MARINE MAMMAL AND PELAGIC ANIMALS SIGHTINGS (WHALESIGHTINGS) DATABASE: A USERS GUIDE

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by

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ABSTRACT

MacDonald, D., Emery, P., Themelis, D., Smedbol, R.K., Harris, L.E., and McCurdy, Q. 2017. Marine mammal and pelagic animal sightings (Whalesightings) database: a users guide. Can. Tech. Rep. Fish. Aquat. Sci. 3244: v + 44 p.

The Marine Mammal and Pelagic Animals or Whale Sighting Database (WSDB) was implemented in 2002 by the Department of Fisheries and Oceans (DFO) to provide a central repository for opportunistic sightings of marine animals and to improve accessibility to data from surveys and research activities conducted in the Bay of Fundy and on the Scotian Shelf. The WSDB consists of three production tables and 21 code tables. Tables for media storage have been developed but are not implemented. The database contains more than 64,000 sightings of whales, porpoises, dolphins and large pelagic animals, mainly through opportunistic sightings by whale watching companies and observers during research activities spanning 1963-2016. These data provide a potential resource for information on the species observed, their location and seasonable distribution, and their behaviour and life history on the Scotian Shelf and Bay of Fundy.

RÉSUMÉ

MacDonald, D., Emery, P., Themelis, D., Smedbol, R.K., Harris, L.E., and McCurdy, Q. 2017. Guide de l'utilisateur de la base de données des observations de mammifères marins et d'animaux pélagiques (observations de baleines). Rapp. tech. can. sci. halieut. aquat. 3244: v + 44 p.

La base de données des observations de mammifères marins et d'animaux pélagiques ou la base de données des observations de baleines (WSDB) a été mise en œuvre en 2002 par Pêches et Océans Canada (MPO) afin de servir de répertoire central pour les observations fortuites de mammifères marins et pour améliorer l'accessibilité des données tirées des relevés et des activités de recherche réalisés dans la baie de Fundy et sur la plate-forme Néo-Écossaise. La WSDB est constituée de trois tableaux de production et de 21 tableaux de codes. Les tableaux pour le stockage multimédia ont été élaborés, mais n'ont pas été mis en œuvre. La base de données contient plus de 64 000 observations de baleines, de marsouins, de dauphins et de grands animaux pélagiques, la plupart des observations fortuites par des entreprises d'observation des baleines et des observateurs lors d'activités de recherche réalisées pendant la période s'échelonnant de 1963 à 2016. Ces données constituent une source potentielle de renseignements sur les espèces observées, leur emplacement et leur répartition saisonnière, leur comportement et leur cycle biologique dans la baie de Fundy et sur la plate-forme Néo-Écossaise.

INTRODUCTION

The Marine Mammal and Pelagic Animals or Whale Sighting Database (WSDB) was developed and implemented in 2002 by the Maritimes Region of the Department of Fisheries and Oceans (DFO). Its objectives were to provide a central repository for opportunistic sightings of marine animals that might otherwise be lost and to improve accessibility to data from surveys and research activities conducted in the Bay of Fundy and on the Scotian Shelf (Maritimes region). Cetacean surveys in the Maritimes region are rare, so opportunistic sightings by whale watching companies, fishermen and mariners, are used to increase data on the occurrence and distribution of large marine animals. The design of the database is consistent with other DFO databases and with the Right Whale Consortium Whale Sightings Database (Kenney 2011) housed at the University of Rhode Island (URI). Departures from the URI standard (mainly species and gear codes) are easily translated by users of either database.

Sightings have been collected from a range of sources that includes historical data reports, at-sea fisheries observers, and whale watch companies, spanning the years 1963 to 2016. Information on human and fishing gear interactions has been added when reported to the database manager by at-sea fishery observers and marine mammal rescue organizations. More recently, poster campaigns have encouraged the general public to report sightings directly by publicising a toll-free phone line (1-1-866-567-6277,) email (XMAR, whalesightings@dfo-mpo.gc.ca) and web applications, for example, Whale Alert (http://www.whalealert.org/).

This report provides an overview of the structure of the WSDB including its data tables and fields. The current holdings of the database are summarized as the numbers of species and records, data sources and years of contribution, and geographic distribution of the more commonly occurring species and taxonomic groups. Most sightings occurred in the Scotian Shelf and Bay of Fundy regions, but some records are included from areas along the Eastern Seaboard of the United States, and the Pacific and Arctic Ocean regions bordering Canada.

DATA COLLECTION, ENTRY AND SHARING

Data sources provided sightings to the WSDB in a variety of formats. The most common are scanned copies of field data sheets (e.g., at-sea fishery observers, DFO incident reports, naval and military reports), original copies of field data sheets, in database reports from other groups (e.g.; DFO Conservation and Protection aerial surveillance records), spreadsheets (e.g. whale watch groups, NGO research, DFO research), and in summaries of activities by scientific license and allowable harm permit holders. Data collection has been standardized since 2013 by providing data formats and marine animal identification sheets to regularly contributing data collectors (Canadian Coast

Guard, commercial fishing associations, whale watching companies). Prior to 2012, most data were entered manually via a form used in Microsoft Access that linked to the database. A faster and less error prone method for data entry implemented recently has been to format and standardize data on spreadsheets followed by batch uploads to the database using SQL scripts. A Microsoft access form is still available for uploading a few sightings.

DATABASE STRUCTURE

The database consists of three production (data) tables and twenty-one code tables (Figure 1; Appendix 1). Data are entered sequentially into the data tables beginning with WSHEADERS. This table captures information about the environmental conditions and circumstances generating a sighting event, i.e. geographical, meteorological information, the observer identity and the type of viewing platform. The second table, WSEVENTS, records more specific information about the event, such as the identity and quantity of the species sighted. A sighting will have one associated WSHEADERS table, but may have multiple WSEVENTS tables. All required fields in the WSHEADERS and WSEVENTS tables must be correctly populated in order to generate a record in the database. However, a sighting can be recorded with as little information as the date and location of the sighting and the animal observed. The third table, WSDETAILS, captures finer detail and is required only if there is behavioural or status information about the animals sighted.

WSHEADERS DATA TABLE

Data entered into the WSHEADERS table include: the sighting date, time, vessel name, data source, trip type (purpose of the trip), coordinates of the sighting, and meteorological information including Beaufort Sea state, visibility, and cloud cover (Table 1). Most fields use codes that are contained in linked code tables (Appendix 3). In 2014, latitude and longitude field formats were converted from degrees decimal minutes to decimal degrees, and all earlier entries have been updated. In December 2016, three new fields were added: data type to differentiate opportunistic from effort based sightings; batch_id to identify the name of the original data file (electronically stored), and date_entered to record the date of entry into the database (auto populated). In November 2017, three new fields were added datacenter_cd to differentiate which data center the data is originating from; region_cd which identifies the DFO region that manages the original data; and restriction_cd to determine the level of access for the data (internal or public).

WSEVENTS DATA TABLE

The WSEVENTS table records information specific to the species sighted (Table 2). A WSEVENTS table is completed for each species or gear type linked by a WS_ID to one

WSHEADERS table. For example, if the observer sees minke whales and harbour porpoise in the same visual area and at the same time, two separate WSEVENTS tables are populated, one each for the minke whales and harbour porpoise, both linked to one WS_ID. Data stored in this table includes the event code, gear code, name of species and number of individuals observed, the reliability of the species identification and the confidence of the observer in the number of animals estimated observed. Most fields use codes that are contained in linked code tables (Appendix 2). This table can also capture information about whether the animal is entangled in gear (GEARIMPACT_CD) when associated with a gear code.

WSDETAILS DATA TABLE

The WSDETAILS table captures detailed information about individual animals sighted. Most fields use codes that can be found in code tables (Appendix 3). Data fields include: WHALEID that identifies individual whales by catalogues names or numbers, the condition of the animal (dead or alive), the animal maturity (MATURITY_CD), any distinguishing marks or features (FEATURE_TYPE_CD), and behaviours displayed by the animal (BEHAVIOUR_CD). This table also captures whether photos were taken of the animal and can store reference numbers for photos.

MEDIA DATA TABLES

Three media tables were added to the database in 2011 to allow the user to upload information pertaining to digital media such as photos, video, and acoustic recordings along with their sightings data (Appendix 2). These tables have not been utilized at the time of this report.

VALIDITY CHECKS

The three database tables contain primary and foreign key constraints and numerous validity and range checks apply to most table fields. There are built in constraints for each data field to prevent or minimize errors during data entry. Many of these constraints are foreign keys for code validation (the entry must use the codes found in the reference table linked by the foreign key). Some fields do not allow null values, while others limit the data entered to within a range of values. For example, latitude must be entered as values between 11 and 80 degrees. Incorrectly entered or incomplete data fields generate error messages, both when entering data through the Microsoft Access data form or batch uploading. Entries generating error messages are not recorded in the database.

ROUTINE MAINTENANCE AND BACK-UP

Data tables residing in Oracle are routinely backed up by DFO Informatics Branch. Electronic data (including data waiting for upload and uploaded data) are archived by

the database manager on an offline desktop computer. The archive is organized in folders by data source. All raw data sheets are archived by the data manager.

Plotting new sighting records by data source semi-annually is recommended to determine latitude and longitude errors. Errors can be fixed by running through a filter or GIS software. The current validity checks catch most of these kinds of errors.

DATABASE CONTENTS

There were more than 65,000 sightings in the database as of January 2017. These sightings were collected from 31 sources spanning the years 1963- 2016, with whale watch groups contributing 45% (about 29,000 records) of all entries (Table 4). Non-governmental organizations and the National Oceanic and Atmospheric Administration have each contributed more than 9,000 records for a total of 30% of the total records. The earliest entries, dating from the 1960s, were extracted from reports on commercial whaling operations at the Blandford Whaling Station (Sutcliffe and Brodie 1977) and ICNAF reports.

The species or taxa was identified in more than three-quarters of the records (n=51,040) with a total of 68 taxa recorded (Table 5). Whales were the most commonly occurring kinds of animals reported (51% of positive records), with humpback (19%) and fin whales (10%) the most commonly reported species. Other kinds of animal sightings archived in the database are porpoises (14%, mainly Harbour porpoise), dolphins (7%), pinnipeds (3%), and large pelagic fishes (1%). There are relatively few records of marine turtles, seabirds and polar bears.

No species was identified (SPECIES_CD=0) in about one quarter of all records (~14,000). This code is most often used for effort based surveys in which the observer records both null and positive sightings during time based intervals along transect lines. A null species code is also used when the observer is recording the presence of fishing gear rather than observing an animal. There are only 15 instances in which it is obvious that SPECIES_CD=0 was used to indicate that an animal, or an indication of a possible animal sighting, was observed (e.g., blow, splashing) but the type of animal was unknown.

Sightings archived in the database range geographically from 11.911°N to 76.341°N and 11.107°W to 173.644°W), with the majority of observations occurring in Atlantic Canada from the Bay of Fundy in the west to the Flemish Cap in the east and north to Labrador (for example, Figure 2).

Maps of the most commonly reported species (or taxonomic groupings of species) recorded in the WSDB are shown in Figures 2-14. These maps are intended to show the geographical breadth of Atlantic Canada from which marine mammals have been reported. Distribution of any species is heavily influenced by the location of the reporting

sources. For example, most large whale sightings occur in the waters around Grand Manan, Digby and Halifax due to the proximity of whale watching companies, the prime data sources for sightings reported to the WSDB.

DATA CONSIDERATIONS AND USE

Not everything that can be counted counts and not everything that counts can be counted.

- Albert Einstein

While the WSDB contains tens of thousands of data entries, not all of these can be used for the same types of data analyses. Abundance and distribution estimates of cetacean populations are usually derived from systematic line-transect surveys where effort is measured (Rechsteiner et al. 2013). The WSDB does contain some data collected during effort based surveys but it sometimes lacks the metadata and survey methodology needed to analyse the data for abundance and distribution estimates. These data may be obtained with permission by contacting the contributing researchers.

The absence of an animal in the database at particular places and times should not be used to infer that the species does not frequent those areas; it may be that no one was there to "count" them when they did occur. Opportunistic sightings rely on the observer being at the right place and time to see an animal. The frequency of observations is often seasonal and declines during periods with less potential observers on the water. This type of sighting also relies on the observer providing data to the database. In addition, the multitude of observers contributing opportunistic sightings results in data being gathered and recorded in different ways; there is no standard sampling protocol or field data recording procedure for the data in the WSBD. As a result, the data are prone to sampling bias, including variation in the detectability of species, reliability of species identification, observer expertise and spatial and temporal heterogeneity in the overlap between species and observer.

Although there are challenges in the analytical use of opportunistic sighting data, these data are valuable and useful in considering ocean development, establishing marine protected areas, and in scientific research including cetacean and ocean ecosystems research, species at risk assessments, and habitat use. Opportunistic sightings tell us about the presence of species in particular areas. Additionally, science is developing new methods to deal with these types of data including statistical models that address bias and lack of observation effort (van Strien et al 2013, Kindberg et al. 2009, Rechsteiner et al. 2013). While these methods have not yet been used for Maritimes Region cetacean data, the potential exists to examine these data using new methods.

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TABLES

Table 1. Sightings data entered into the WSHEADERS table: variable names, field types, descriptions and associated code tables.

