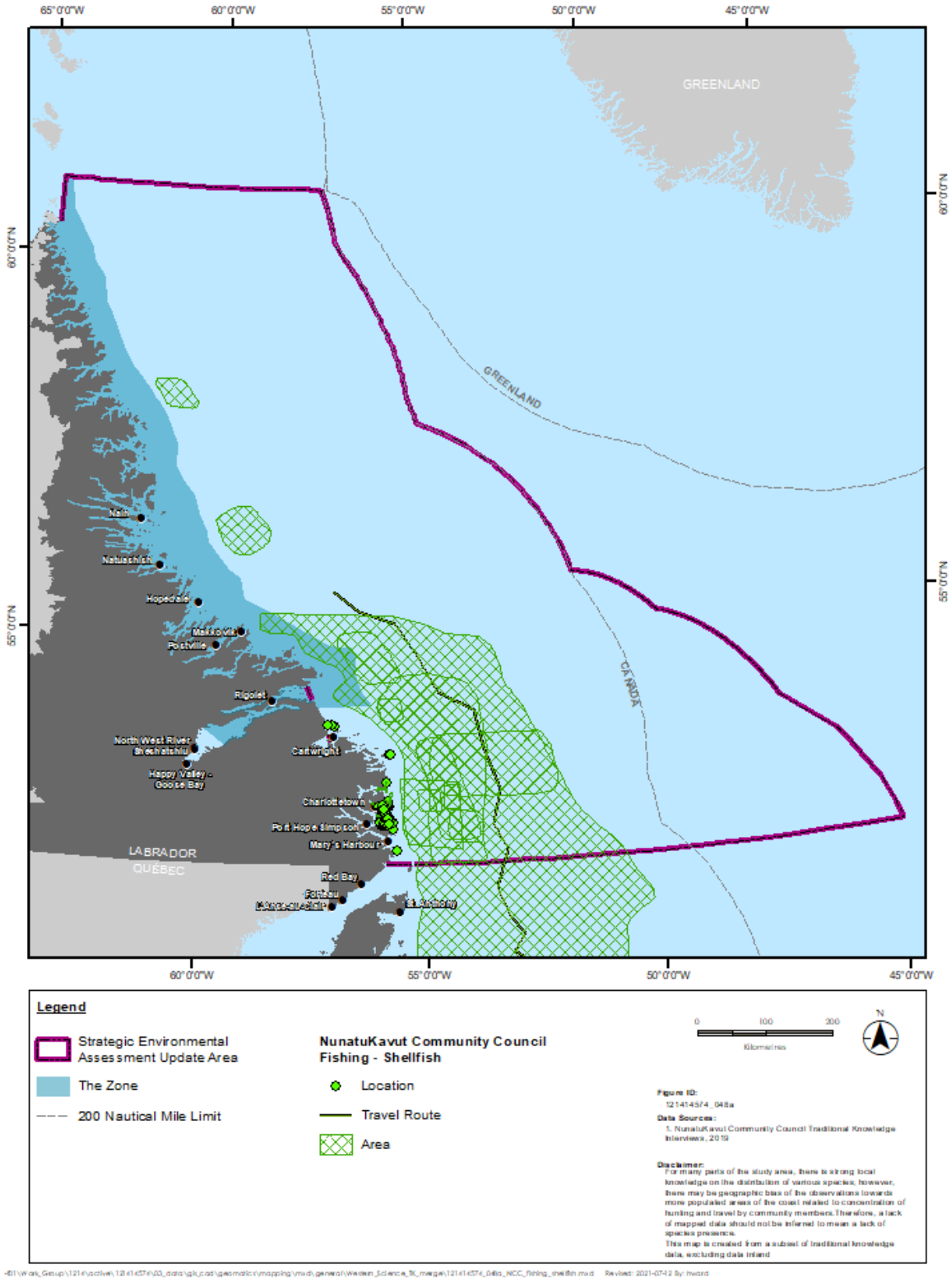


Figure 9-45 NunatuKavut Community Council Shellfish Harvesting Areas

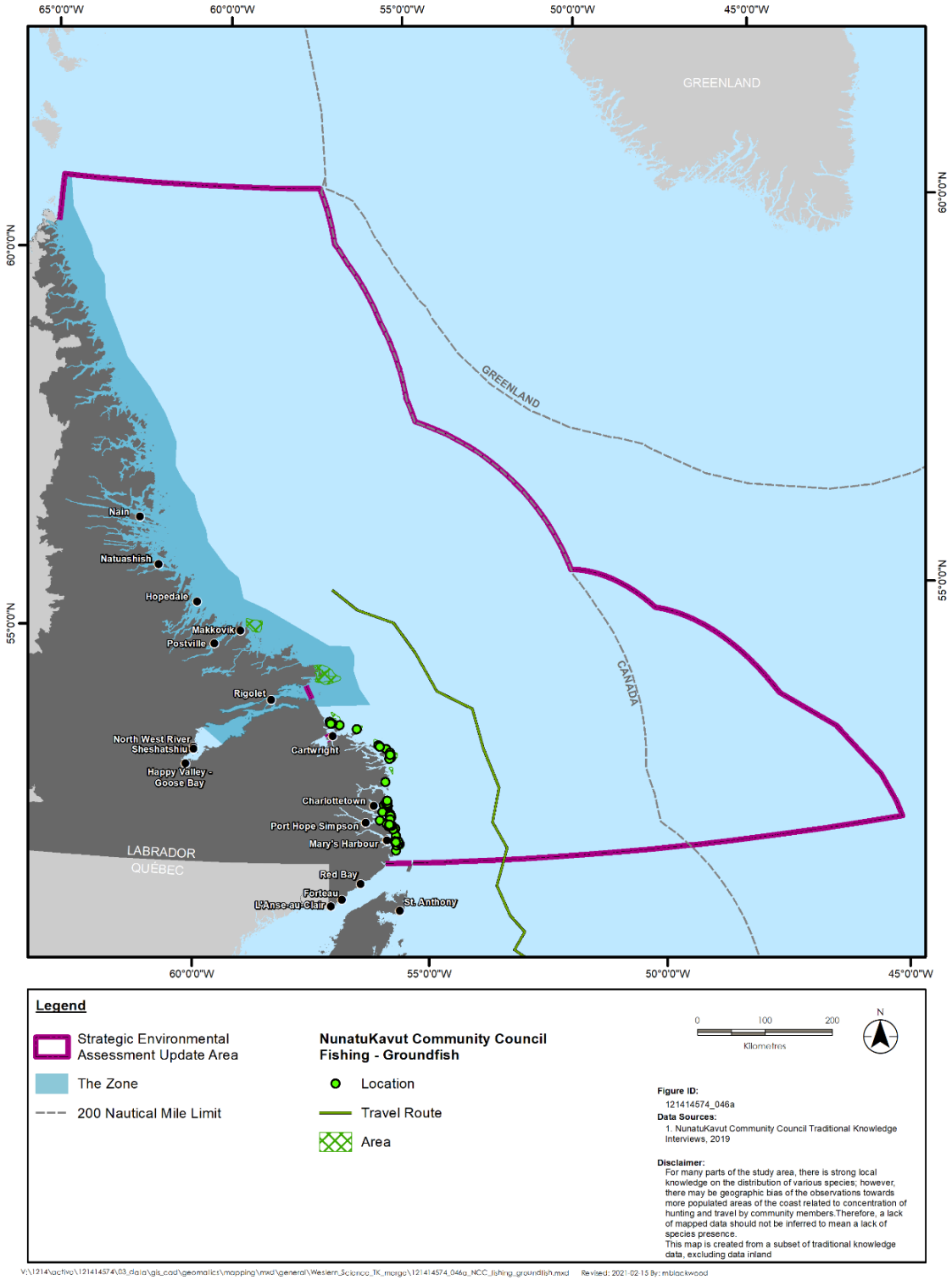


Figure 9-46 NunatuKavut Community Council Groundfish Harvesting Areas

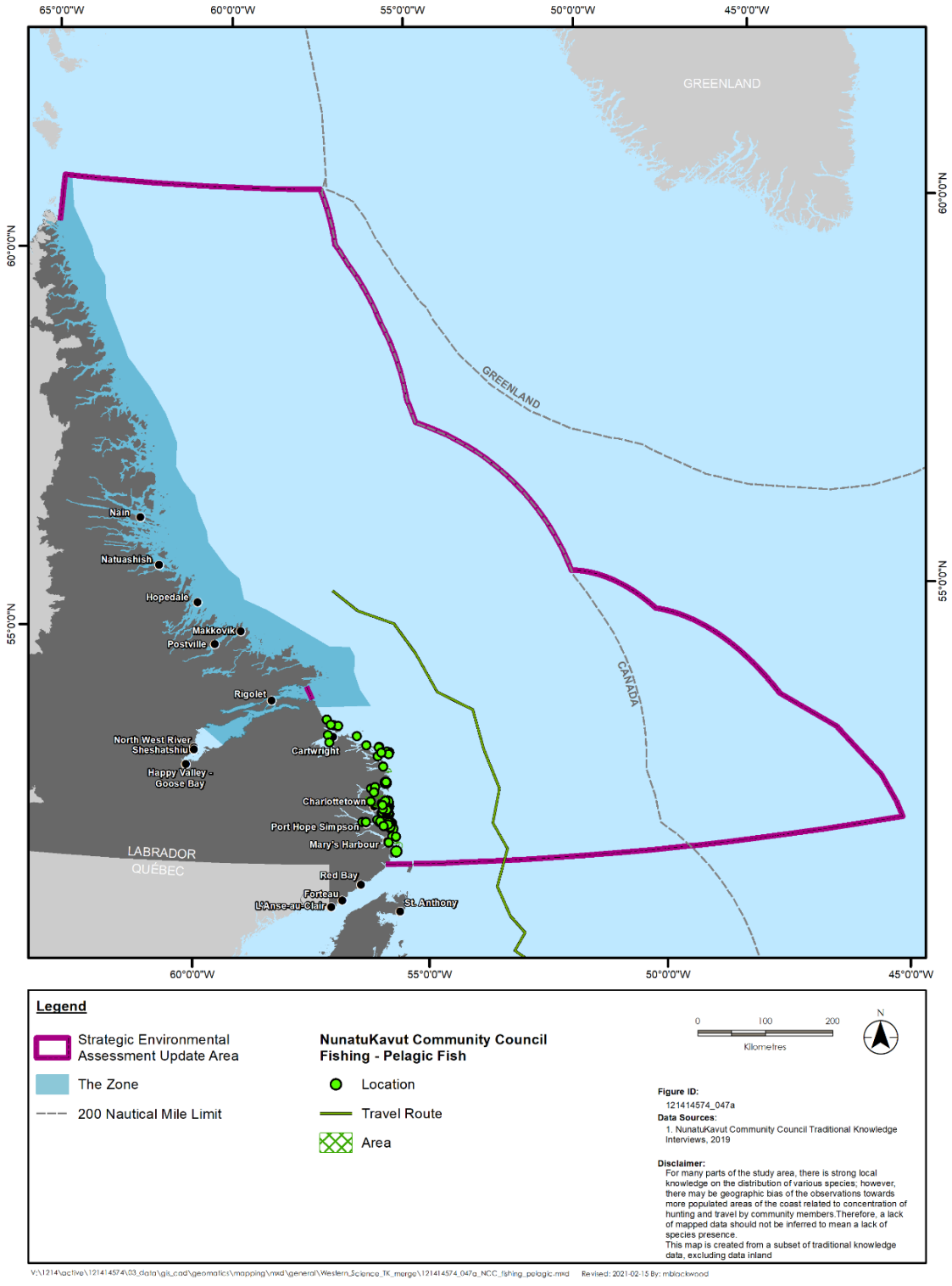


Figure 9-47 NunatuKavut Community Council Pelagic Fish Harvesting Areas

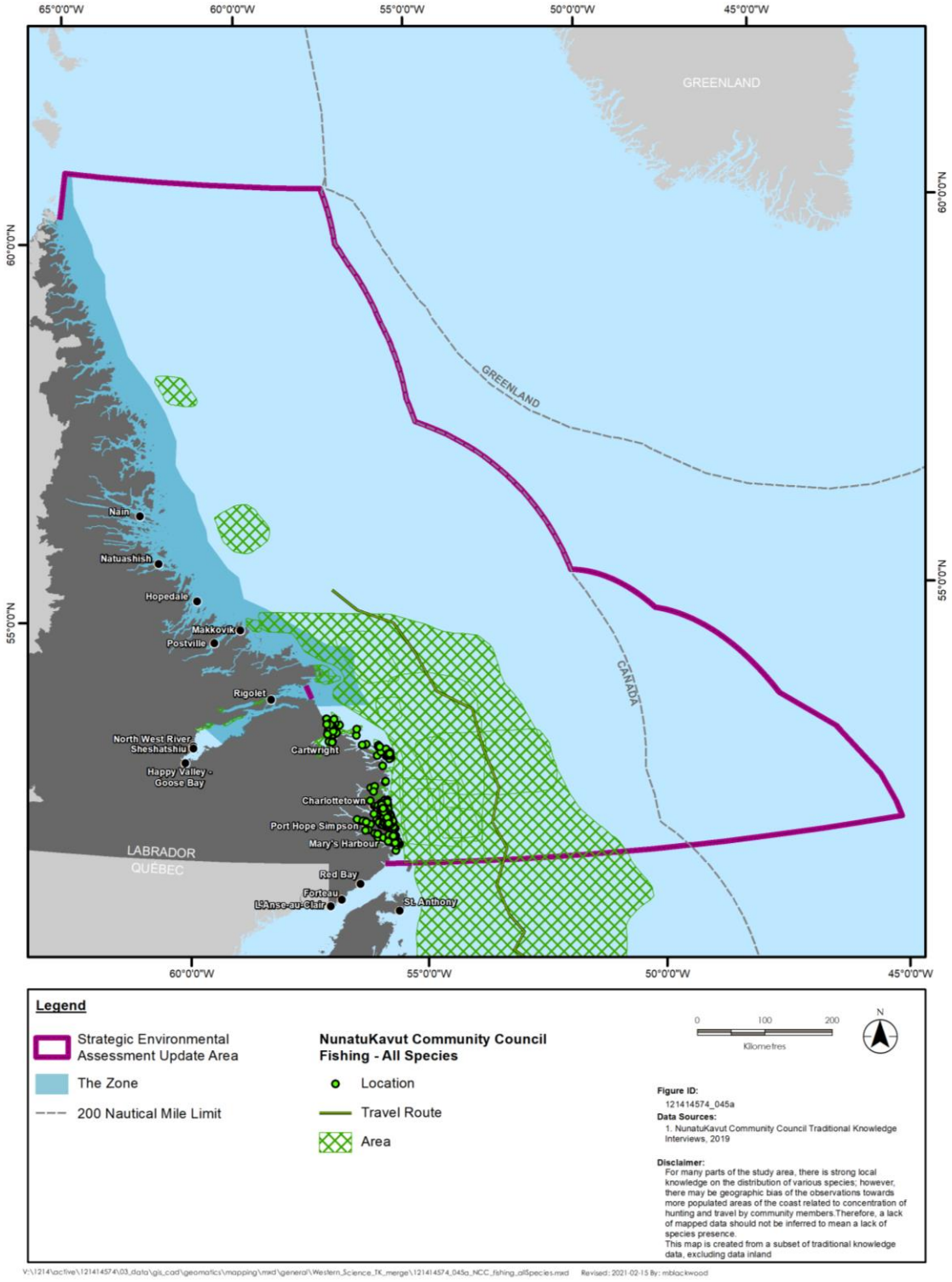
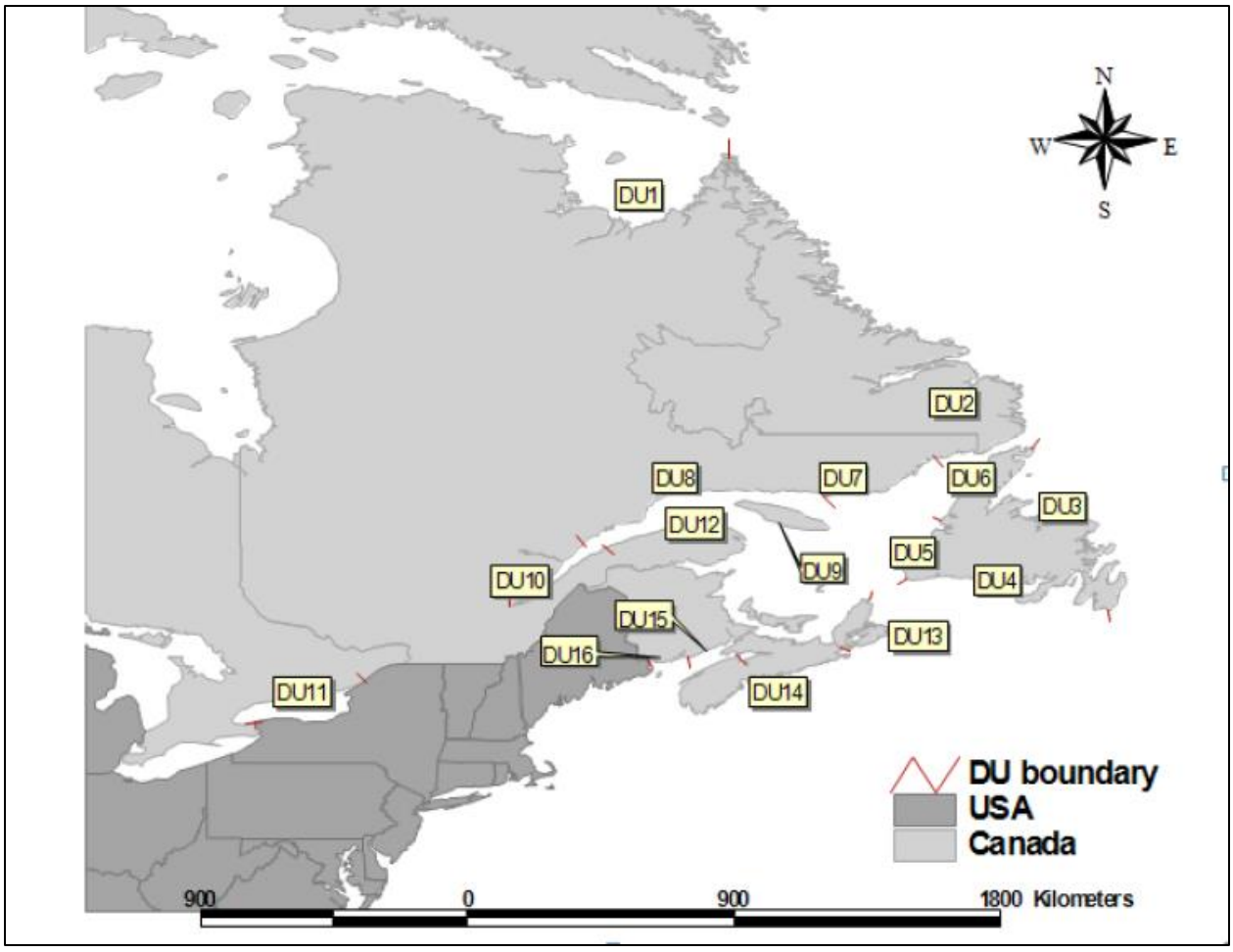


Figure 9-48 NunatuKavut Community Council Fish Harvesting Areas - All Species

9.4.4 Atlantic Salmon

Atlantic salmon has been identified in past EAs for oil and gas projects in NL as an important species that is harvested traditionally by Indigenous communities in Labrador. Atlantic salmon are a migratory species, and while there are large knowledge gaps regarding the movements of specific populations of Atlantic salmon in offshore Labrador, it is generally accepted that they will move from their natal rivers and migrate into the open sea, including the Labrador Sea, and areas within the Labrador Shelf SEA Update Area. With Labrador, there are two distinct populations of Atlantic salmon. The Nunavik population of Atlantic salmon is located at the northern tip of Labrador and is within Designatable Unit 1 (Figure 9-49). The population boundary extends from the tip of Labrador west along Ungava Bay to the western extent of the species range and represents the most northerly known population of Atlantic salmon in North America (COSEWIC 2010). Currently, this population is considered data deficient by COSEWIC (2010).



Source: COSEWIC 2010

Figure 9-49 Designatable Units for Atlantic Salmon in Eastern Canada

The Labrador Population is located within Designatable Unit 2 and is presently considered not at Risk by COSWEIC and not listed as a SAR. This population extends from the northern tip of Labrador, down to the Naptipi river of Quebec (Figure 9-49).

