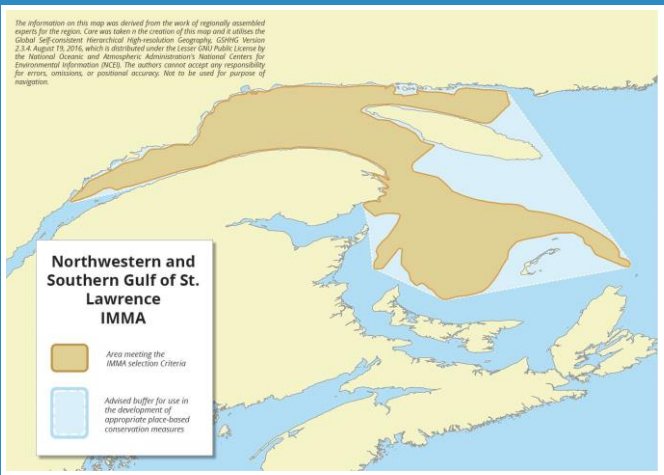
Northwestern and Southern Gulf of St. Lawrence IMMA



Area Size

69,733 km²

Qualifying Species and Criteria

Blue Whale – *Balaenoptera musculus*

Criterion A; B (2); C (2)

North Atlantic Right Whale – *Eubalaena glacialis*

Criterion A; B (2); C (2)

Fin Whale – *Balaenoptera physalus*

Criterion A; C (2)

Hooded Seal – *Cystophora cristata*

Criterion A; C (1)

Humpback Whale – *Megaptera novaeangliae*

Criterion B (2); C (2)

Harbor Porpoise – *Phocoena phocoena*

Criterion B (2); C (2)

Harp Seal – *Pagophilus groenlandicus*

Criterion C (1)

Criterion D (2) - Marine Mammal Diversity

Balaenoptera acutorostrata, Balaenoptera musculus, Balaenoptera physalus, Cystophora cristata, Delphinapterus leucas, Eubalaena glacialis, Globicephala melas, Halichoerus grypus, Lagenorhynchus albirostris, Leucopleurus acutus, Megaptera novaeangliae, Pagophilus groenlandicus, Phoca vitulina, Phocoena phocoena, Physeter macrocephalus

Summary

The Northwestern and Southern Gulf of St. Lawrence IMMA, including the Lower St. Lawrence Estuary, is located in eastern Canada. The confluence of temperate waters with the cooler Labrador Current waters creates conditions that support a high diversity of marine mammal species. Beluga (*Delphinapterus leucas*) and harbour seals *(Phoca vitulina*) occur in the IMMA year-round although their distribution varies with season. Other species enter the IMMA in the autumn or early winter to feed and breed such as harp seals (*Pagophilus groenlandicus*) and hooded seals (*Cystophora cristata*). Several species use the IMMA mainly during the ice free season to feed, including blue whales (*Balaenoptera musculus*), fin whales (*Balaenoptera physalus*), minke whales (*Balaenoptera acutorostrata*), humpback whales (*Megaptera novaeangliae*), sperm whales (*Physeter macrocephalus*), long-finned pilot whales (*Globicephala melas*), white-sided dolphins (*Lagenorhynchus acutus*), white-beaked dolphins (*Lagenorhynchus albirostris*), grey seals (*Halichoerus grypus*), harbour porpoises (*Phocoena phocoena*), and North Atlantic right whales (*Eubalaena glacialis*). The IMMA is used by threatened species (North Atlantic right whales, St. Lawrence Estuary belugas, blue whales, fin whales, hooded seals, and sperm whales), and sustains a particularly high diversity of marine mammals (15 species). The IMMA encompasses part of the Saguenay St-Lawrence Marine Park, most of the important habitats of blue whales, four EBSAs, and important habitat for a large portion of the critically endangered NARW population.