Field Name	Type (size)	Description	Link to Code Table
WS_ID	PK, NUMBER (9)	Primary key: unique number identifying each sighting	
WS_DATE	DATE (7)	Formatted Sighting date (DD-MON-YYYY)	
WS_TIME	NUMBER (4)	Formatted Sighting time (24 hr, hhmm or hmm, 0 = unknown)	
PLATFORM_CD	NUMBER(5)	Vessel or aircraft name from which sighting occurred. Land based sightings=77.	WS_PLATFORMS
LATITUDE	NUMBER(9,6)	Latitude (decimal degrees) of the observer at the time of the sighting.	
LONGITUDE	NUMBER(9,6)	Longitude (decimal degrees) of the observer at the time of the sighting.	
TRIPTYPE_CD	NUMBER(2)	Trip type or purpose of the trip (e.g., whale watch, research, survey)	WS_TRIPTYPES
DATASOURCE_CD	NUMBER(2)	General identifier for data provider (e.g. at-sea fishery observers,, fishers, military)	WS_DATASOURCES
WINDDIR_CD	NUMBER(2)	Wind bearing direction relative to North (e.g. East = 90)	WS_DIRECTIONS
BEAUFORT_CD	NUMBER(2)	Beaufort scale for wind speed and sea state	WS_BEAUFORT
VESSSPEED	NUMBER(6,2)	Vessel speed (knots)	
VESSHEAD_CD	NUMBER(2)	Coded Vessel heading at time of sighting	WS_DIRECTIONS
ALTITUDE	NUMBER(4)	Altitude of observation platform (feet)	
GLAREL_CD	NUMBER(1)	Coded glare on water from left of aircraft	WS_GLARECODES
GLARER_CD	NUMBER(1)	Coded glare on water from right of aircraft	WS_GLARECODES
VISIBILITY_CD	NUMBER(1)	Coded visibility (combination of distance and weather) at the time of the sighting	WS_VISIBILITYCODES
CLOUD_CD	NUMBER(1)	Percent cloud cover	WS_CLOUDCODES
SIGHTOBS_CD	NUMBER(3)	Code for observer and their affiliation.	WS_SIGHTOBSCODES
BATCH_ID[1]	VARCHAR2 (100)	Batch load file name i.e. the name of the original data file (max 100 characters).	
DATE_ENTERED[1]	DATE (9)	Date data entered (DD-MON-YYYY)	
DATA_TYPE[1]	VARCHAR2	Opportunistic or effort based (max 20 characters)	WS_DATATYPES
REGION_CD[2]	VARCHAR2	Code of region which manages the data	WS_REGIONS

Field Name	Type (size)	Description	Link to Code Table
DATACENTER_CD[2]	VARCHAR2	Code of data center submitting the data	WS_DATACENTERS
RESTRICTION_CD[2]	VARCHAR2	Code indicating level of access for the data	WS_RESTRICTIONS

1. Fields added in December 2016.
2. Fields added in November 2017.

Table 2. Sightings data entered into the WSEVENTS table: variable names, field types, descriptions and associated code tables.

Field	Type (Size)	Description	Link to Code Table
WS_EVENT_ID	NUMBER(9)	Primary Key: unique number identifying each event	
WS_ID	NUMBER(9)	Number generated in WSHEADERS table. Unique in combination with SPECIES_CD	WS_HEADERS
EVENT_CD	NUMBER(1)	Records what was seen by the observer, NOT what the observer was doing	WS_EVENTTYPES
GEAR_CD	NUMBER(3)	Coded to identify type of gear, aircraft or vessel observed in the area. Only used in conjunction with gear codes 2, 3, 4, 6	WS_GEARCODES
SPECIES_CD	NUMBER(4)	Species or taxa observed. Unique in combination with WS_ID.	WS_SPECIESCODES
IDREL_CD	NUMBER(1)	Coded level of reliability that sighting has been identified correctly	WS_IDRELCODES
NUMB	NUMBER(5)	Total number of animals sighted in the event	
CL_CD	NUMBER(2)	Coded level of confidence in the estimated number of animals sighted	WS_CONFIDENCELEVELS
ANBEARING	NUMBER(2)	Animal's bearing from the bow of the vessel using clock positions	
ANHEAD_CD	NUMBER(2)	Animal's true heading relative to North (e.g. East = 90)	WS_DIRECTIONS
NOGRPS	NUMBER(2)	Number of animal groups sighted	
DISTANCE	NUMBER(4)	Estimated distance between sighted animal and viewing platform (metres)	
GEARIMPACT_CD	NUMBER(1)	Identifies gear impact on the animal if entangled.	WS_GEARIMPACTCODES
COMMENTS	VARCHAR2 (250)	Comments about the sighting event (max 250 characters)	

Table 3. Sightings data entered into the WSDETAILS table: variable names, field types, descriptions and associated code tables.

Field	Type (size)	Description	Link to Code table
WS_DETAIL_ID	PK, NUMBER(9)	Primary key; unique number identifying each animal's details	
WS_EVENT_ID	NUMBER(9)	Whale Sighting Event ID generated in WSEVENTS table. Unique in combination with WHALENO	WSEVENTS
WHALENO	NUMBER(2)	User assigned sequential number for whales with WHALEID, MATURITY_CD, or PHOTO_CD	
WHALEID	VARCHAR2 (200)	Whale ID - pre-assigned by catalogue number or common name by identification experts (200 characters)	
MATURITY_CD	NUMBER(1)	Maturity stage of animal	WS_MATURITYCODES
SWIMDIR_CD	NUMBER(2)	Swim direction of animal based on points of the compass and azimuth bearings (e.g. East = 90)	WS_DIRECTIONS
FEATURE_TYPE_CD	NUMBER(2)	Feature used to identify whale species and/or WHALEID	WS_FEATURETYPECODES
FEATURE_DESC	VARCHAR2 (1000)	Further description of feature (1000 characters)	
MARKS	VARCHAR2 (200)	Marks on animal noted by observer (200 characters)	
PHOTO_CD	NUMBER(1)	Identifies photo format	WS_PHOTOCODES
COMMENTS	VARCHAR2 (250)	Comments about animal details by observer (250 characters)	
FRAME_REF	VARCHAR2 (10)	Image reference number (max 10 characters)	
BEHAVIOUR_CD1	NUMBER(3)	First Behaviour Code	WS_BEHAVIOURCODES
BEHAVIOUR_CD2	NUMBER(3)	Second Behaviour Code	WS_BEHAVIOURCODES
BEHAVIOUR_CD3	NUMBER(3)	Third Behaviour Code	WS_BEHAVIOURCODES
BEHAVIOUR_CD4[1]	NUMBER(3)	Fourth Behaviour Code	WS_BEHAVIOURCODES
BEHAVIOUR_CD5[1]	NUMBER(3)	Fifth Behaviour Code	WS_BEHAVIOURCODES
ANIMAL_CONDITION[1]	VARCHAR2 (20)	Animal condition at time of sighting (dead, alive) (max 20 characters)	WS_ANIMALCONDITION
LENGTH_RANGE	VARCHAR2(20)	Length or length range of animal (cm)	

1. Fields added in December 2016

Table 4. Total number of records in database by data source, and timespan, as of January 2017.

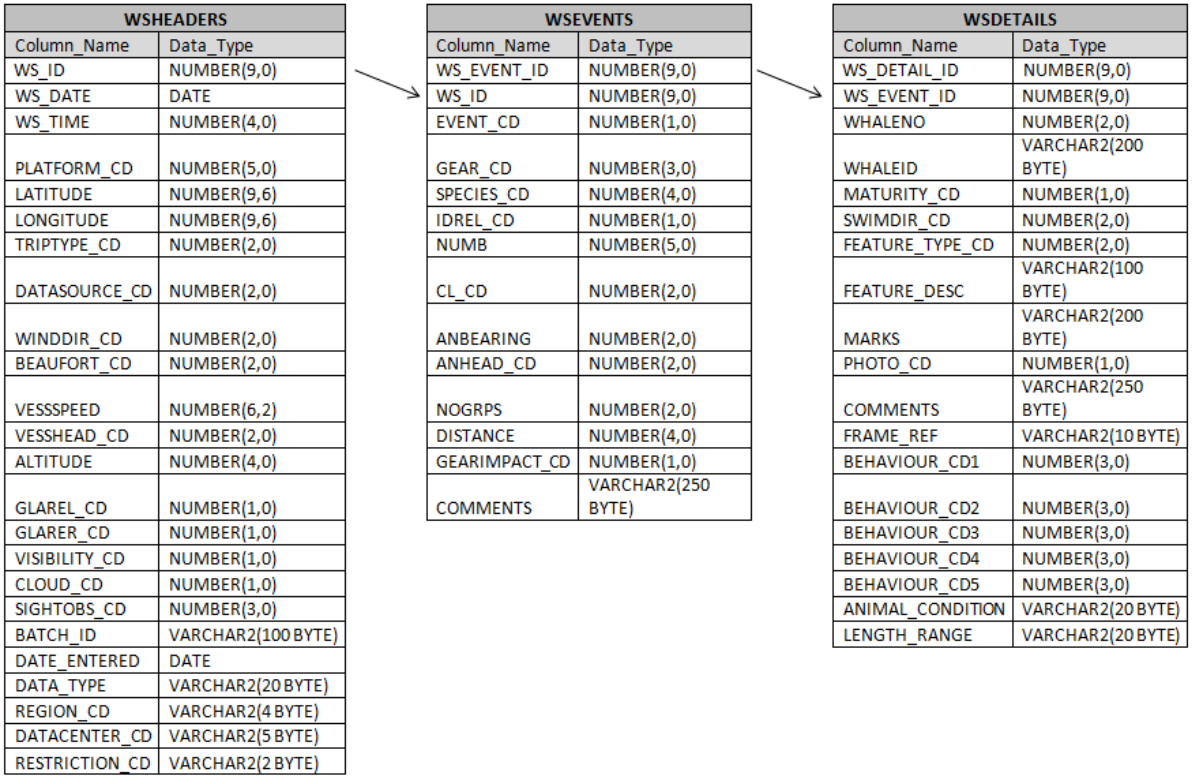
Data Source	Earliest Record	Latest Record	Number Records	Percent total records
Whale Watch companies	1997	2016	28,726	44.51
NOAA Personnel	1998	2015	9,626	14.92
NGO Research	1988	2015	9,416	14.59
CWS (observers)	2006	2015	3,123	4.84
DFO Research Vessel surveys	1999	2014	3,061	4.74
Commercial fishermen/logs	1966	2016	2,656	4.12
Observer Program (ISDB)	1990	2016	1,930	2.99
Consulting Companies	1998	2016	1,746	2.71
DFO Research Surveys	1999	2016	1,315	2.04
ECES Aerial	2001	2001	913	1.41
Military Personnel	1998	2016	382	0.59
NMFS Research Surveys	2002	2015	329	0.51
NEAQ Personnel	2014	2014	240	0.37
Commercial Vessels	2000	2016	215	0.33
Academic Research	1992	2011	175	0.27
Fisheries Surveillance	1999	2015	157	0.24
DFO C&P Personnel	2004	2015	140	0.22
CCG Personnel	2012	2016	137	0.21
Aerial Surveillance	1999	2016	108	0.17
NAFO (ICNAF) personnel	1963	1986	69	0.11
GENERAL PUBLIC (phone, email, social media	2004	2016	29	0.04
Whale Alert App	2015	2016	26	0.04
Campobello Whale Rescue	2011	2013	8	0.01
Dalhousie University	1992	1992	2	0.00
Facebook	2014	2016	2	0.00
Online news report (e.g. CBC)	2016	2016	2	0.00
CCG Advisory Notice	2013	2013	1	0.00

Table 5. Total number of records by species or taxa in the database as of January 2017 (51,040 positive records in which taxon was identified; NS – species not identified).

Major Group	COMMON NAME	Total Records	Percent of positive records
WHALES	HUMPBACK WHALE	12,353	18.89
	FIN WHALE	6,184	9.46
	MINKE WHALE	5,856	8.95
	RIGHT WHALE	2,539	3.88
	NORTHERN BOTTLENOSE WHALE	1,539	2.35
	ATLANTIC PILOT WHALE	1,165	1.78
	SEI WHALE	933	1.43
	LONG-FINNED PILOT WHALE	705	1.08
	SPERM WHALE-	506	0.77
	BLUE WHALE	227	0.35
	BOWHEAD WHALE	132	0.20
	BEAKED WHALE (NS)	119	0.18
	KILLER WHALE	62	0.09
	BALEEN WHALE (NS)	50	0.08
	BELUGA WHALE	42	0.06
	SOWERBY'S BEAKED WHALE	42	0.06
	GREY WHALE	12	0.02
	FALSE KILLER WHALE	4	0.01
	CUVIER'S BEAKED WHALE	2	0.00
	PYGMY SPERM WHALE	1	0.00
PORPOISES	HARBOUR PORPOISE	9300	14.22
	DALL'S PORPOISE	60	0.09
DOLPHINS	WHITE-SIDED DOLPHIN	1788	2.73
	DOLPHINS/PORPOISE (NS)	1653	2.53
	COMMON DOLPHINS	776	1.19
	WHITE-BEAKED DOLPHIN	215	0.33
	STRIPED DOLPHIN	115	0.18
	ATLANTIC BOTTLENOSE DOLPHIN	88	0.13
	DALL'S PORPOISE	60	0.09
	RISSOS DOLPHIN	25	0.04
	SPOTTED DOLPHIN	8	0.01
	PACIFIC WHITE-SIDED DOLPHIN	2	0.00
	LONG SNOUTED SPINNER DOLPHIN	2	0.00
PINNIPED	SEALS (NS)	1332	2.04
	GREY SEAL	313	0.48
	RINGED SEAL	267	0.41
	HARP SEAL	102	0.16
	HARBOUR SEAL	72	0.11
	BEARDED SEAL	46	0.07

Major Group	COMMON NAME	Total Records	Percent of positive records
	NORTHERN FUR SEAL	19	0.03
	SPOTTED SEAL	8	0.01
	HOODEDSEAL	6	0.01
	WALRUS	5	0.01
	STELLAR SEA LION	2	0.00
	RIBBON SEAL	2	0.00
LARGE PELAGIC	BASKING SHARK	369	0.56
	OCEAN SUNFISH	306	0.47
	BLUEFIN TUNA	65	0.10
	SHARKS (NS)	21	0.03
	UNIDENTIFIED PELAGIC FISH	16	0.02
	BLUE SHARK	6	0.01
	SWORDFISH	4	0.01
	GREENLAND SHARK	1	0.00
	BLUE MARLIN	1	0.00
	PORBEAGLE SHARK	1	0.00
	THRESHER SHARK	1	0.00
SEA TURTLE	LEATHERBACK SEATURTLE	58	0.09
	LOGGERHEAD SEATURTLE	39	0.06
	SEATURTLE (NS)	21	0.03
	GREEN SEATURTLE	2	0.00
LAND MAMMAL	POLAR BEAR	51	0.08
SEABIRD	ATLANTIC PUFFIN	3	0.00
	GREATER SHEARWATER	3	0.00
	GREAT EGRET	1	0.00
	LAUGHING GULL	1	0.00
	RED-NECKED PHALAROPE	1	0.00
	STORM PETREL (NS)	1	0.00