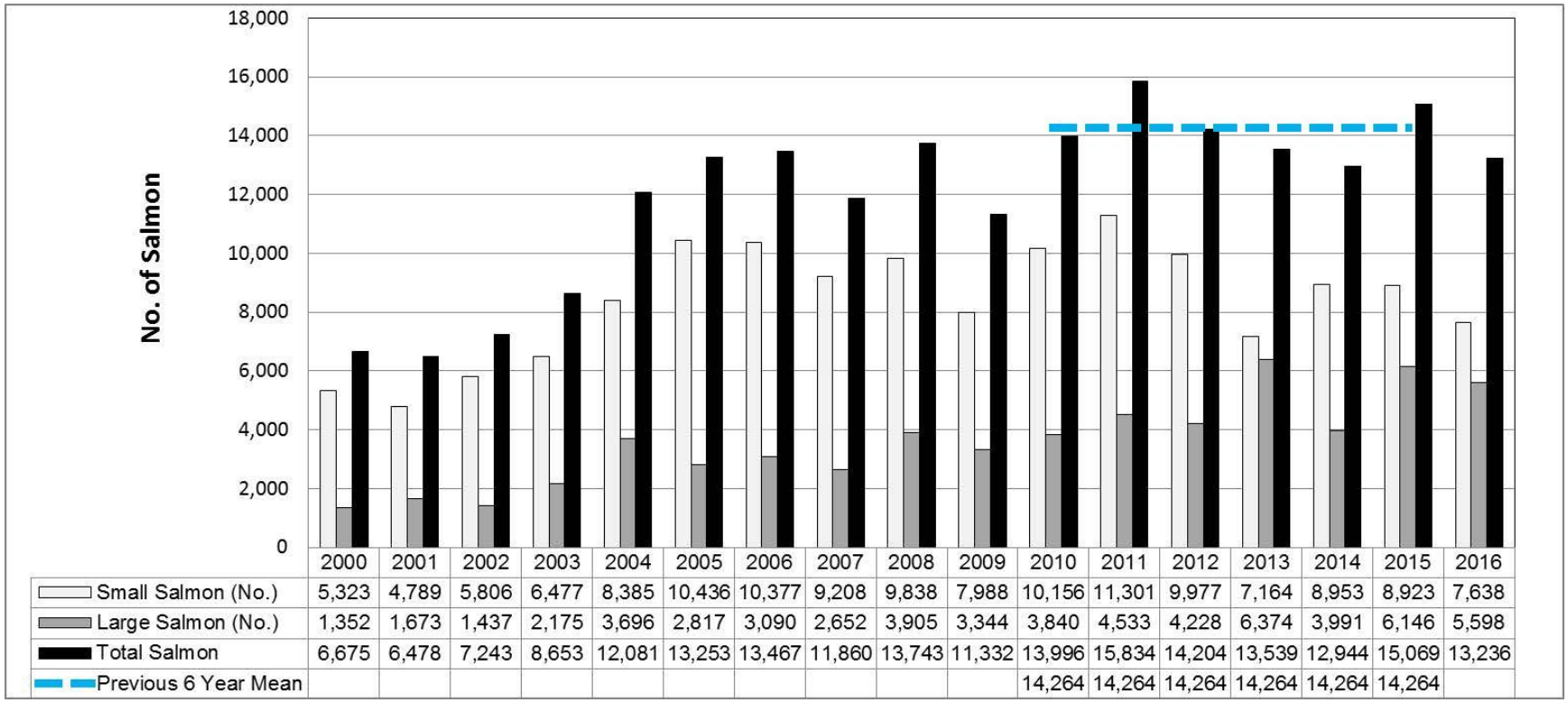
While there is no commercial fishery for this species, Atlantic salmon are harvested by Indigenous communities for food, social and ceremonial purposes, and are considered an important food source for Indigenous communities and culture. In a recent status update on Atlantic salmon stocks in NL, Labrador FSC and subsistence fisheries harvested approximately 12,783 salmon from Labrador rivers in 2019 (DFO 2020c). This is 9% less than the mean of 13,984 between 2011 and 2018. Data collected by Vienott et al. (2018) indicted that large salmon represented 42% of the catch by number (Figure 9-50) and 63% of the catch by weight (Figure 9-51).

9.5 FISHERIES RESEARCH

Marine research activities take place in the waters of Canada-NL Offshore Area. These research activities are primarily related to biophysical research being carried out by DFO, within the 200 nautical mile EEZ of Canada. DFO's Atlantic Zone Monitoring Program and the RAPID Climate Change Program study involve bottom trawl surveys to collect information on the marine environmental, including commercial fish species. This information is used to inform decisions on the management and monitoring of resources in the Canada-NL Offshore Area. In addition to informing stock assessments, data from RV surveys have been integral in the designation of EBSAs and SBAs, used in ecosystem-based research, and used by researchers around the world. Figure 9-52 illustrates the research vessel transects within the Labrador Shelf SEA Update Area from 2007 to 2018.

In addition to research undertaken solely by DFO, industry representatives also partner with DFO to undertake surveys. For example, FFAW-Unifor, in partnership with DFO, undertake an annual post-season snow crab survey to assist in understanding the health of the offshore stocks. This survey is conducted once the commercial fishery has ended for the season and involves setting fixed gear (crab pots) at various locations in the Canada-NL Offshore Area. Stations are sampled annually in multiple CMAs to collect data on snow crab, which are then incorporated into the scientific assessment of stocks and overall management of the species. Each year approximately 1,500 stations are sampled in selected CMAs. Some of these are considered core stations and are sampled each year, while other stations are selected early in the year. Figure 9-53 shows survey locations, within the Labrador Shelf SEA Update Area, for crab surveys in 2017. In Labrador, the Torngat Fisheries Secretariat also partners with DFO to conduct post-season trap surveys for snow crab; survey locations are also illustrated in Figure 9-53.

