ANNEX F: Gulf Region Commercial Fisheries Maps

The DFO Gulf Region's Marine Planning and Conservation GIS group has prepared a series of commercial fisheries maps in response to the IAAC request for advice. These will also be used for the DFO SeaFOAM mapping project. Various models were developed and applied to map the distribution of the georeferenced and non-georeferenced logbook landings data for the purpose of this exercise.

Data Source:

- Fisheries Logbook landings data for the 2012-2021 period (DFO Gulf Statistics).

Targeted species:

- Atlantic halibut, American plaice, Greysole (Witch), Winter flounder, Atlantic herring, Mackerel, Bluefin tuna, Sea scallop, Lobster, Atlantic rock crab and Snow (Queen) crab.

Species selection criteria:

- Important economic value for the fishing industry;
- High georeferenced logbook data (>70%);
- Mapping feasibility (available data).

Parameters and gaps:

- These include the original fishing area, fishing area extracted from point location, fishing area extracted from fishing license and fishing area extracted from landing port location.
- Data gaps in the fishing area field were filled using complementary port and year by year license information.
- Fishing areas were used instead of NAFO zones as it was deemed a better indicator of the fishing location as less errors were found, and because it is the actual area used by license holders.
- All the non-commercial and scientific (ex: Sentinel surveys) licenses were removed from the dataset
- Non-georeferenced species like lobster, Atlantic herring and mackerel require special attention as they need more model development resources. Since logbook data cannot help identify areas where there's fish landings, other sources of information are needed to come up with proxy maps. These can be information on fishers' behavior like the distance they fish from their landing port or the depth they find their sought species. Spatial distribution or potential habitat is also very important sources of information. Human and habitat data like Traditional Ecological Knowledge (TEK) or Traditional Fisheries Knowledge (TFK) can be incorporated in models to map fish landings.

Methodology:

Models were created in ArcGIS (ESRI) to map fisheries in the study area. The methods are based on the percentage of georeferenced data per fishing area. Method 1 (**M1**) is for species with more than 70% of georeferenced data, Method 3 (**M3**) is for species with less than 70% of georeferenced data and Method 4 (**M4**) is for species with 0% georeferenced data (proxy). Georeferenced percentage was obtained by calculating the ratio of georeferenced and non-georeferenced data for the underlying fishing areas of the study area. Table A shows the georeferenced percentage, fishing areas under study, and method used per species for the mapping project.

*A geodatabase is available to load this data into geomatics software or into the MSP Planning atlas.

Table A. Georeferenced percentage of Gulf logbook data by species and fishing areas in Gulf Nova Scotia (2012-2021)

Species	Code	Fishing area (landings in tons)	Georeferenced data	Method
Atlantic halibut	130	4T1 (30), 4T7 (3), 4T8 (64), 4T9A (41), 4T9B (96)	83.6%	M1
American plaice	140	4T8 (41), 4T9B (4)	93.7%	M1
Greysole	142	4T9A (6), 4T9B (693)	98.5%	M1
Winter flounder	143	4T1 (3), 4T7 (4), 4T8 (28)	65.9%	M1
Atlantic herring	200	16E (30,016), 16F (43,104), 16G (12,337)	0.0%	M4 (proxy)
Mackerel	250	16 (17,879)	0.0%	M4 (proxy)
Bluefin tuna	254	4RST (1,457)	73.0%	M1
Sea scallop	612	22 (371), 23 (8), 24 (176)	31.1%	M3
Lobster	700	25, 26A, 26B	0.0%	M4 (proxy)
Atlantic rock crab	704	25 (7,939), 26A (9,526), 26B (7)	63.0%	M3
Snow crab	705	12 (79,230), 12E (853), 12F (1,262), 18 (3,643), 19 (12,789)	88.2%	M1

Greysole Landings 2012-2021 Gulf Region

Landing ports
SeaFOAM study area (Gulf Region)
Fishing area
Bathymetry (depth)

Landings (kg)
- 486 - 3,019
- 3,020 - 6,134
- 6,135 - 12,897
- 12,898 - 31,874
- 31,875 - 65,784

4T2a
4T5
4T9a
4T9b
4T1
4T7
Summerside
Charlottetown
4T8
New Glasgow
BAY ST. LAWRENCE
Cabot Strait

-500 m
-300 m
-200 m
-100 m
-50 m
-30 m
-10 m

Legend: quantile classification
Resolution: 10 km² hexagonal grids
Methods: landings estimated using method 1 (>70% georeferenced logbook data) developed by Quebec Region
Coordinate system: WGS 1984 Web Mercator
Date: 2023-10-03
Author: AE GIS Unit (Gulf Region)

0   25   50   100 km

Fisheries and Oceans Canada   Pêches et Océans Canada

Winter Flounder Landings 2012-2021 Gulf Region

Landing ports
SeaFOAM study area (Gulf Region)
Fishing area
Bathymetry (depth)

Landings (kg)
- 58 - 187
- 187 - 238
- 239 - 252
- 253 - 580
- 581 - 769

4T3b
4T2a
4T9a
4T9b
4T1
4T8
Charlottetown
North Lake
ARISAIG
New Glasgow
Truro
Sydney
Cabot Strait

-300 m
-200 m
-100 m
-50 m
-30 m
-10 m

Legend: quantile classification
Resolution: 10 km² hexagonal grids
Methods: landings estimated using method 1 (>70% georeferenced logbook data) developed by Quebec Region
Coordinate system: WGS 1984 Web Mercator
Date: 2023-10-03
Author: AE GIS Unit (Gulf Region)

0   25   50   100 km

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Atlantic Herring Landings 2012-2021 Gulf Region

Bluefin Tuna Landings 2012-2021 Gulf Region

Sea Scallop Landings 2012-2021 Gulf Region

Lobster Landings 2012-2021 Gulf Region

**Atlantic Rock Crab Landings
2012-2021
Gulf Region**

Landing ports
SeaFOAM study area (Gulf Region)
Fishing area
Bathymetry (depth)

Landings (kg)

144 - 2,112
2,113 - 5,738
5,739 - 9,640
9,641 - 20,090
20,091 - 110,529

Summerside

CAPE TORMENTINE
VICTORIA
NINE MILE CREEK
MACHON POINT
WOOD ISLAND
PUGWASH
WALLACE
SKINNER'S COVE
TONEY RIVER
CARIBOU FERRY WHARF
New Glasgow

24
25
26A
26B
27

Cabot Strait

Legend: quantile classification
Resolution: 10 km² hexagonal grids
Methods: landings estimated using method 3 (>0% - 70% georeferenced logbook data) developed by Quebec Region
Coordinate system: WGS 1984 Web Mercator
Date: 2023-09-26
Author: AE GIS Unit (Gulf Region)

Fisheries and Oceans Canada   Pêches et Océans Canada

0   25   50   100 km

**Snow Crab Landings
2012-2021
Gulf Region**

Landing ports
SeaFOAM study area (Gulf Region)
Fishing area
Bathymetry (depth)

Landings (kg)

103 - 4,296
4,297 - 13,056
13,057 - 34,083
34,084 - 71,997
71,998 - 472,747

Summerside
Charlottetown
New Glasgow

12
12F
BufferF
19
Buffer18
18
25

Cabot Strait

Legend: quantile classification
Resolution: 10 km² hexagonal grids
Methods: landings estimated using method 1 (>70% georeferenced logbook data) developed by Quebec Region
Coordinate system: WGS 1984 Web Mercator
Date: 2023-09-26
Author: AE GIS Unit (Gulf Region)

Fisheries and Oceans Canada   Pêches et Océans Canada

0   25   50   100 km