FIGURES



WSHEADERS	
Column_Name	Data_Type
WS_ID	NUMBER(9,0)
WS_DATE	DATE
WS_TIME	NUMBER(4,0)
PLATFORM_CD	NUMBER(5,0)
LATITUDE	NUMBER(9,6)
LONGITUDE	NUMBER(9,6)
TRIPTYPE_CD	NUMBER(2,0)
DATASOURCE_CD	NUMBER(2,0)
WINDDIR_CD	NUMBER(2,0)
BEAUFORT_CD	NUMBER(2,0)
VESSSPEED	NUMBER(6,2)
VESSHEAD_CD	NUMBER(2,0)
ALTITUDE	NUMBER(4,0)
GLAREL_CD	NUMBER(1,0)
GLARER_CD	NUMBER(1,0)
VISIBILITY_CD	NUMBER(1,0)
CLOUD_CD	NUMBER(1,0)
SIGHTOBS_CD	NUMBER(3,0)
BATCH_ID	VARCHAR2(100 BYTE)
DATE_ENTERED	DATE
DATA_TYPE	VARCHAR2(20 BYTE)
REGION_CD	VARCHAR2(4 BYTE)
DATACENTER_CD	VARCHAR2(5 BYTE)
RESTRICTION_CD	VARCHAR2(2 BYTE)

WSEVENTS	
Column_Name	Data_Type
WS_EVENT_ID	NUMBER(9,0)
WS_ID	NUMBER(9,0)
EVENT_CD	NUMBER(1,0)
GEAR_CD	NUMBER(3,0)
SPECIES_CD	NUMBER(4,0)
IDREL_CD	NUMBER(1,0)
NUMB	NUMBER(5,0)
CL_CD	NUMBER(2,0)
ANBEARING	NUMBER(2,0)
ANHEAD_CD	NUMBER(2,0)
NOGRPS	NUMBER(2,0)
DISTANCE	NUMBER(4,0)
GEARIMPACT_CD	NUMBER(1,0)
COMMENTS	VARCHAR2(250 BYTE)

WSDETAILS	
Column_Name	Data_Type
WS_DETAIL_ID	NUMBER(9,0)
WS_EVENT_ID	NUMBER(9,0)
WHALENO	NUMBER(2,0)
WHALEID	VARCHAR2(200 BYTE)
MATURITY_CD	NUMBER(1,0)
SWIMDIR_CD	NUMBER(2,0)
FEATURE_TYPE_CD	NUMBER(2,0)
FEATURE_DESC	VARCHAR2(100 BYTE)
MARKS	VARCHAR2(200 BYTE)
PHOTO_CD	NUMBER(1,0)
COMMENTS	VARCHAR2(250 BYTE)
FRAME_REF	VARCHAR2(10 BYTE)
BEHAVIOUR_CD1	NUMBER(3,0)
BEHAVIOUR_CD2	NUMBER(3,0)
BEHAVIOUR_CD3	NUMBER(3,0)
BEHAVIOUR_CD4	NUMBER(3,0)
BEHAVIOUR_CD5	NUMBER(3,0)
ANIMAL_CONDITION	VARCHAR2(20 BYTE)
LENGTH_RANGE	VARCHAR2(20 BYTE)

Figure 1. Entity relationships between the three main data tables of the Whale Sightings database. The arrows indicate the primary key linkages between the tables.

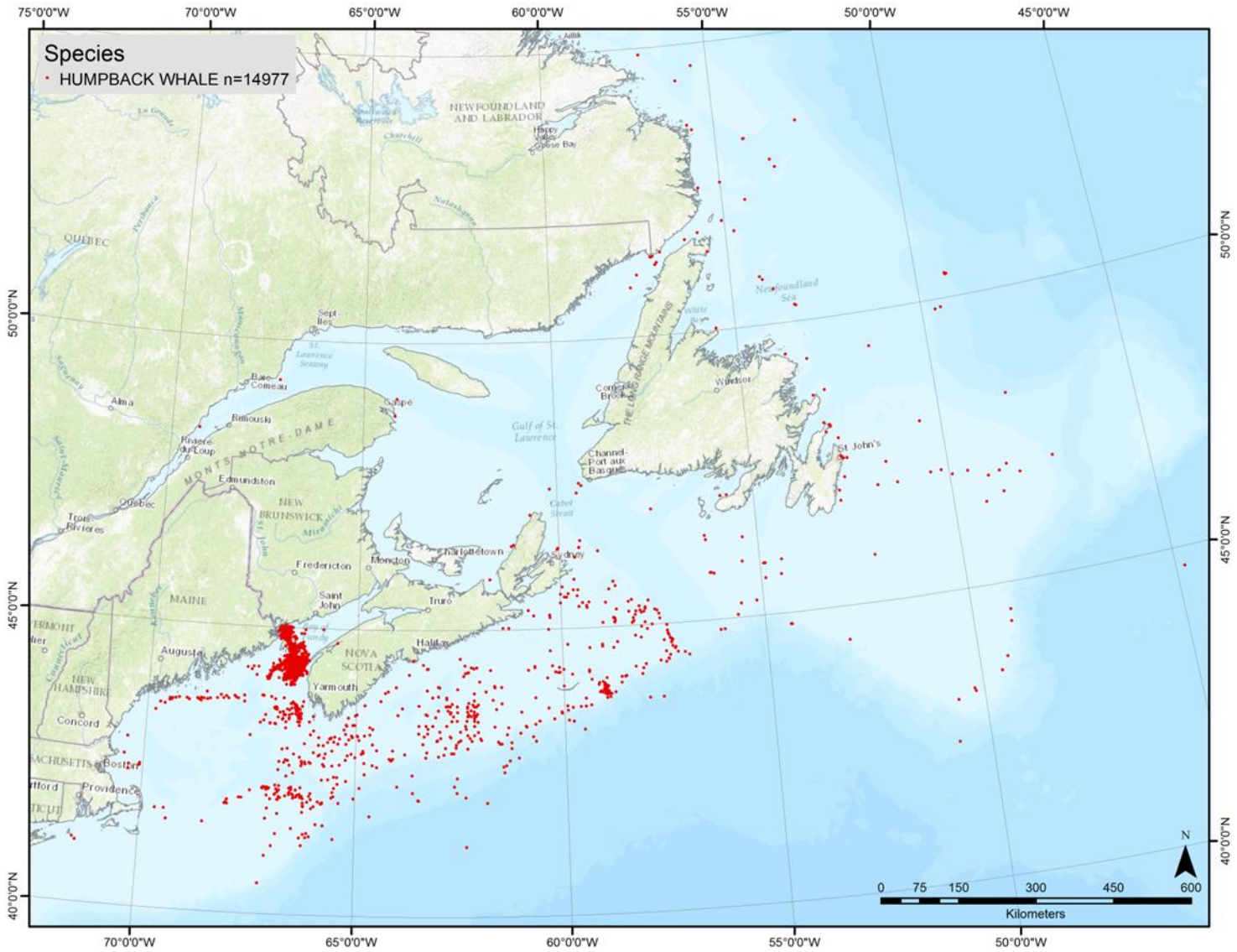


Figure 2. Geographic distribution of Humpback Whale (Megaptera novaeangliae) sightings archived by the DFO Maritimes Region Whale Sightings Database (n=14,977). Sightings are mainly opportunistic and not corrected by effort.

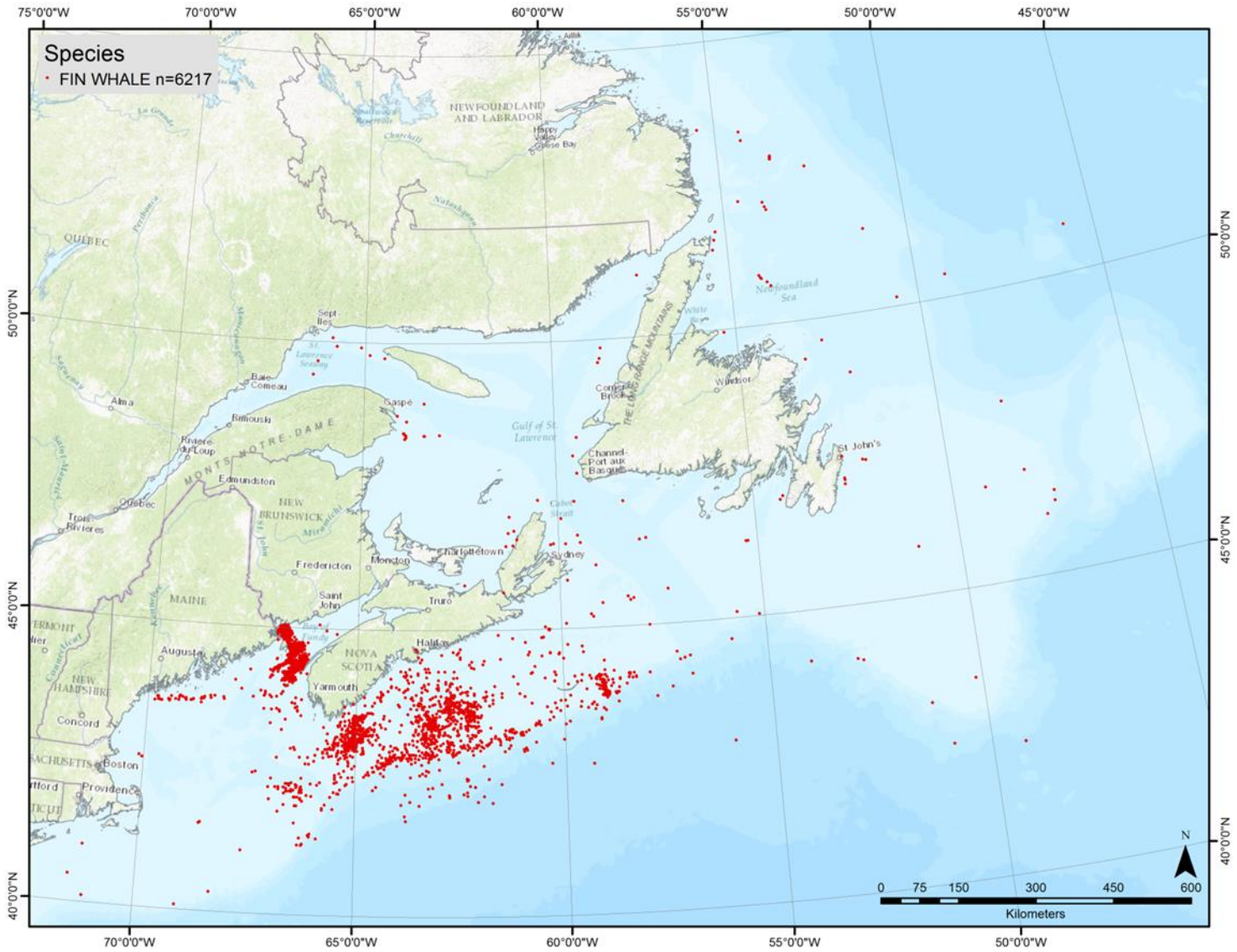


Figure 3. Geographic distribution of Fin Whale (Baleanoptera physalus) sightings archived by the DFO Maritimes Region Whale Sightings Database (n=6,217). Sightings are mainly opportunistic and not corrected by effort.

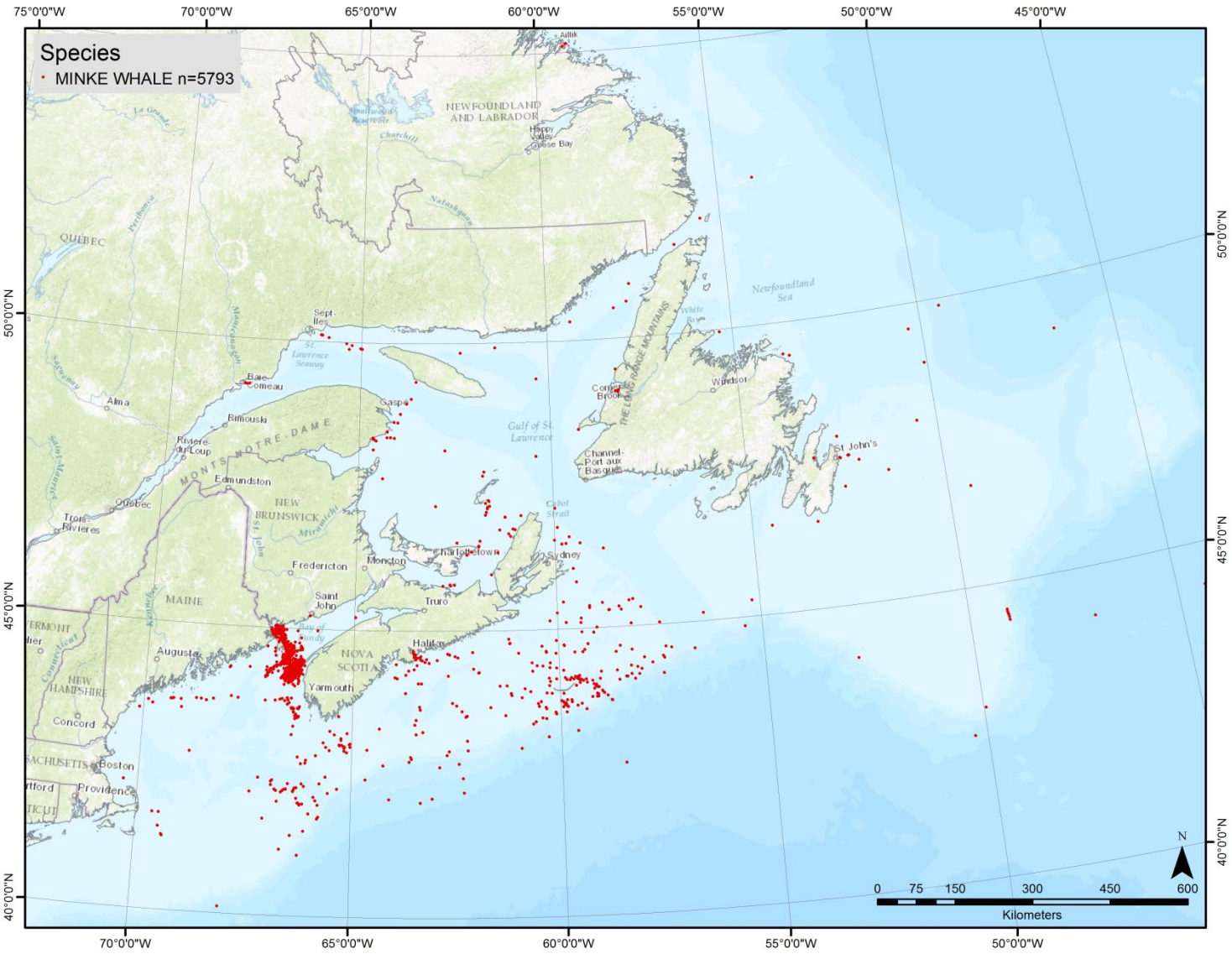


Figure 4. Geographic distribution of Minke Whale (Baleanoptera acutorostrata) sightings archived by the DFO Maritimes Region Whale Sightings Database (n=5,793). Sightings are mainly opportunistic and not corrected by effort.