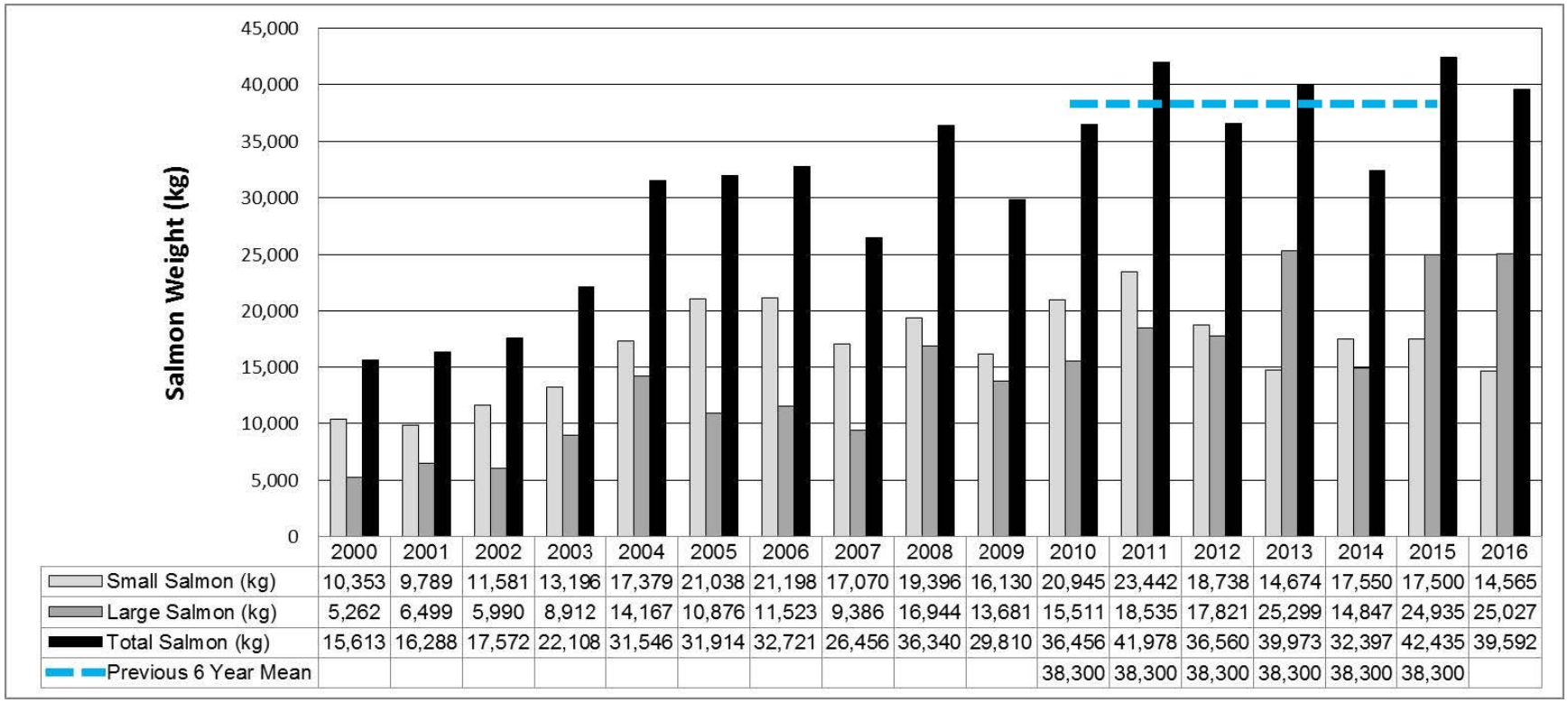
Other research organizations are also present in the Canada-NL Offshore Area, including within the Labrador Shelf SEA Update Area. The Canadian Association of Prawn Producers conducts surveys in northern Labrador for northern shrimp. These surveys are conducted in partnership with the Northern Shrimp Research Fund, a non-profit initiative that provides funding and a vessel to conduct these surveys.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Small Salmon (No.)	5,323	4,789	5,806	6,477	8,385	10,436	10,377	9,208	9,838	7,988	10,156	11,301	9,977	7,164	8,953	8,923	7,638
Large Salmon (No.)	1,352	1,673	1,437	2,175	3,696	2,817	3,090	2,652	3,905	3,344	3,840	4,533	4,228	6,374	3,991	6,146	5,598
Total Salmon	6,675	6,478	7,243	8,653	12,081	13,253	13,467	11,860	13,743	11,332	13,996	15,834	14,204	13,539	12,944	15,069	13,236
Previous 6 Year Mean											14,264	14,264	14,264	14,264	14,264	14,264	

Source: Veinott et al. (2018)

Figure 9-50 Harvest by Number of Atlantic Salmon from FSC and Subsistence Fisheries In Labrador for Salmon Fishing Areas 1 and 2



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Small Salmon (kg)	10,353	9,789	11,581	13,196	17,379	21,038	21,198	17,070	19,396	16,130	20,945	23,442	18,738	14,674	17,550	17,500	14,565
Large Salmon (kg)	5,262	6,499	5,990	8,912	14,167	10,876	11,523	9,386	16,944	13,681	15,511	18,535	17,821	25,299	14,847	24,935	25,027
Total Salmon (kg)	15,613	16,288	17,572	22,108	31,546	31,914	32,721	26,456	36,340	29,810	36,456	41,978	36,560	39,973	32,397	42,435	39,592
Previous 6 Year Mean											38,300	38,300	38,300	38,300	38,300	38,300	

Source: Veinott et al. (2018)

Figure 9-51 Harvest by Weight of Atlantic Salmon from FSC and Subsistence Fisheries In Labrador for Salmon Fishing Areas 1 and 2