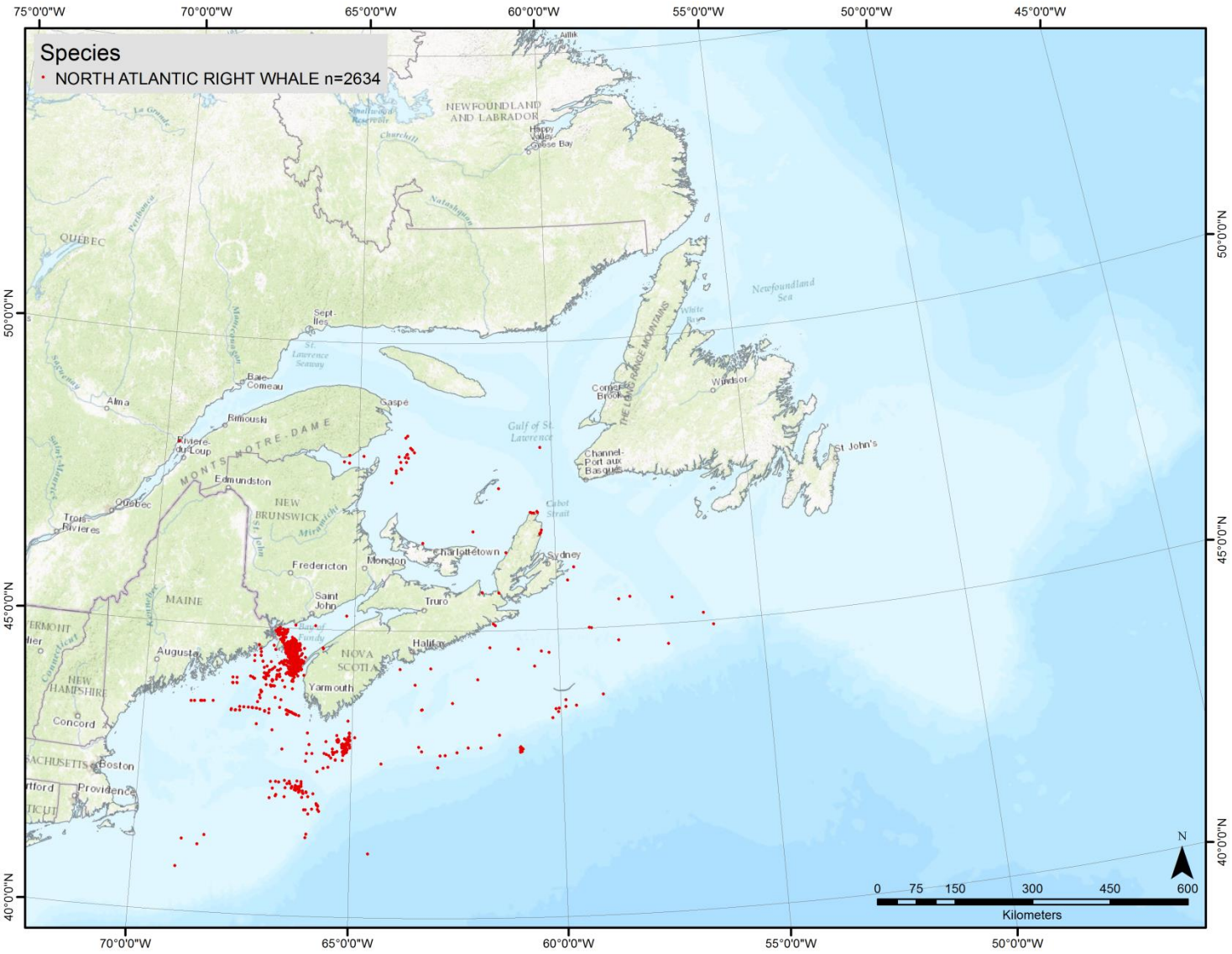


Figure 5. Geographic distribution of North Atlantic Right Whale (Eubalaena glacialis) sightings archived in the DFO Maritimes Region Whale Sightings Database (n=2,634). Sightings are mainly opportunistic and not corrected by effort.

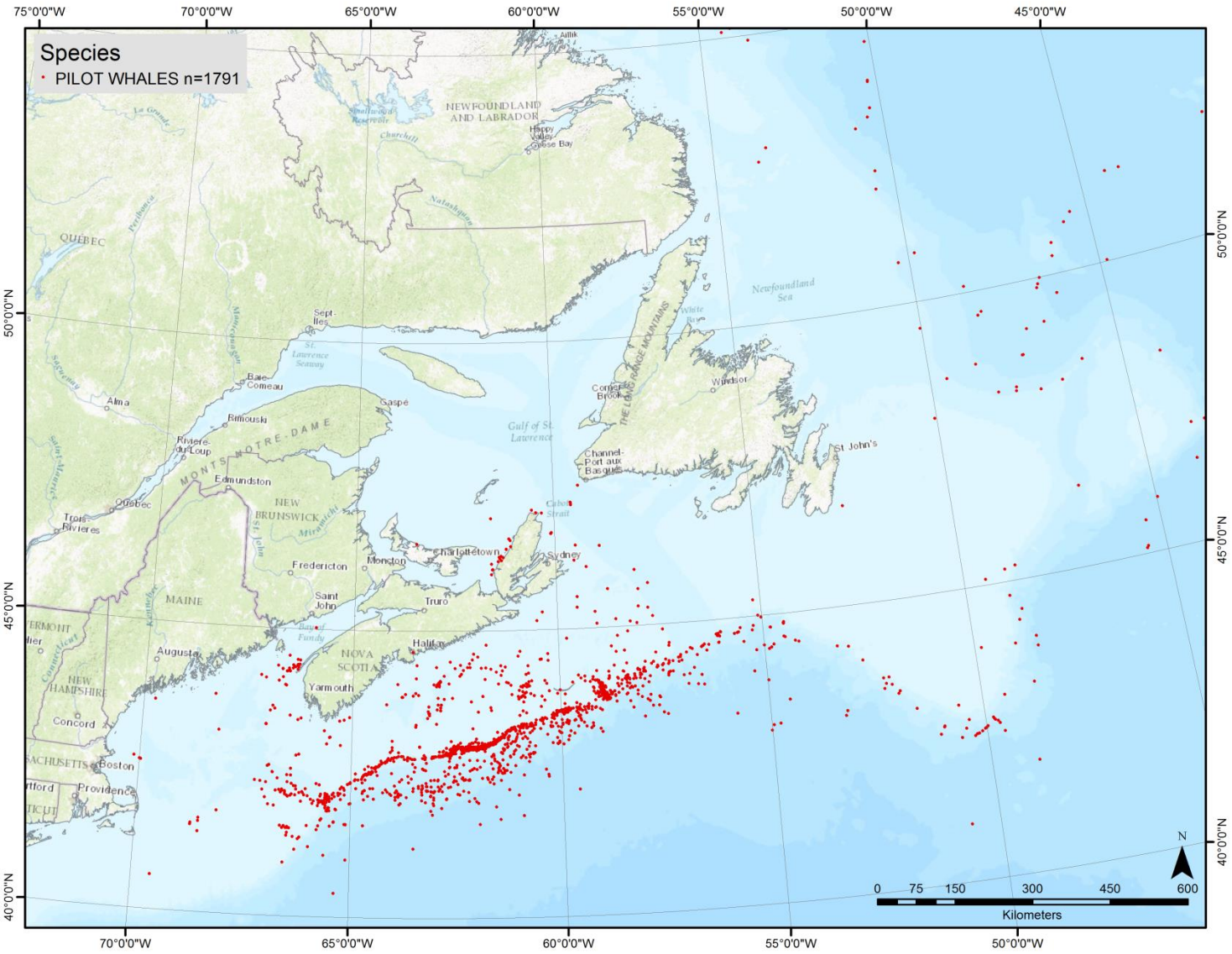


Figure 6. Geographic distribution of Long-finned pilot (Globicephala melas) and Atlantic pilot (Globicephala melaena) whale sightings archived in the DFO Maritimes Region Whale Sightings Database (n=1,791). Sightings are mainly opportunistic and not corrected by effort.

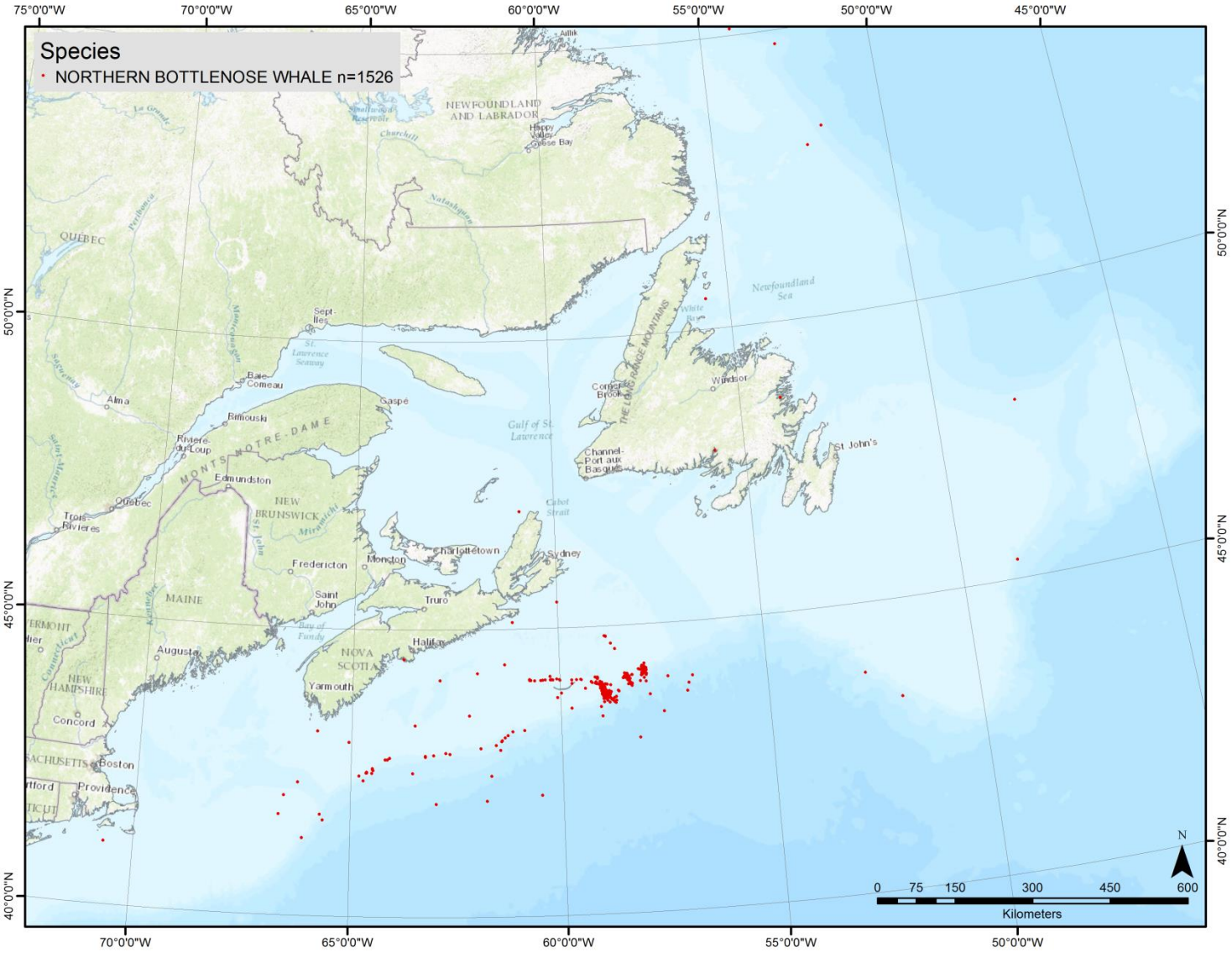


Figure 7. Geographic ddistribution of Northern Bottlenose Whale (Hyperoodon ampullatus) sightings archived in the DFO Maritimes Region Whale Sightings Database (n=1,526). Sightings are mainly opportunistic and not corrected by effort.

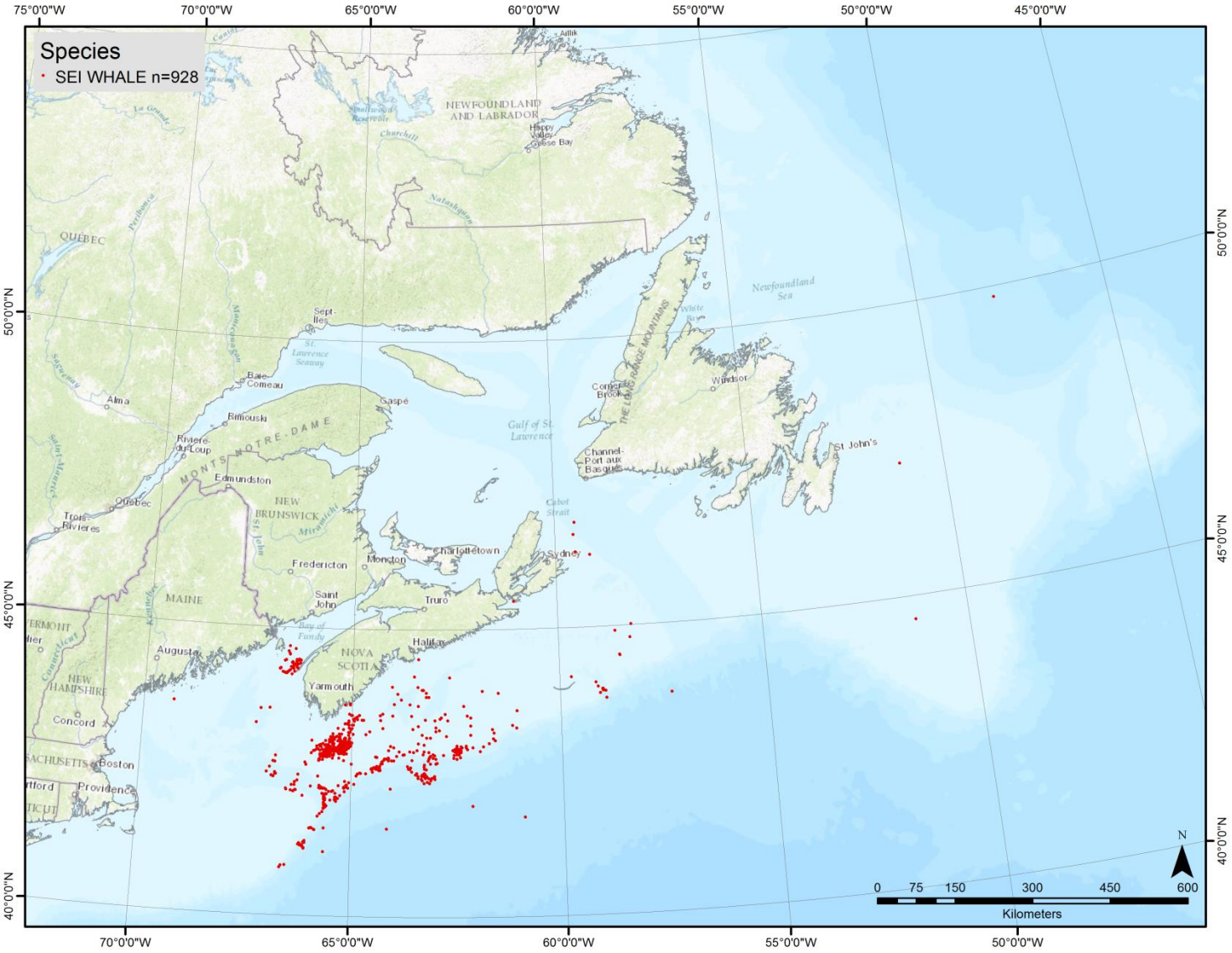


Figure 8 Geographic distribution of Sei whale (Balaenoptera borealis) sightings archived in the DFO Maritimes Region Whale Sightings Database (n=928). Sightings are mainly opportunistic and not corrected by effort.

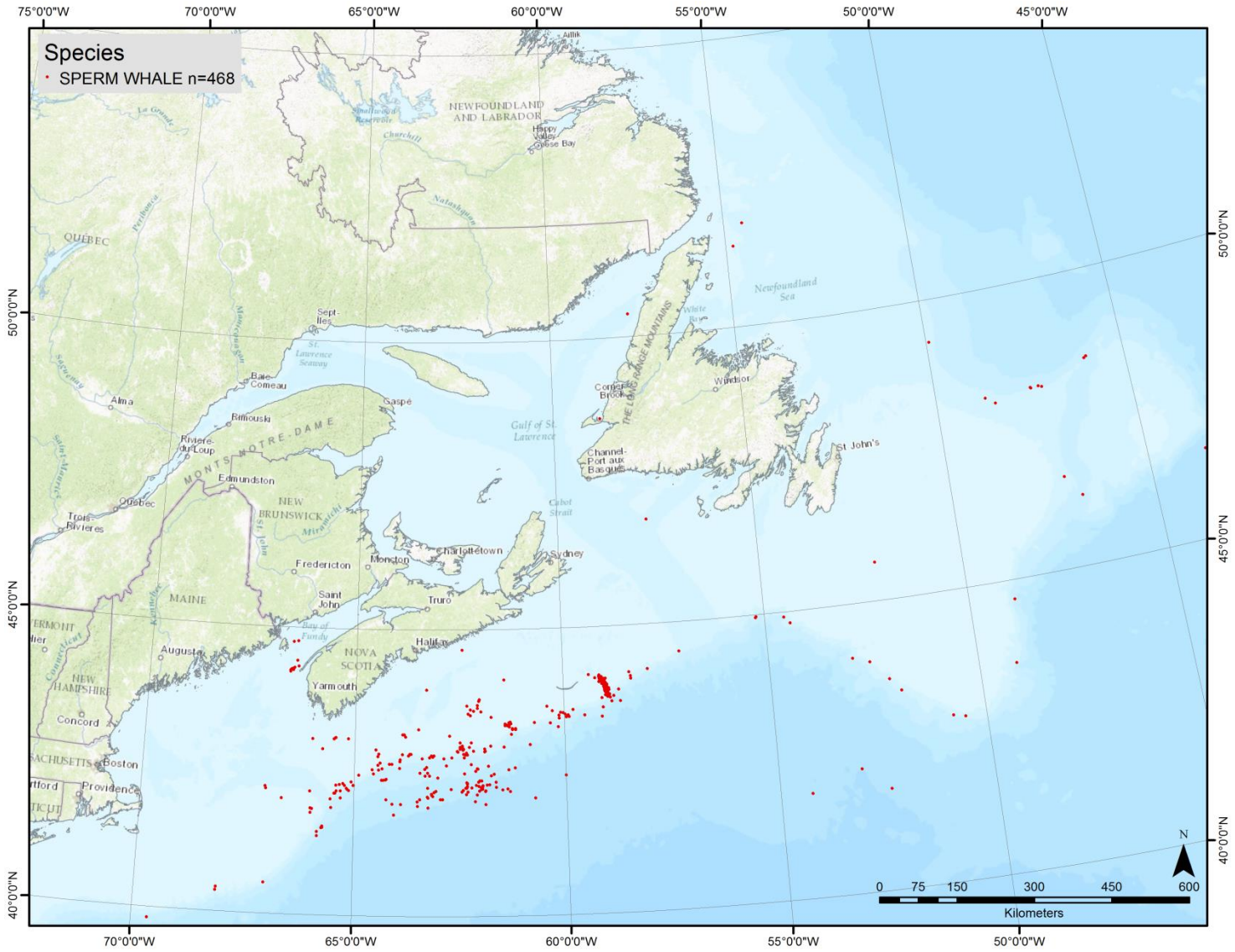


Figure 9. Geographic distribution of Sperm whale (Physeter macrocephalus) sightings archived in the DFO Maritimes Region Whale Sightings Database (n=468). Sightings are mainly opportunistic and not corrected by effort.

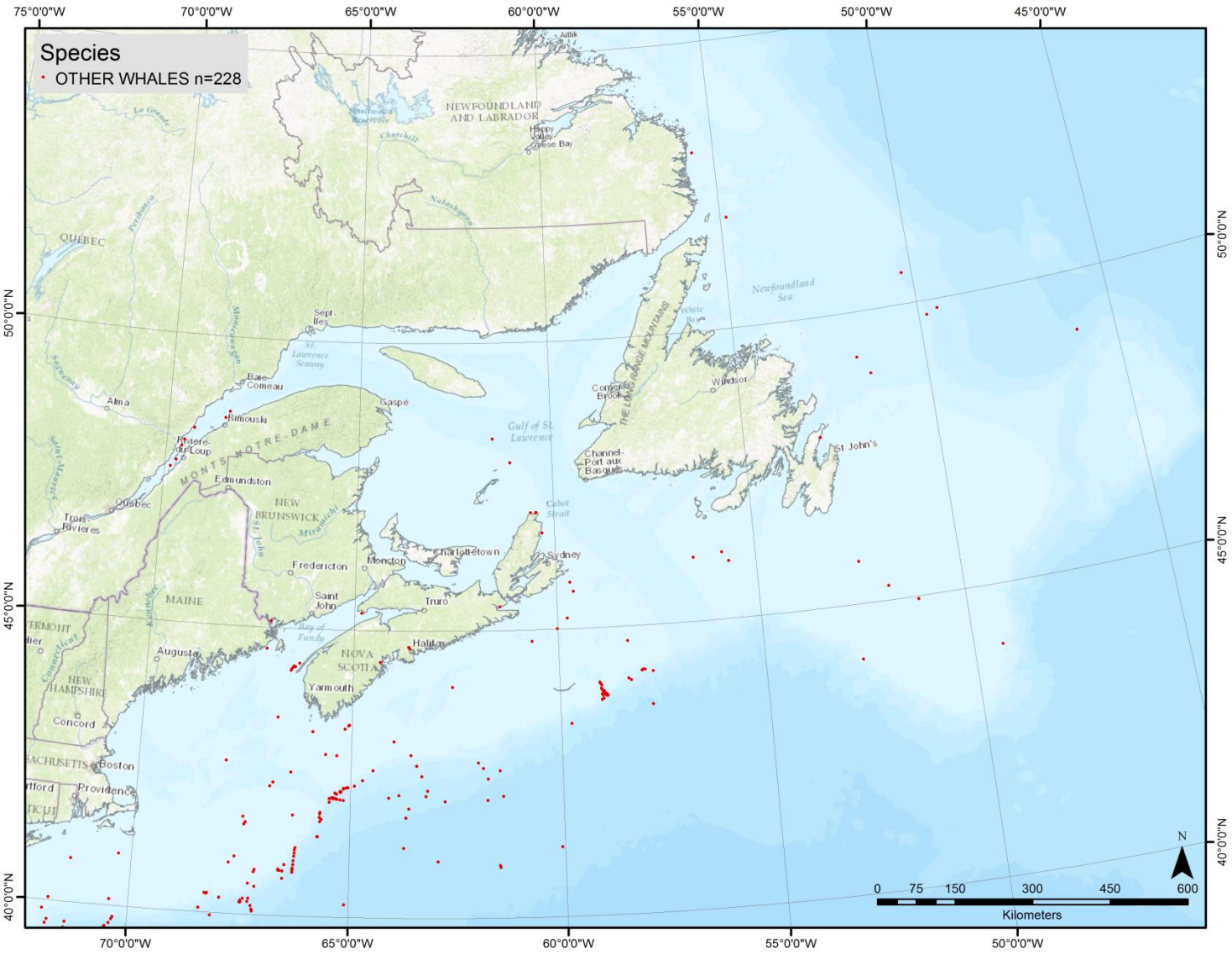


Figure 10. Geographic distribution of False Killer, Pygmy Sperm,Beluga, Bowhead, Grey, Killer and Sowerby's Beaked whales sightings archived in the DFO Maritimes Region Whale Sightings Database (n=228).Sightings are mainly opportunistic and not corrected by effort

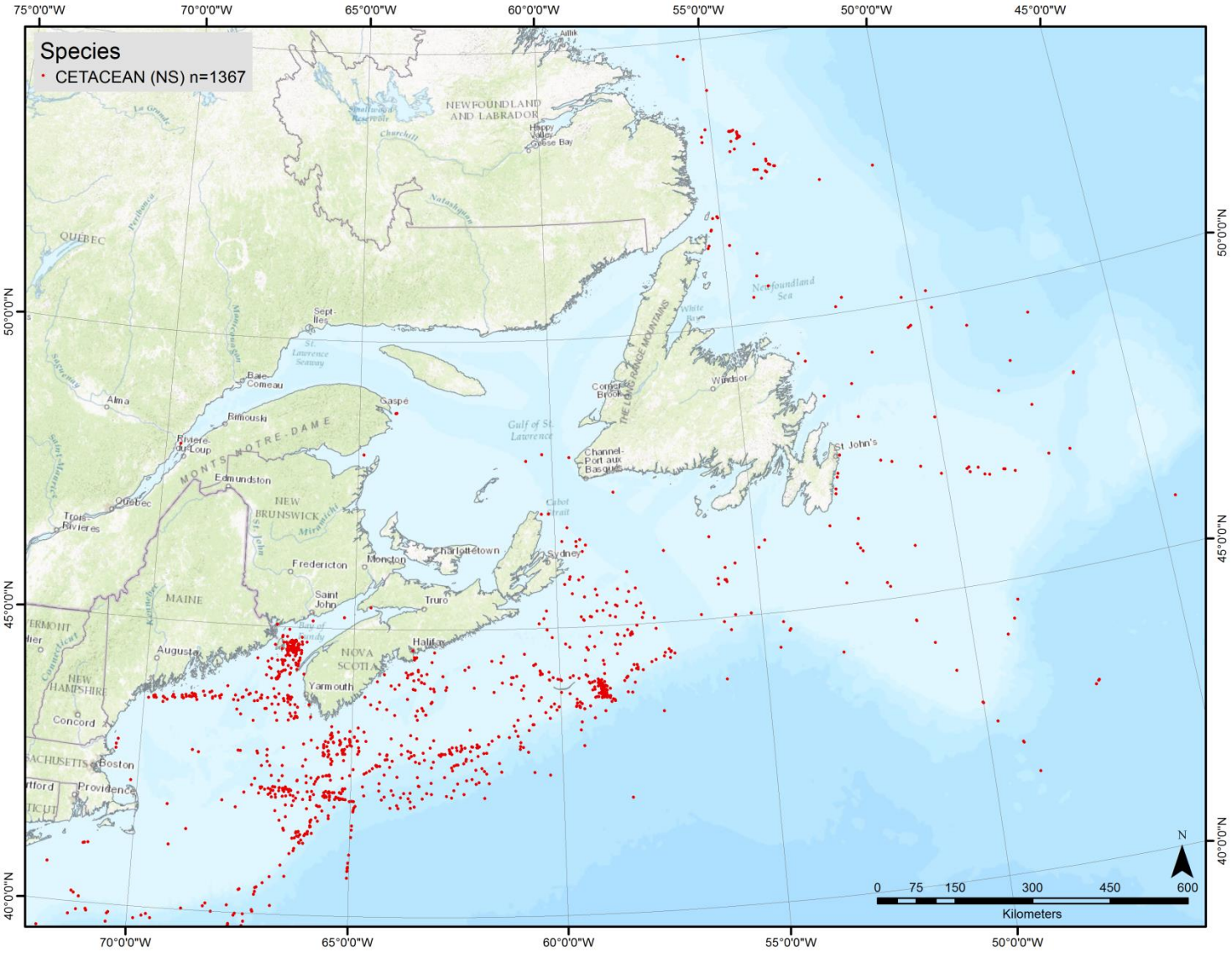


Figure 11. Geographic distribution of unidentified cetacean sightings archived in the DFO Maritimes Region Whale Sightings Database (n=1,367). Sightings are mainly opportunistic and not corrected by effort.