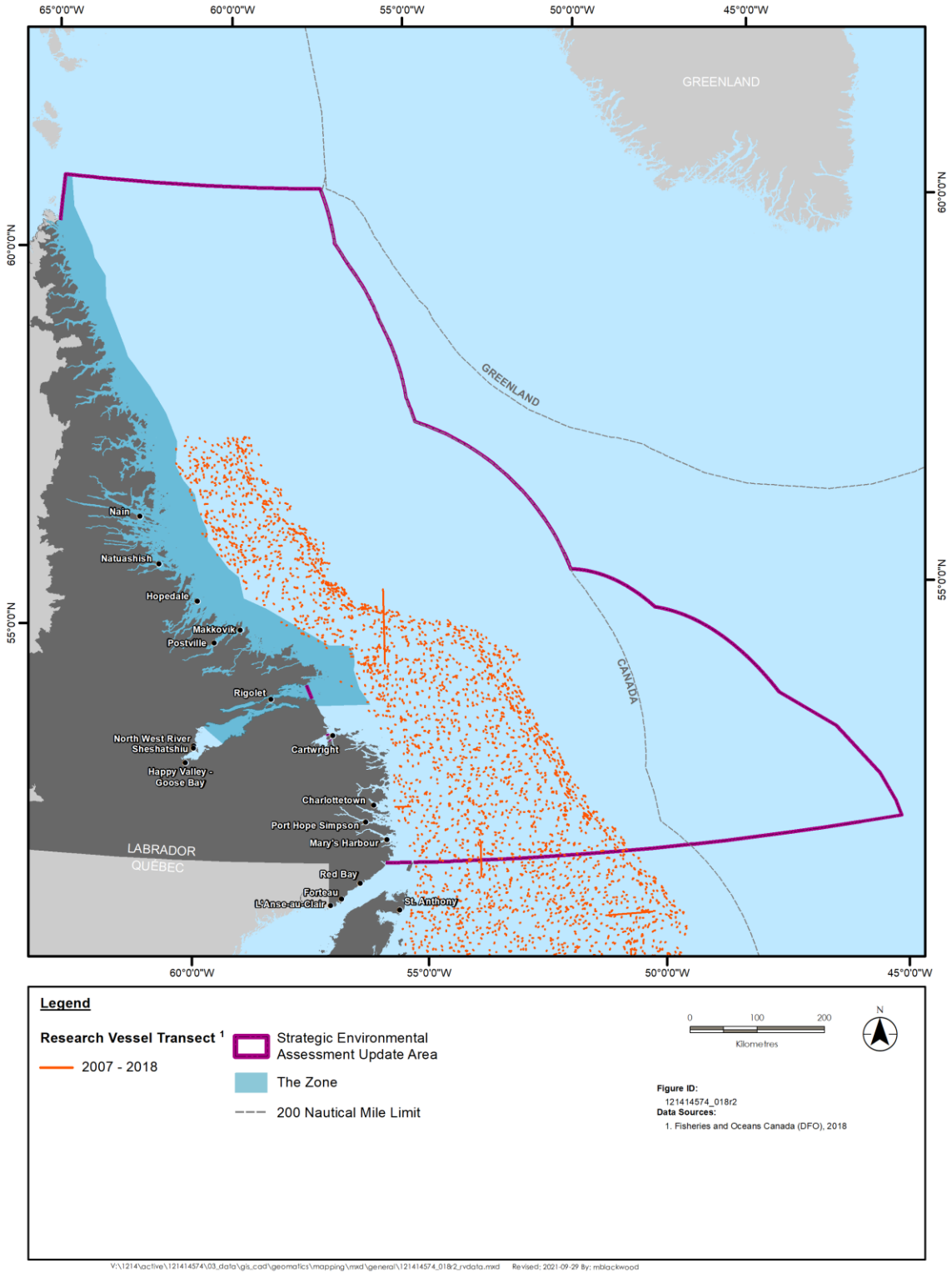


Figure 9-52 DFO Research Vessel Transects, 2007 to 2018

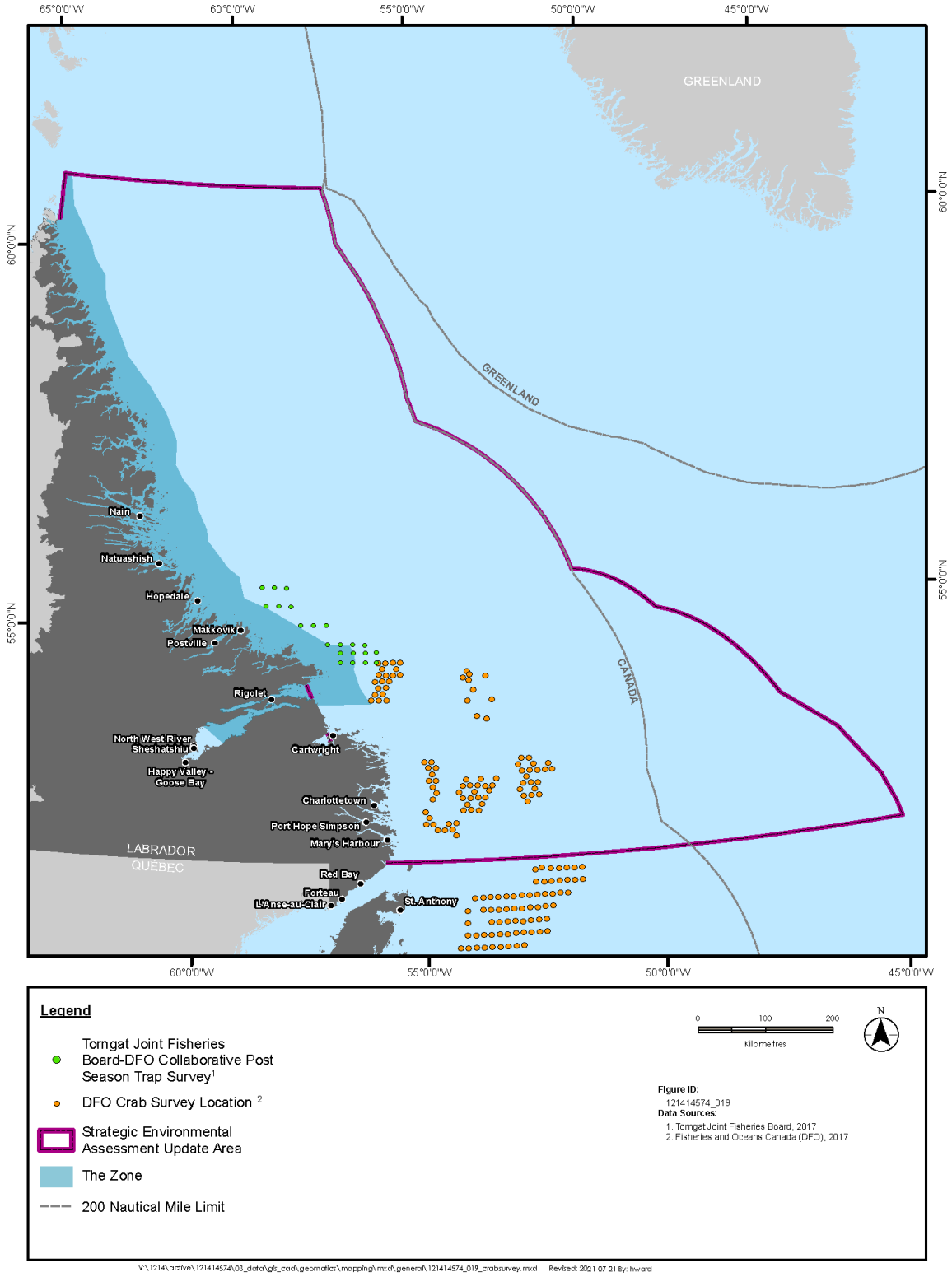


Figure 9-53 DFO and Fishing Industry Post Season Crab Survey Locations, 2017

The Atlantic Groundfish Council is a non-profit organization designed to represent the interests of offshore groundfish fishing enterprises in Atlantic Canada. This organization has conducted surveys along the offshore waters of NL in the past, including surveys within the Labrador Shelf SEA Update Area.

Winter seal sampling is conducted annually and in addition to ongoing aerial and acoustic cetacean surveys by DFO Science, there is opportunistic genetic sampling of cetaceans by hunters and Fisheries Officers in Labrador (DFO 2021d).

Multi-year research programs on the coast of Labrador (Integrated Studies in Coastal Labrador Ecosystems) and in deep ocean areas of the Labrador Sea (Integrated Studies and Ecosystem Characterization of the Labrador Deep Sea) are ongoing in partnership with the Nunatsiavut Government (DFO 2021d).

In addition to offshore marine research, coastal and nearshore research is also ongoing through DFO, the Nunatsiavut Government, and academic institutions to fill data gaps that have been identified through ongoing planning. Potential areas for coastal research include coastal ice, plankton communities, ecosystem connectivity, as well as remote coastal areas (Coté et al. 2019; DFO 2021e).

9.6 POTENTIAL EFFECTS

This section provides an identification and discussion of the potential interactions between commercial, recreational, and Indigenous fisheries and possible future offshore oil and gas activities in the Labrador Shelf SEA Update Area. This section also includes standard mitigation measures and a discussion of planning considerations related to possible future offshore oil and gas activities. The section concludes with an evaluation of the availability and adequacy of existing environmental baseline information and relevant data gaps and requirements.

Commercial, recreational and Indigenous fisheries are selected as a VC because of the anticipated interactions between possible future offshore oil and gas activities and a variety of human activities, and in recognition of the socioeconomic importance of inshore and offshore fishing activity and the key role it has played in shaping the people, communities and overall culture in NL.

During engagement conducted for the Labrador Shelf SEA Update, concerns were raised regarding potential effects on fish harvesting activities and associated target species within the Labrador Shelf SEA Update Area, which supports various commercial, recreational, and Indigenous fisheries. For example, the Nunatsiavut Government has noted several commercially and/or culturally important fish species that are harvested from the Labrador Shelf SEA Update Area (e.g., snow crab, Arctic char, and Atlantic salmon). Fish harvesters expressed concern that the timing of oil and gas activities may coincide with prime fishing season. Concerns were also raised regarding the effects of seismic activities on commercial fishing.

Indirect effects on fishing caused by injury, mortality, or behavioural changes of commercially fished species are discussed in the Fish and Fish Habitat VC, and although they apply indirectly to commercial, recreational, and Indigenous fisheries, they are not repeated here, but can be referred to in Section 5.7.