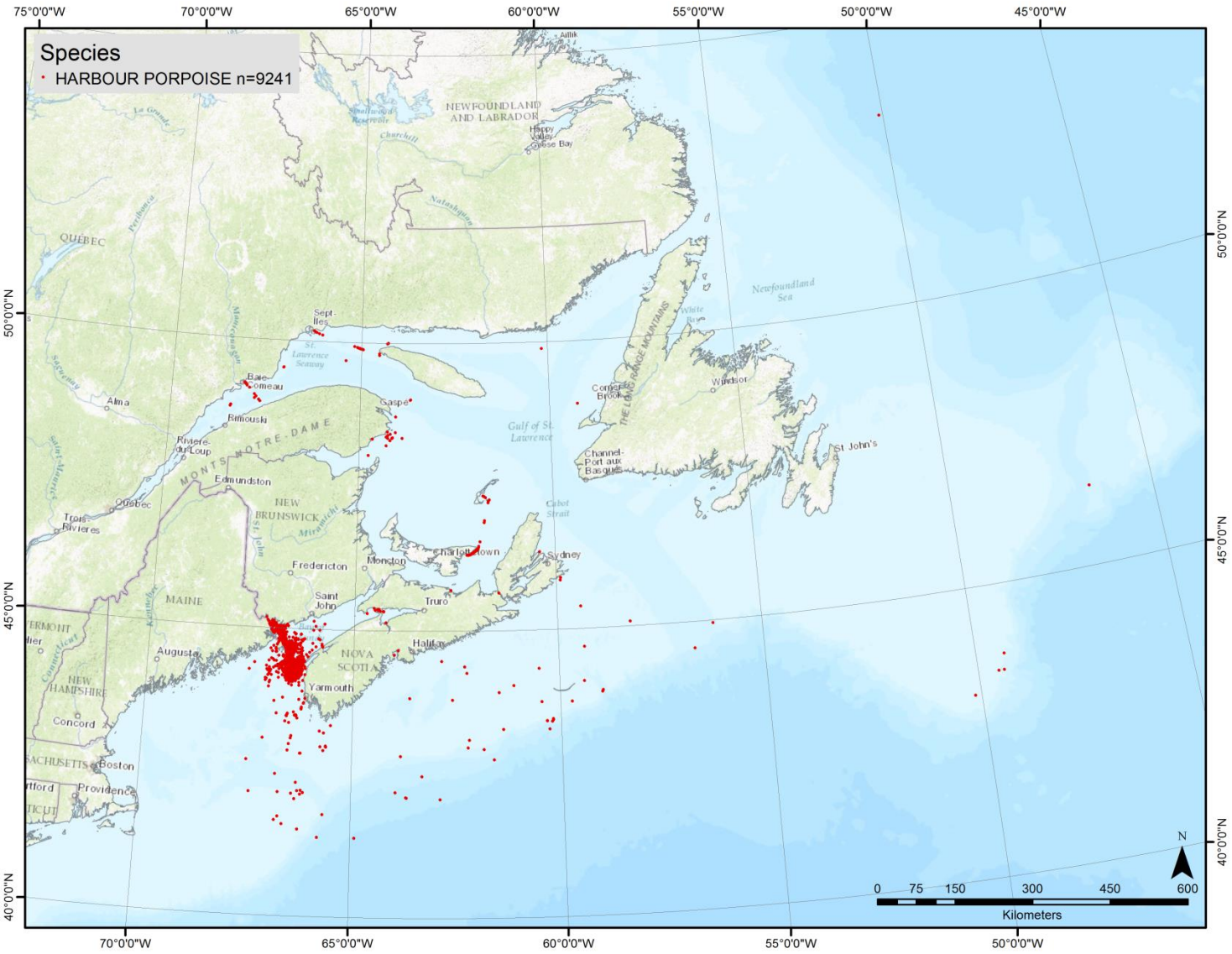


Figure 12. Geographic distribution of Harbour Porpoise sightings (Phocoena phocoena) archived in the DFO Maritimes Region Whale Sightings Database (n=9,241). Sightings are mainly opportunistic and not corrected by effort.

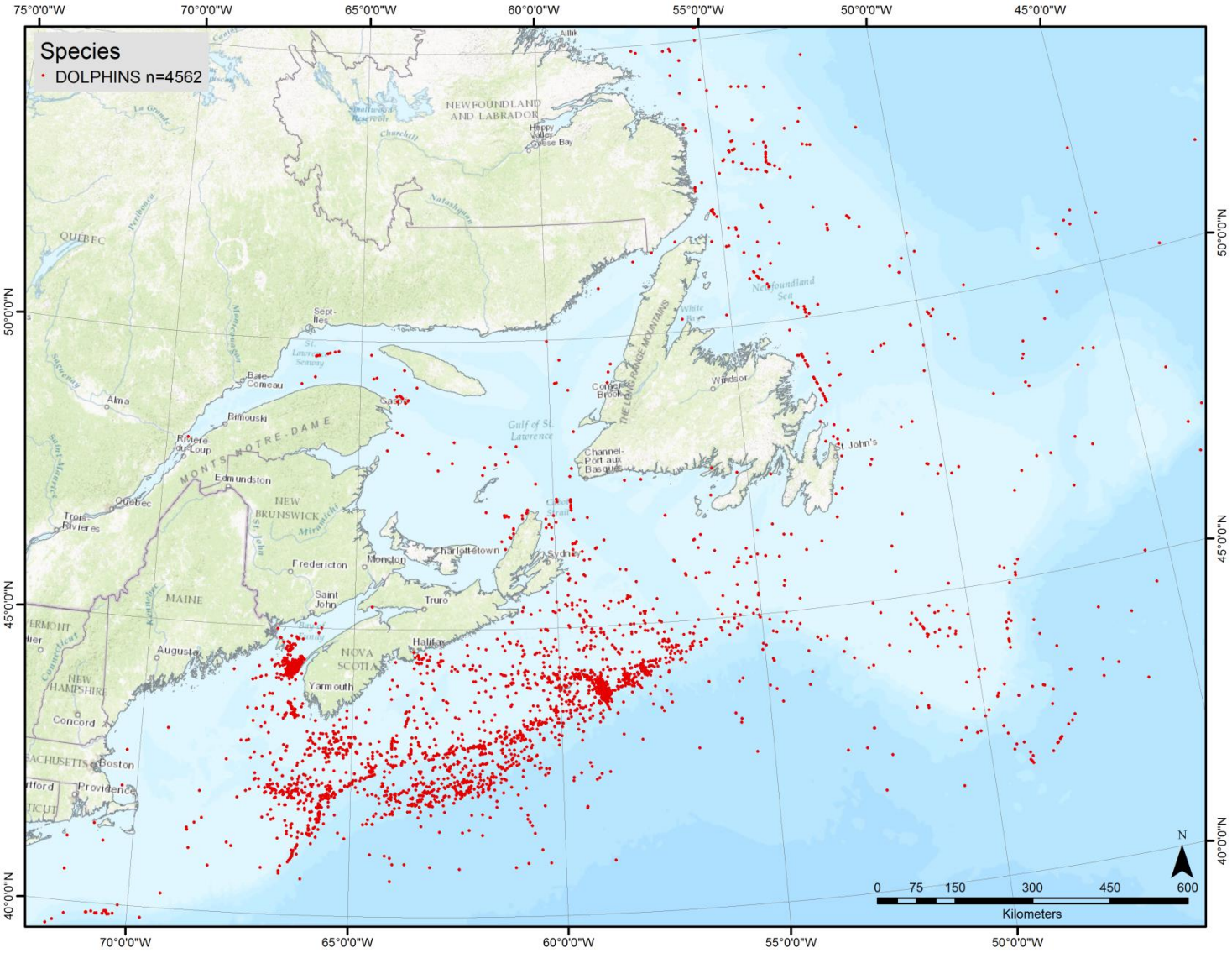


Figure 13. Geographic distribution of dolphin sightings archived by the DFO Maritimes Region Whale Sightings Database (n=4,562). Sightings are mainly opportunistic and not corrected by effort. (Species names shown in Table 5).

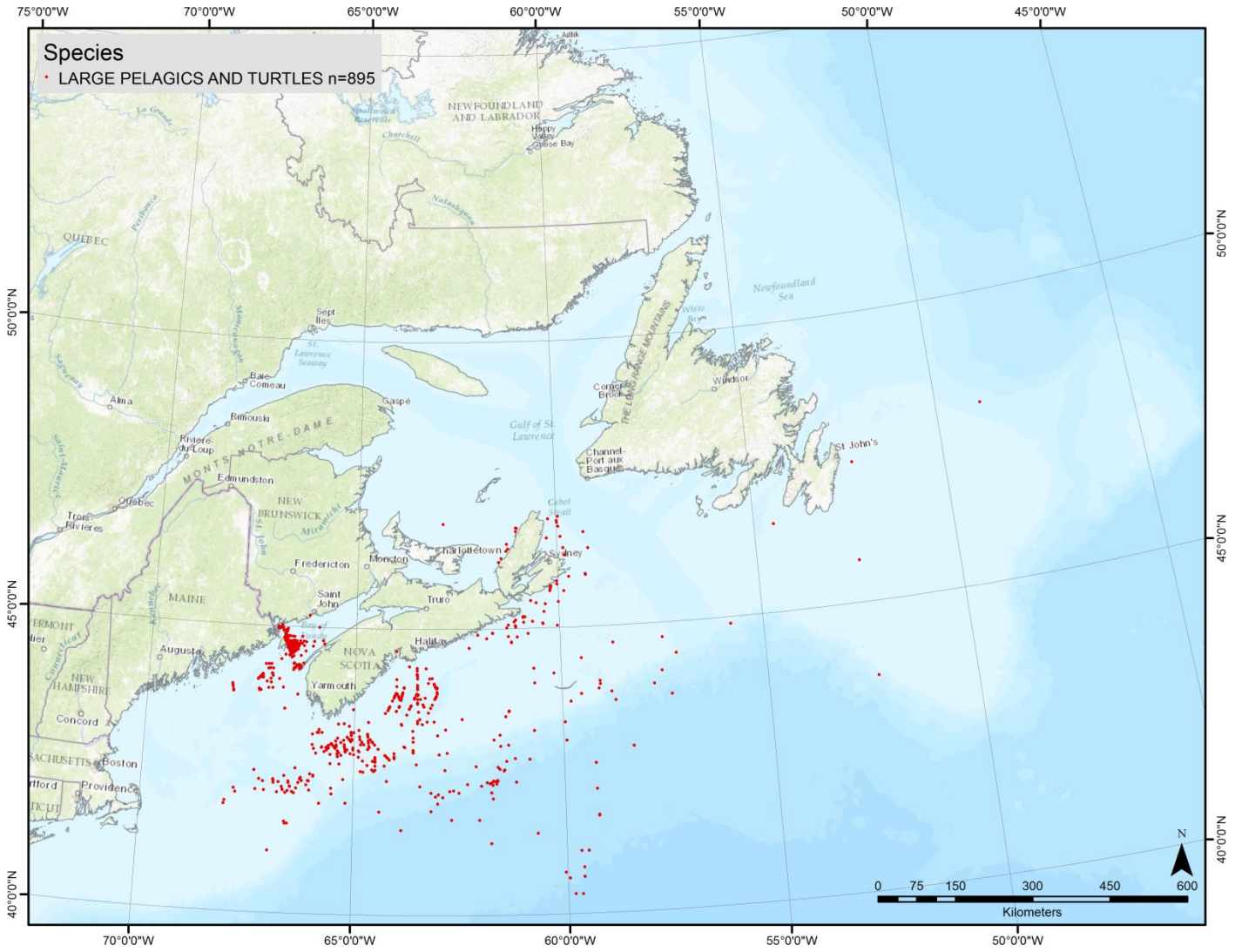
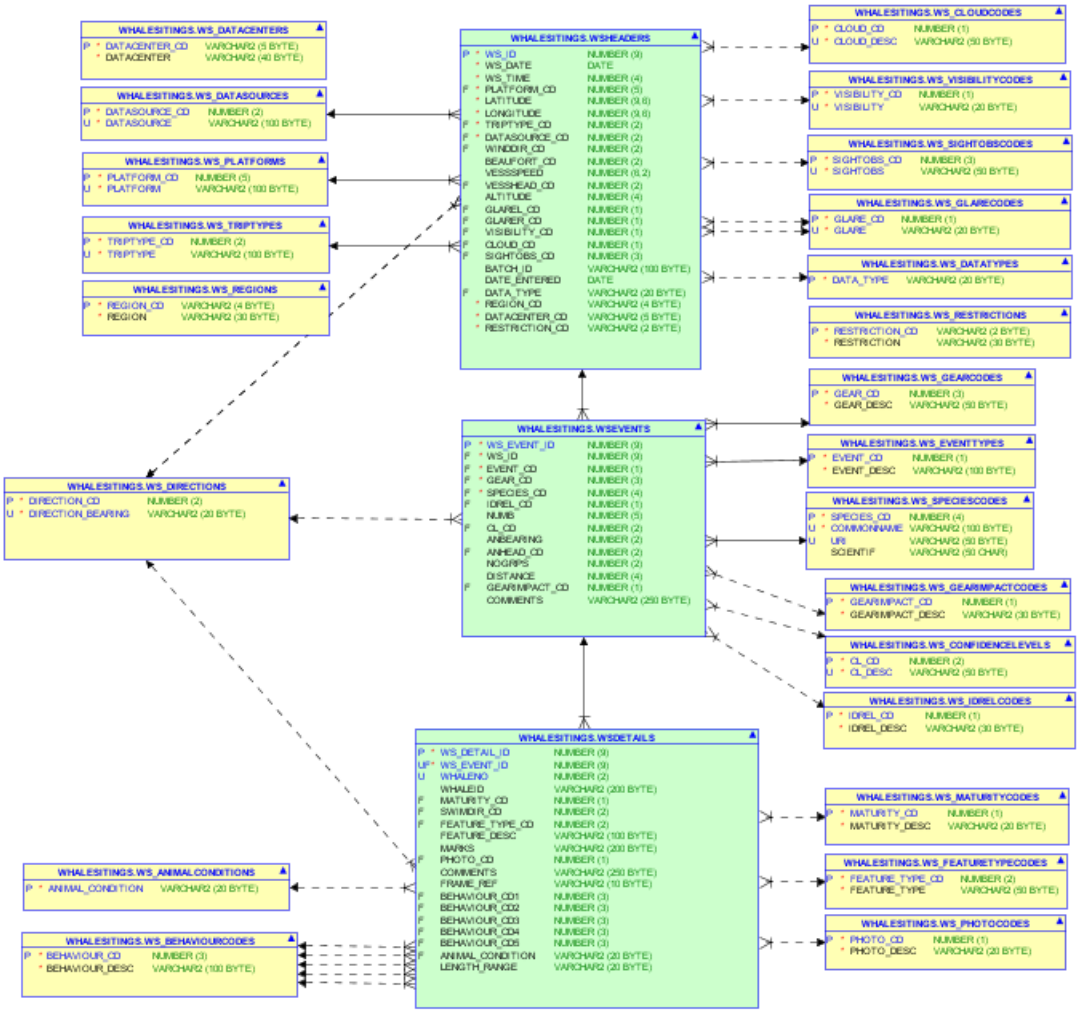
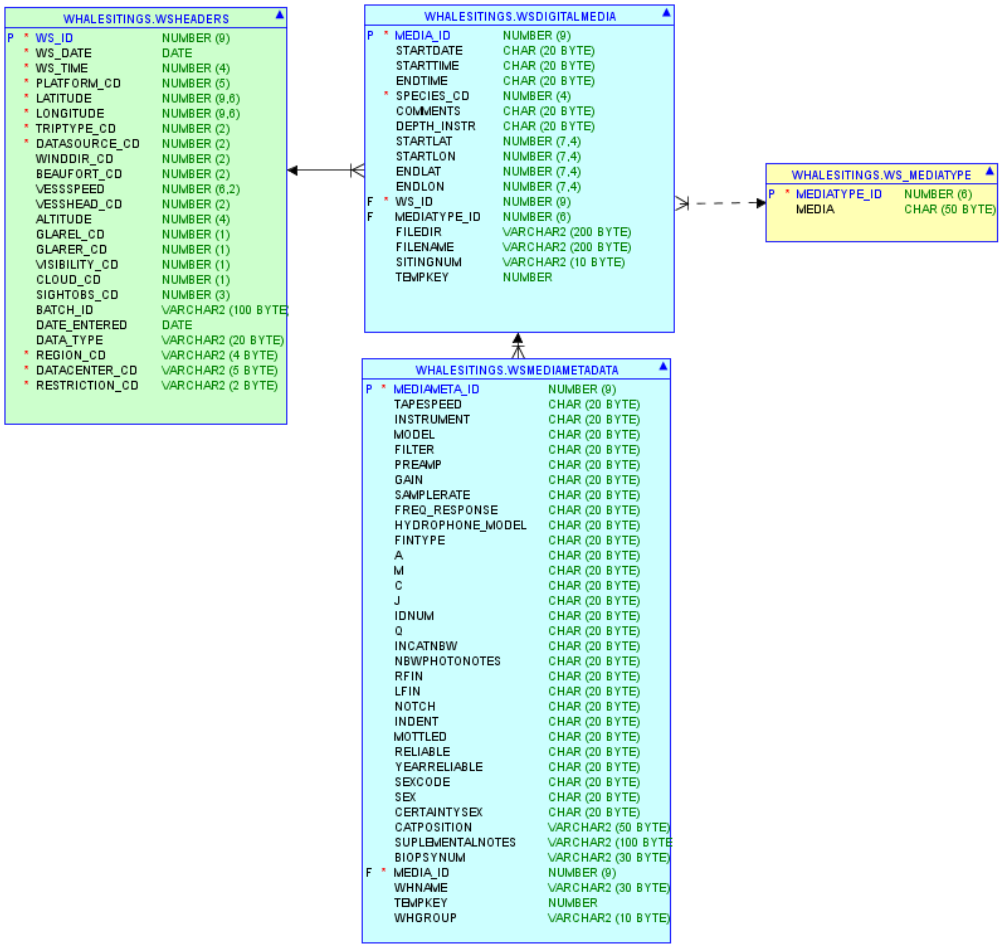


Figure 14. Geographic distribution of large pelagic fishes and marine turtle sightings archived in the DFO Maritimes Region Whale Sightings Database (n=895).Sightings are mainly opportunistic and not corrected by effort.

APPENDIX 1. THE DATA MODEL FOR WHALESITINGS DATABASE



APPENDIX 2. MEDIA TABLES These tables have not been utilized at the time of this report.



APPENDIX 3. CODE TABLES (ALPHABETICAL ORDER)

1. WS_ANIMAL CONDITION

ALIVE
DEAD

2. WS_BEAUFORT (Wind and Wave Height information codes).

BEAUFORT_CD	BEAUFORT SCALE
0	CALM, SEA SMOOTH AND MIRROR LIKE. WAVE HEIGHT 0m
1	LIGHT, RIPPLES, 1-3 KNOTS. WAVE HEIGHT 10-20 CM
2	BREEZE, WAVELETS,4-6 KNOTS . WAVE HEIGHT 20-50 CM
3	GENTLE BREEZE,LARGE WAVELETS, OCCASIONAL CRESTS, 7-10 KNOTS. WAVE HEIGHT 0.5m-1m
4	MODERATE BREEZE,FREQUENT CRESTS, 11-16 KNOTS. WAVE HEIGHT 1-2m
5	FRESH BREEZE, MANY CRESTS, SOME SPRAY,17-21 KNOTS. WAVE HEIGHT 2-3m
6	STRONG BREEZE, LARGE WAVES, SPRAY FREQUENT,22-27 KNOTS. WAVE HEIGHT 3-4m
7	NEAR GALE, BLOWING FOAM,28-33 KNOTS. WAVE HEIGHT 4-5.5m
8	WHOLE GALE,FOAM BLOWN IN STREAKS, 34-40 KNOTS. WAVE HEIGHT 5.5-7.5m
9	STRONG GALE, HIGH WAVES, CRESTING SEAS, 41-47 KNOTS. WAVE HEIGHT 7-10m
10	STORM,WAVESSHOCKLIKE, VISIBILITY GREATLY REDUCED, 48-55 KNOTS WAVE HEIGHT 9-12.5m
11	VIOLENT STORM, TOPS OF WAVES BLOWN OFF, 56-63 KNOTS. WAVE HEIGHT 11.5-16m
12	HURRICANE,AIR FILLED WITH FOAM AND SPRAY, 60 KNOTS. WAVE HEIGHT >=14m
13	N/A

3. WS_BEHAVIOUR (Behaviour codes).

BEHAVIOUR_CD	BEHAVIOUR DESCRIPTION
0	DEAD, IN WATER
1	DEAD, STRANDED
2	DEAD, FISHING GEAR
3	KILLED BY WHALERS
4	STRANDED, ALIVE RESCUED
5	VISIBLE INJURY
6	FAST SWIMMING (>10 KNOTS)
7	MODERATE SWIMMING (1-10 KNOTS)
8	SLOW SWIMMING (< 1 KNOT)
9	OBVIOUS SPEED CHANGE
10	INFLUENCED BY VESSEL
11	PORPOISING
12	RIDING BOW WAVE
13	BREACH (WHALES)
14	AEROBATICS (DOLPHINS)
15	SWIMMING UPSIDE DOWN
16	SWIMMING ON SIDE
17	SWIMMING AT SURFACE
18	SWIMMING BELOW SURFACE
19	FLIPPERING
20	LOBTAILING, TAIL SLASH
21	SPYHOPPING
22	MOTIONLESS AT SURFACE
23	DIVE, FLUKES NOT RAISED
24	DIVE, FLUKES RAISED
25	BLOW, MIST VISIBLE
26	BLOW, MIST NOT VISIBLE
28	DIVE INTERVALS RECORDED
30	SWIMMING IN WAKE OF VESSEL
34	SWIMMING IN ONE DIRECTION
35	CIRCULAR MOTION
36	OBVIOUS CHANGE OF DIRECTION
37	DEFAECATION
38	CLOSE (<0.5 MILE) TO FISHING GEAR
40	MOTHER WITH YOUNG
41	APPARENT CALVING
42	APPARENT NURSING
43	PENIS OBSERVED
44	BODY CONTACT, BELLY TO BELLY
45	RIDING WHALE BOW WAVE
50	ASSOCIATED WITH SEAWEED
51	ASSOCIATED WITH OTHER CETACEANS
52	ASSOCIATED WITH PINNIPEDS
53	ASSOCIATED WITH BIRDS
54	APPARENT FEEDING
55	FEEDING ON FISHERY CATCH OR BY CATCH
58	BUBBLES OBSERVED
59	ASSOCIATED WITH SMALL FISH
60	ASSOCIATED WITH LARGE FISH
61	ASSOCIATED WITH SQUID
62	ASSOCIATED WITH JELLYFISH
63	ASSOCIATED WITH VISIBLE ZOOLPLANKTON
65	DISTINCT SUB GROUPS

67	BELLY TO BELLY CONTACT
68	MOTIONLESS BELOW SURFACE
69	DIVING (TURTLES)
70	ON BEACH, NESTING OR OTHER (TURTLES)
76	HAULED OUT ON BEACH (SEALS)
77	HAULED OUT ON ROCKS (SEALS)
78	MILLING
79	ASSOCIATED WITH PHYSICAL FEATURES
80	AUDIBLE SOUNDS PRODUCED
81	UNDERWATER SOUNDS RECORDED
82	APPARENT OIL AVOIDANCE
83	APPARENT OIL ATTRACTION
84	IN CONTACT WITH OIL
85	APPARENTLY NOT INFLUENCED BY OIL
86	CHANGE IN GROUP HEADING
87	CHANGE IN GROUP STRUCTURE
88	BIOPSY DARTED
89	TAGGED (ALL TYPES)
90	SURFACE ACTIVE GROUP (RIGHT WHALES)
91	THRASHING, VIOLENT BEHAVIOUR
92	TANGLED IN FISHING GEAR
93	ABNORMAL BEHAVIOUR
94	UNCODEABLE BEHAVIOUR
97	MUD ON ANIMAL
98	STRUCK BY VESSEL.
99	NOT RECORDED
100	escort with cow and young
101	animal approaching platform
102	animal rolling on its side
103	splashing at surface
104	ASSOCIATED WITH FEED (NS)
105	Distinct individual(s)/subgroup JOIN with other individual or subgroup
106	split or break away from group
107	Trumpetting
108	Random Travel (humpbacks)
109	LONG DIVES (>=10 MINUTES)

4. WS_CLOUDCODES (percentage of sky covered by cloud).

CLOUD_CD	CLOUD CONDITIONS DESCRIPTION
0	NO CLOUD GIVEN
1	CLEAR < 10 %
2	SCATTERED (10-50 %)
3	BROKEN (50-90 %)
4	OVERCAST (> 90%)
9	SKY OBSCURED, CANNOT BE ESTIMATED

5. WS_CONFIDENCELEVELS (confidence in estimated number of animals

CL_CD	CONFIDENCE RANGE
0	+/ - 0
1	+/ - 1
2	+/ - 2
3	+/ - 5
4	+/- 10
5	+/ - 25
6	+/ - 50
7	+/ - 100
8	+/ - 1000
9	+ "At least" for groups
11	Unknown number of animals
10	no estimate of confidence

6. WS_DATACENTERS

DATACENTER_CD	DATACENTER
BIO	Bedford Institute of Oceanography
SABS	St Andrews Biological Station
IML	Maurice Lamontagne Inst.
NAFC	Northwest Atlantic Fisheries Ctr.
NOAA	Natnl Oceanic Atmospheric Admin
NEFSC	Northeast Fisheries Science Center

7. WS_DATASOURCES

DATASOURCE_CD	DESCRIPTION
1	OBSERVER PROGRAM
2	FISHERMEN
3	CONSULTING
4	FSRS
5	DFO SURVEYS*
6	MILITARY PERSONNEL
7	AERIAL SURVEILLANCE
8	FISHERIES SURVEILLANCE
9	NGO RESEARCH
10	COMMERCIAL VESSEL
11	DFO RESEARCH
12	NMFS RESEARCH
15	ECES AERIAL
16	WHALE WATCH
18	Academic Research
17	GENERAL PUBLIC
19	CWS (observers)
23	DFO C&P Personnel
20	Dalhousie University
21	CCG Advisory Notice
22	CCG Personnel
25	NEAQ Personnel
26	Whale Alert App
28	NOAA Personnel
27	Facebook
24	Campobello Whale Rescue

8. WS_DATATYPES

EFFORT
OPPORTUNISTIC

9. WS_DIRECTIONS

DIRECTION_CD	DIRECTION BEARING
0	N 349-011
1	NNE 012-033
2	NE 034-056
3	ENE 057-078
4	E 079-101
5	ESE 102-123
6	SE 124-146
7	SSE 147-168
8	S 169-191
9	SSW 192-213
10	SW 214-236
11	WSW 237-258
12	W 259-281
13	WNW 282-303
14	NW 304-326
15	NNW 327-348
16	Circling
17	Various
99	Not given

10. WS_EVENTTYPES

EVENT-CD	EVENT DESCRIPTION
1	ANIMAL SPECIES
2	GEAR,DEBRIS TYPE
0	NO EVENT GIVEN
3	FISHING VESSELS
6	WHALE WATCH/RESEARCH ACTIVITY
4	ACOUSTIC MONITORING

11. WS_FEATURETYPECODES

FEATURETYPE_CD	FEATURE USED TO IDENTIFY SPECIES
0	N/A
1	Colour
2	Blow
3	Swimming
4	Flukes
5	markings
6	fins
7	size

12. WS_GEARCODES

GEAR_CD	GEAR DESCRIPTION
0	NO GEAR GIVEN
1	RESEARCH VESSEL
2	WHALE WATCH VESSEL
3	FISHING VESSEL
4	RECREATIONAL VESSEL
5	SEISMIC AIR GUN OPERATIONS
6	SURVEY PLANE
7	COMMERCIAL SHIP
8	CCG Vessel
9	Aircraft-military
11	OTTER TRAWL - SIDE
12	OTTER TRAWL -STERN
15	MIDWATER TRAWL - STERN
20	SEINE - UNSPECIFIED
31	PURSE SEINE
40	GILLNET - UNSPECIFIED
41	SET GILLNETS
42	DRIFT GILLNETS
50	LONGLINE - UNSPECIFIED
51	SET LONGLINES
52	DRIFT LONGLINES
53	HANDLINERS
54	TROLL LINES
60	FIX TRAPS - UNSPECIFIED
62	POTS - CRAB, LOBSTER
63	WEIR
71	DREDGE BOAT
81	HARPOONS
85	FEEDING ON OFFAL AND GEAR LOSS
90	MISC OTHER GEARS
97	ISAACS KID TRAWL
99	Not Given
100	UNIDENTIFIED FISHING VESSEL
101	FISHING GEAR/ROPES NS TYPE

13. WS_GEARIMPACTCODES

GEARIMPACT_CD	Impact of fishing gear on animal
1	Entangled - dead on gear
2	Entangled - released alive
9	No Gear Code Given
3	dead- not entangled