9.6.1 Potential Pathways

Potential interactions between commercial, recreational and Indigenous and potential oil and gas activities, including seismic and geophysical surveys, exploration and production drilling, and production activities, are related to the following identified pathways:

- Damage to fishing gear or vessels as a result of direct interactions with oil and gas related equipment, activities and/or environmental discharges;
- Loss of access to known fishing grounds and travel routes during offshore exploration or production activities, and possible resulting impacts on fishing success. For example, NunatuKavut Community Council and Nunatsiavut Government expressed concerns of potential effects of offshore oil and gas development on the shrimp, crab, and turbot fishery (as it is usually right in the heart of the crab areas) (SEM 2008; NunatuKavut Community Council 2019);
- Decrease in quality / value of fishing activities due a perceived change in taste and smell of commercially fished species during activities where discharges are present;
- Possible interference with governmental / industry fish survey activities, including direct disturbance and/or effects upon research results and associated management decisions; and
- Indirect effects on commercial, recreational, and Indigenous fishing activity, through biological effects on fish and fish habitat and marine mammals (Chapters 5 and 6) that may be of commercial, social, or cultural value. This includes injury or mortality due to exposure to seismic surveys, resulting in changes in resource availability (NunatuKavut Community Council 2019). Indirect effects on commercial, recreational, and Indigenous fishing activity may also occur as a result of the perceived or reduced quality of fish products (e.g., taint), which could affect profits.

9.6.2 Overview of Effects

Table 9.9 and the text that follows provides a summary of known environmental interactions and effects that have been documented through scientific literature, consultations with fish harvesters, and IK and other stakeholder engagement. This discussion is meant to update that provided in the original SEA Report (SEM 2008). Potential effects on fish and fish habitat and marine mammals (i.e., how oil and gas activities may affect the availability of resources) are outlined in Chapter 5 and 6, and project-specific EAs will carry out more detailed effects assessments to characterize potential effects, and the associated significance of indirect effects on resource availability, based on project-specific information.

Table 9.9 Summary of Potential Environmental Effects from Routine Activities on Commercial, Recreational and Indigenous Fisheries

Components / Activities	Potential Environmental Interactions			
	Possible Gear / Equipment Damage	Loss of Access to Fishing Areas	Decreased Quality / Value of Fishing Activities	Interference with Fisheries Research Surveys
Geophysical Surveys				
Sound source arrays		•		•
Support vessel movement	•	•		•
Exploration and Production Drilling				
Presence and operation of the MODU	•	•		•
Movement of support vessels and aircraft	•	•		•
Routine discharges, including drill cuttings	•		•	
Well flow testing and flaring	N/A	N/A	N/A	N/A
Well abandonment	•	•		•
Atmospheric emissions	N/A	N/A	N/A	N/A
Oil and Gas Production				
Routine discharges	•		•	
Support vessel and tanker traffic	•	•		•

Timing of possible oil and gas activity and fishing seasons for fish species that are commercially or recreationally harvested coincide with one another, which may lead to potential interactions between the two sectors. During geophysical surveys, exploration and production drilling, and production activities, there is the possibility of direction interactions of seismic vessels, drilling rigs, production platforms or equipment and vessels supporting oil and gas exploration or production with fishing gear and/or fishing vessels or fisheries research surveys. The direct interaction may cause damage to fishing or fisheries research gear or fishing vessels, resulting in possible lost time / wages due to the inability to fish while repairs take place, and also associated costs with repairing the damage. For fisheries research surveys, the quality of research may also be affected. Damage to gear may also occur during well abandonment. After a well is abandoned, it is most often plugged and capped, which can be done either below the seafloor or suspended. If suspended, there is the potential for damages to bottom type mobile fishing gear as they may become snagged on the wellhead, causing damage to the gear.

Routine discharges into the marine environment during exploration and production drilling and oil and gas production can also cause fouling to fishing gear, rendering them inoperable while they are cleaned or replaced. Most at risk to fouling are fixed gear type, such as crab pots, as they are not able to be moved or retrieved instantaneously in the event of a discharge, before fouling can take place. Although there is the potential that commercially fished species may come in direct contact with discharges, thereby affecting the quality / value of the catch, results from ongoing Environmental Effects Monitoring

of the Grand Banks indicate no taint from project activities in common commercially fish species (American plaice, scallop, or crab) (AMEC Foster Wheeler 2019; Husky Energy 2019; Suncor Energy 2019).

Safety zones are required to be established around exploration drilling and production activities, namely during drill rig and or MODU operation, or during similar periods of disruption during active seismic survey work. Along with safety zones, the *Canada Shipping Act 2001* indicates that other vessels may have to give the right of way to offshore geophysical survey vessels. Safety zones are often small in size with current safety zones in the Eastern Newfoundland Oilfield on the Grand Banks being no larger than a 500 m buffer surrounding the Hibernia platform, offloading system, and flowlines and Terra Nova and White Rose excavated drill centres. Within the safety zone, other vessel activity, including fishing vessels and research vessels, is restricted. This means that loss of access or alternate routing to fishing grounds can occur depending on the timing and magnitude of the activity taking place.

9.6.3 Mitigation Measures for Commercial, Recreational, and indigenous Fisheries

Table 9.10 provides an overview of standard mitigation measures that are often required and/or otherwise implemented during offshore oil and gas activities to help avoid or reduce adverse environmental and socioeconomic effects on commercial, recreational and Indigenous fisheries, including the impact on Indigenous rights. These mitigation measures build on those highlighted in the original SEA Report. Enhanced mitigation measures are also considered in this section, following the table. Mitigation measure associated with indirect effects on Fish and Fish Habitat are also applicable and can also be reviewed in Section 5.7.3.

Table 9.10 Summary of Standard Environmental Mitigation Measures for Commercial, Recreational, and Indigenous Fishing

Mitigation	Applicability		
	Geophysical Surveys	Exploration and Production Drilling	Oil and Gas Production
Conduct ongoing information gathering and analysis regarding fishing areas and times and continued monitoring of fishing activity.	•	•	•
Plan oil and gas activities to avoid key commercial, recreational, and Indigenous fishing areas / times where technically and economically feasible[1].	•	•	•
Adjust the timing, speed, and routing of marine traffic to reduce disturbance to commercial, recreational, and Indigenous fishing areas to the extent that is technically and economically feasible[1].	•	•	•
Provide the necessary information to the appropriate agencies and parties for the timely issuance of Notices to Fish Harvesters, Notices to Mariners (NOTMAR), Navigational Warnings (NAVWARN), and/or other notifications and direct industry communications, as applicable.	•	•	•

Table 9.10 Summary of Standard Environmental Mitigation Measures for Commercial, Recreational, and Indigenous Fishing

Mitigation	Applicability		
	Geophysical Surveys	Exploration and Production Drilling	Oil and Gas Production
Establish and communicate safety / no-go zones around survey vessels, drill rigs, and any required anchoring, in accordance with relevant regulations.	•	•	•
Provide details of safety / no-go zones to the Marine Communication and Traffic Services for broadcasting and publishing in the NOTMAR and NAVWARN.	•	•	•
To maintain navigational safety, keep obstruction lights, navigation lights and foghorns in working condition on board the MODU and support vessels. Establish and maintain radio communication systems in working order for contacting other marine vessels as necessary.	•	•	•
Establish, communicate, and implement a Fishing Gear Damage or Loss Compensation Program as per applicable C-NLOPB guidelines.	•	•	•
Establish a single point of contact and communication regarding the locations of wellheads left in place.		•	•
Use a sequential approach to drilling multiple wells in an area.		•	
Employ Fisheries Liaison Officers (FLOs).	•	•	•
Actively and continuously communicate and coordinate with other marine users and key agencies and organizations (e.g., fisheries organizations), To facilitate coordinated communication with fishers, a Fisheries Communication Plan, developed in liaison with Indigenous groups and commercial fishers, should include: procedures for informing commercial fishers and Indigenous groups of planned activities with several weeks' notice prior to starting a well; information regarding the location of safety zones, anticipated vessel schedules and routes, and the locations of suspended or abandoned wells; determination of FLO and guide vessel needs; and notification procedures for an accidental event (including associated health risks), as well as appropriate response procedures.	•	•	•
Develop and implement a well and wellhead abandonment plan for submission to the C-NLOPB for acceptance at least 30 days prior to abandonment of each well. If wellhead abandonment may interfere with fisheries, develop the Plan in consideration of the views of potentially affected commercial fishers and Indigenous groups, as identified by DFO.		•	•
Provide information on the locations of any wellheads left in place to fish harvesters and other marine users, and to appropriate authorities for inclusion on nautical charts and communications such as Notices to Shipping.		•	•

Note:
[1] Technical and economic feasibility are determined by the operator and reviewed by the C-NLOPB in consultation with expert departments, where and as applicable (e.g., DFO, ECCC, Transport Canada).

Additional mitigation measures are sometimes required for specific projects, depending on the location, timing, environmental and socioeconomic settings, and possible interactions and effects. Mitigation measures are largely determined on a project-specific basis, through individual regulatory review of proposed oil and gas activities in the Labrador Shelf Offshore Area. Most often, fisheries communications plans are established by the operator and fishing industry / Indigenous groups to facilitate coordinated communication with fishers.

One of the key aspects of reducing potential interactions between commercial, recreational, and Indigenous fisheries and possible future offshore oil and gas activities in the Labrador Shelf SEA Update Area is using established communication protocols. Communications are conducted through the media, direct industry-to-industry contacts, and the issuance of Notices to Fish Harvesters, NAVWARNs, and NOTMARs, and would include such information as location and timing of vessel activity, location of safety / fisheries closure areas, and location of suspended wellheads. In instances where potential interactions directly impact treaty rights, communication and consultations will occur directly with Indigenous groups.

Compensation guidelines applicable for offshore oil and gas activities in the Canada-NL Offshore Area include the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2019) and the Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity (C-NLOPB and CNSOPB 2017).

The use of FLOs and Fisheries Guide Vessels are assessed using the *Risk Management Matrix Guidelines for the Utilization of Fisheries Liaison Officers and Fisheries Guide Vessels for the Fishing and Petroleum Industries of Newfoundland and Labrador* (One Ocean n.d.).

In addition to the standard mitigation measures identified in Table 9.10, the Committee responsible for the recently completed Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (Bangay et al. 2020) recommended that several refinements and additions to the standard mitigation measures become general requirements for all future exploratory drilling projects in the Regional Assessment Study Area. The Labrador Shelf SEA Update Area is outside of the area assessed by the Regional Assessment, but it is possible that mitigations identified in the report could be recommended for future exploratory drilling in the Labrador Shelf SEA Update Area. The following proposed requirements were recommended by the Regional Assessment Committee (Bangay et al. 2020):

- As indicated in Table 9.10, currently there is a requirement for operators to develop Fisheries Communication Plans in liaison with Indigenous groups and commercial fishers. The Committee recommended that operators be required to prepare and submit their Fisheries Communication Plan at the time of, and as part of, their application for an OA from the C- NLOPB, for timely development and implementation. The Committee also recommended that the communication measures outlined in that Plan should be implemented throughout the OA review and approval process, as well as during the planning and conduct of the proposed project in question.

- As indicated in Table 9.10, currently there is a requirement for the Fisheries Communication Plan to include procedures for informing commercial fishers and Indigenous groups of planned drilling activities. The Committee recommended that operators commence the notification process at least two months prior to starting a well (as opposed to the two weeks' notice that has previously been specified), and provide subsequent updates and information as these become available. The Committee also recommended that operators should be required to demonstrate how they will provide more timely notifications to these parties regarding planned rig movements.

The Committee's recommendations summarized above are not currently standard practice and may therefore be considered enhanced mitigation measures in the context of present-day oil and gas activities in the Canada-NL Offshore Area (and the Labrador Shelf SEA Update Area therein). However, these currently non-standard measures may have potential to become standard practices and/or mandatory requirements in the future through industry leadership and/or through incorporation into relevant guidelines, policies, regulations, and/or conditions of regulatory approval.

9.6.4 Environmental Planning Considerations for Commercial, Recreational and indigenous Fisheries

Operators will be required to use spatial and temporal planning considerations to avoid key traditional harvesting areas and recreation activities. Operators may also have to consider special mitigation measures or practices to avoid certain times of the year when traditional harvesting activities are occurring for a particular species.

9.7 DATA GAPS

There are a number of data gaps and/or constraints related to commercial, recreational, and Indigenous fisheries in the Labrador Shelf SEA Update Area. Due to privacy-related limitations, large amounts of DFO data from their commercial fisheries datasets cannot be released, which inserts a level of uncertainty regarding other smaller fisheries that may occur within the Labrador Shelf SEA Update Area. While larger fisheries that have multiple harvesters and landings may be well represented in the datasets, there is uncertainty surrounding the specifics for smaller fisheries and their associated weight and value. The discussion on commercial fishing in this section should be conducted with the knowledge that not all fisheries were able to be discussed in more detail due to the lack of publicly available landings information from DFO at the time of writing.

A lack of research documents, including stock assessments for some species in the Labrador Shelf SEA Update Area, is another data gap. For example, there has been little information publicly available on Arctic char fishing in the Labrador Shelf SEA Update Area since the original SEA Report, which has posed a challenge. Information on other species highlighted in the original SEA Report, such as scallop, witch flounder, Atlantic cod, and halibut also have lower levels of information pertaining to stock statuses for offshore Labrador. This is noted as an opportunity for research to provide more information on the health of these species in the Labrador Shelf SEA Update Area.

There is limited information on emerging or potential fisheries within the Labrador Shelf SEA Update Area, as well as those underused fisheries in the area. This is due to a lack of available data from both DFO and the province of NL. More research and innovation into the potential for new fisheries would provide more clarity on what potential oil and gas operators can expect to see in the Labrador Shelf SEA Update Area in the future.

While there are data gaps / constraints, their relation to offshore oil and gas is dependent on the nature and timing of the activity. Project-specific EAs should confirm that data constraints are still relevant and have not been addressed or if new data constraints have been identified.

9.8 REFERENCES

9.8.1 Personal Communication

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