14. WS_GLARECODES

GLARE_CD	GLARE DESCRIPTION
0	NONE
1	SLIGHT
2	MODERATE
3	SEVERE
9	NOT GIVEN

15. WS_IDRELCODES

IDREL_CD	IDREL DESCRIPTION
1	UNSURE/POSSIBLE
2	PROBABLE
3	DEFINITE
9	UNKNOWN/NOT RECORDED

16. WS_MATURITYCODES

MATURITY_CD	MATURITY DESCRIPTION
1	Adult
2	Sub-adult
3	Calf
9	Undetermined

17. WS_PHOTOCODES

PHOTO_CD	PHOTO DESCRIPTION
1	no
2	slide,prints
3	cinemat
4	video
5	mutiple types
6	e-files

18. WS_PLATFORMS

PLATFORM_CD	PLATFORM*
1	CCGS J.L HART
2	CCGS ALFRED NEEDLER
3	CCGS CYGNUS
4	TAR N KEN
5	CESSNA SKYMASTER
6	CCGS EDWARD CORNWALLIS
7	CCGS HUDSON
8	W.B SCOTT
9	SALAR
10	CAPE JOHN
11	GRAND MANAN WHALE AND SEABIRD
12	FISHING VESSELS - OBSERVER TRIPS
13	GREENWOOD - AURORA
14	CAT FERRY
15	BRIER ISLAND WHALEWATCH
16	PROVINCIAL AIR - DFO
17	CCGS PARIZEAU
18	CCGS PANDALUS

*Additional codes not provided here due to privacy concerns

19. WS_REGIONS

DATACENTER_CD	DATACENTER
MAR	DFO-Maritimes
QUE	DFO-Quebec
NFL	DFO-Newfoundland
GFL	DFO-Gulf

20. WS_RESTRICTIONS

DATACENTER_CD	DATACENTER
P	Public
I	Internal

*21. WS_SIGHTOBSCODES**

PLATFORM_CD	PLATFORM
1	CCGS J.L HART
2	CCGS ALFRED NEEDLER
3	CCGS CYGNUS
4	TAR N KEN
5	CESSNA SKYMASTER
6	CCGS EDWARD CORNWALLIS
7	CCGS HUDSON

- Only a *sample of this table is reproduced here due to privacy concerns)*

22. WS_SPECIESCODES

SPECIES_CD	COMMON NAME	SCIENTIFIC NAME
0	SPECIES NOT IDENTIFIED	
33	MARLIN - BLUE	*Makaira nigricans*
71	TUNA-BLUEFIN	*Thunnus thynnus*
72	SWORDFISH	*Xiphias gladius*
230	SHARK - PORBEAGLE	*Lamna nasus*
231	SHARK-BLUE	*Prionace glauca*
233	SHARK-BASKING	*Cetorhinus maximus*
234	Thresher Shark	*Alopias vulpinus*
237	GREENLAND SHARK	*Somniosus microcephalus*
256	UNIDENTIFIED PELAGIC FISH	
592	SHARKS (NS)	
730	OCEAN SUNFISH	*Mola mola*
900	SEALS (NS)	
901	SEAL-HARBOUR	*Phoca Vitulina*
902	SEAL-GREY	*Halichoerus grypus*
920	WHALES (NS)	
921	WHALE-ATLANTIC PILOT	*Globicephala melaena*
922	WHALE-NORTHERN BOTTLENOSE	*Hyperoodon ampullatus*
923	WHALE-SOWERBY'S BEAKED	*Mesoplodon bidens*
924	WHALE-BEAKED (NS)	
925	WHALE- CUVIER'S BEAKED	*Ziphius cavirostris*
930	DOLPHINS/PORPOISE (NS)	
931	DOLPHINS-ATLANTIC BOTTLENOSE	*Tursiops truncatus*
932	DOLPHINS-WHITE-BEAKED	*Lagenorhynchus albirostris*
933	DOLPHINS-ATLANTIC WHITE-SIDED	*Lagenorhynchus acutus*
934	DOLPHINS-COMMON	*Delphinus delphis*
935	DOLPHINS-RISSO'S	*Grampus griseus*
936	DOLPHINS-STRIPED	*Stenella coeruleoalba*
937	DOLPHIN-ATLANTIC SPOTTED	*Stenella frontalis*
7019	PYGMY SPERM WHALE	*Kojia breviceps*
7020	WHALE-SPERM	*Physeter macrocephalus*
7021	WHALE-FIN	*Balaenoptera physalus*
7022	WHALE-MINKE	*Balaenoptera acutorostrata*
7023	WHALE-NORTH ATLANTIC RIGHT	*Eubalaena glacialis*
7024	WHALE-HUMPBACK	*Megaptera novaeangliae*
7025	PORPOISE-HARBOUR	*Phocoena phocoena*
7026	WHALE-BLUE	*Balaenoptera musculus*
7027	WHALE-SEI	*Balaenoptera borealis*
7028	WHALE-KILLER	*Orcinus orca*
7029	WHALE-BELUGA	*Delphinapterus leucas*
7030	BALEEN WHALE (NS)	

22. WS_SPECIESCODES

SPECIES_CD	COMMON NAME	SCIENTIFIC NAME
7031	WHALE- LONG-FINNED PILOT	*Globicephala melas*
7032	WHALE-BOWHEAD	*Balaena mysticetus*
7033	WHALE-GREY	*Eschrichtius robustus*
7034	DOLPHIN-PACIFIC WHITE-SIDED	*Lagenorhynchus obliquidens*
7035	PORPOISE-DALL'S	*Phocoenoides dalli*
7036	CETACEAN (NS)	*Cetacea*
7037	FALSE KILLER WHALE	*Pseudorca crassidens*
7038	LONG SNOUTED SPINNER DOLPHIN	*Stenella longirostris*
7201	SEAL-BEARDED	*Erignathus barbatus*
7202	SEAL-HARP	*Pagophilus groenlandicus*
7203	SEAL-HOODED	*Cystophora cristata*
7204	SEAL-NORTHERN FUR	*Callorhinus ursinus*
7205	SEAL-RINGED	*Pusa hispida*
7206	SEAL-RIBBON	*Histriophoca fasciata*
7207	SEAL-SPOTTED	*Phoca largha*
7208	WALRUS	*Odobenus rosmarus*
7209	SEA LION-STELLAR	*Eumetopias jubatus*
7220	BEAR-POLAR	*Ursus maritimus*
9210	SEABIRD-GREAT EGRET	*Ardea alba*
9211	SEABIRD-STORM PETREL (NS)	*Hydrobatidae*
9430	SEATURTLE (NS)	
9431	SEATURTLE-GREEN	*Chelonia mydas*
9435	SEATURTLE-LEATHERBACK	*Dermochelys coriacea*
9436	SEATURTLE-LOGGERHEAD	*Caretta caretta*
9453	SEABIRD-RED-NECKED PHALAROPE	*Phalaropus lobatus*
9460	SEABIRD-LAUGHING GULL	*Leucophaeus atricilla*
9485	SEABIRD-ATLANTIC PUFFIN	*Fratercula arctica*
9488	SEABIRD-GREATER SHEARWATER	*Puffinus gravis*

23. WS_TRIPTYPES

TRIPTYPE_CD	TRIPTYPE
1	DFO SURVEY
2	FISHING
3	ENERGY SECTOR RESEARCH (OIL AND GAS, TIDAL ENERGY)
4	WHALEWATCH
5	COMMERCIAL (FERRY, CONTAINER SHIP)
6	MILITARY SHIP
7	FISHERIES SURVEILLANCE SHIP (DFO C&P)
8	FISHERIES SURVEILLANCE AIR (DFO C&P)
9	AERIAL SURVEY
10	NGO RESEARCH
11	DFO RESEARCH
12	NMFS RESEARCH
15	ACADEMIC RESEARCH
13	GENERAL PUBLIC (PRIVATE CITIZEN)
14	MILITARY AIRCRAFT
16	NA
17	CCG ACTIVITIES (PATROLS, MAINTENANCE, ETC)
19	NEAQ WHALE SURVEY
18	WHALE RESCUE
20	NOAA RESEARCH/ MONITORING/SURVEY
21	NRCAN RESEARCH
22	NAFO (ICNAF) RESEARCH

24. WS_VISIBILITYCODES

VISIBILITY_CD	VISIBILITY DESCRIPTION
1	clear > 2nm
2	< 2nm, fog
3	< 2nm, haze
4	< 2nm, rain
5	< 2nm, snow
9	none given
6	< 2nm, darkness
7	<2nm, no reason PROVIDED

APPENDIX 4. DATA REQUEST AGREEMENT

<table>
<tr><td>Client Name</td><td colspan="3"></td></tr>
<tr><td>Date of Request</td><td colspan="3">Click here to enter a date.</td></tr>
<tr><td>Date Data Required
(please allow 5-10 business days)</td><td colspan="3">Click here to enter a date.</td></tr>
<tr><td>Client Contact Information</td><td colspan="3">Phone Number:
E-mail:</td></tr>
<tr><td rowspan="2">Organization
(Please check all that apply and include organization name)</td><td>External
☐Federal Gov't (not DFO):
☐Provincial Gov't:
☐Academic:
☐Association:
☐NGO:
☐Other:</td><td>DFO
☐Maritimes Region:
☐Gulf Region:
☐Newfoundland Region:
☐Quebec Region
☐Central and Arctic
☐Pacific Regions
☐National Headquarters</td><td>DFO continued
☐DFO Science
☐C&P
☐Oceans
☐Resource Management
☐Policy
☐Economics
☐Other</td></tr>
<tr><td colspan="3">Organization/ department name:</td></tr>
<tr><td>Data Description
(Please provide a detailed description of the data requested- see page 2 for data fields available)</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Intended use of Data
(Please check all that apply and provide a description)</td><td>☐Consultation
☐Environmental Impact Assessment (indicate type)
Industry Type:
☐Academic Research
☐Public Publication
☐NGO Research</td><td colspan="2">☐Internal Research
☐Internal Publication
☐Other</td></tr>
<tr><td colspan="3">Detailed Description:</td></tr>
<tr><td>Geographic Area Requested</td><td colspan="3">Description of Area (e.g. Roseway Basin, Scotian Shelf….):

Where possible, please provide ranges in latitude and longitude.
Latitude From: To:
Longitude From: To:</td></tr>
</table>

Fields Requested *(Please check all that apply)*	☐Date ☐Time ☐Latitude ☐Longitude ☐Beaufort State ☐Visibility ☐Cloud Cover ☐Species Identification Confidence Level	☐Number sighted ☐Number Sighted Confidence Level ☐Number of Groups ☐Whale ID (when available) ☐Maturity ☐Behaviours
	Species (please check all that apply) ☐ALL ☐NO SPECIES GIVEN ☐TUNA-BLUEFIN ☐ SWORDFISH ☐ SHARK-BLUE ☐ SHARK-BASKING ☐ UNIDENTIFIED PELAGIC FISH ☐ SHARKS (NS) ☐ OCEAN SUNFISH ☐ SEALS (NS) ☐ SEAL-HARBOUR ☐ SEAL-GREY ☐ WHALES (NS) ☐ WHALE-ATLANTIC PILOT ☐ WHALE-NORTHERN BOTTLENOSE ☐ WHALE-SOWERBY'S BEAKED ☐ WHALE-BEAKED (NS) ☐ WHALE- CUVIER'S BEAKED ☐ DOLPHINS (NS) ☐ DOLPHINS-ATLANTIC BOTTLENOSE ☐ DOLPHINS-WHITE-BEAKED ☐ DOLPHINS-WHITE-SIDED ☐ DOLPHINS-COMMON ☐ DOLPHINS-RISSOS ☐ DOLPHINS-STRIPED ☐ DOLPHIN-SPOTTED ☐ PYGMY SPERM WHALE ☐ WHALE-SPERM ☐ WHALE-FIN ☐ WHALE-MINKE	☐ WHALE-North Atlantic RIGHT ☐ WHALE-HUMPBACK ☐ PORPOISE-HARBOUR ☐ WHALE-BLUE ☐ WHALE-SEI ☐ WHALE-KILLER ☐ BALEEN WHALE (NS) ☐ WHALE- LONG-FINNED PILOT ☐ SEATURTLE (NS) ☐ SEATURTLE-GREEN ☐ SEATURTLE-LEATHERBACK ☐ SEATURTLE-LOGGERHEAD ☐Other Species:

Please note the following caveats regarding data in the Whale Sightings Database:

1. The sighting data have not yet been completely error-checked.
2. The quality of some of the sighting data is unknown. Most sightings are collected on an opportunistic basis and observations may come from individuals with a variety of expertise in marine mammal identification experiences.
3. Most data have been gathered from platforms of opportunity that were vessel-based. The inherent problems with negative or positive reactions by cetaceans to the approach of such vessels have not yet been factored into the data
4. Sighting effort has not been quantified (i.e., the numbers cannot be used to estimate true species density or abundance for an area). Lack of sightings do not represent lack of species present in a particular area
5. Numbers sighted have not been verified (especially in light of the significant differences in detectability among species).
6. For completeness, the data represent an amalgamation of sightings from a variety of years and seasons. Effort (and number of sightings) is not necessarily consistent among months, years, and areas. There are large gaps between years. Thus seasonal, depth, and distributional information should not be considered definitive.
7. Many sightings could not be identified to species, but are listed to the smallest taxonomic group possible.

Data Use Conditions:

1. The following citation format shall be used in all references to these data: Whalesitings Database, Ocean and Ecosystem Sciences Division, Dartmouth, NS, *[yyyymmdd]*
2. The data may only be used for the following intended purpose given in the form above.
3. DFO personnel shall be invited to review draft publications to ensure that business confidentiality is maintained. This condition is only required for some data.
4. DFO personnel shall be informed of any publication resulting from these data. NOTE: Any figures, tables and/or reports that utilize the data provided must clearly indicate the associated caveats regarding data accuracy.
5. DFO permission is required for any other use.
6. Copyright and ownership of the data remains with DFO in right of her majesty the Queen.
7. The data shall not be copied, digitized, scanned, sold, licensed, leased, assigned or given to a third party for the purpose of reproducing, extracting or marketing the DFO data, without the prior approval of DFO.
8. The data shall not be included in whole or in part in any commercial products without a licensing agreement with DFO.
9. You recognize the limitations of the data and understand that DFO does not warrant or guarantee the accuracy, completeness or currency of the data for any specific use.

_____ _____

Applicant Signature Date