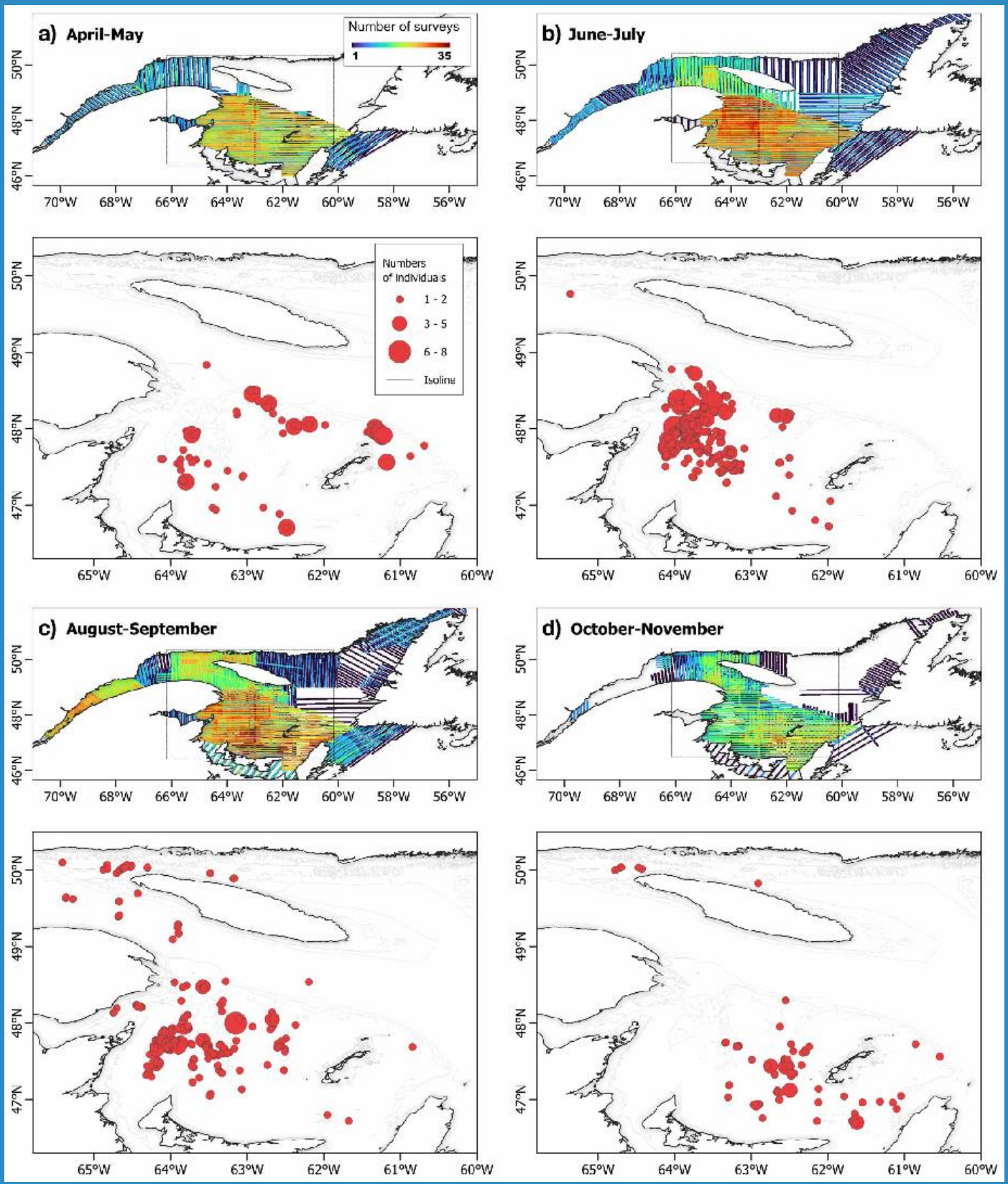


Figure 1: Survey effort (upper panels) and location of North Atlantic right whale (*Eubalaena glacialis*) sightings (lower panels) during aerial visual surveys conducted from 2017 to 2023 in the Gulf of St Lawrence. For complete survey effort in eastern Canadian waters see St-Pierre et al. (2024). Excerpt from Mosnier et al. (2025).

Figure 2: Two blue whales (*Balaenoptera musculus*) lunge feeding in the Gulf of St. Lawrence. Photo credit: MICSPhoto/Video.

Description:

The IMMA is located in eastern Canada. It is bounded in the Gulf of St. Lawrence by the southern edge of the Laurentian Channel, along which south-flowing water mass movements enhance prey densities, and by the head of the Laurentian Channel in the Lower St. Lawrence Estuary. The IMMA has highly heterogeneous bathymetry, with multiple canyons. The abrupt end of the Laurentian Channel in the Lower St. Lawrence results in intense tidally-driven upwelling and complex water mass movements interacting with local topography Estuary that enhance productivity (Saucier et al., 2009; Savenkoff et al., 2017). The Gaspé Current and Anticosti Gyre results are the two main drivers of the hydrodynamic circulation in the Gulf of St. Lawrence. The Lower St. Lawrence Estuary and northwestern Gulf of St. Lawrence have an intertwined hydrodynamic circulation that provides the *Calanus* spp. supply necessary for maintaining the feeding habitat of NARW in the southern Gulf of St. Lawrence (Johnson et al., 2024), and the highly concentrated / aggregated biomasses of fish and zooplankton species along abrupt topographical features that are sought by a suite of species.

The IMMA encompasses four recognized EBSAs (Lesage et al., 2007; Savenkoff et al., 2007), part of the Critical Habitat and important habitats for St. Lawrence Estuary beluga (DFO, 2012; Lesage et al., 2024), the Saguenay St. Lawrence Marine Park, which aims to protect marine mammals, most of the important habitats for blue whales (Figure 4; Lesage et al., 2018), and some important feeding habitat for North Atlantic right whales (Crowe et al., 2021; Johnson et al., 2024; St-Pierre et al., 2024; Wright et al., 2024). This area is subject to voluntary and mandatory speed reduction measures to mitigate collision risks to rorquals and North Atlantic right whales, and to seasonal fishery closures to reduce entanglement risks to the latter species (Chion et al., 2018; DFO, 2024; Transport Canada, 2024).

Criterion A: Species or Population Vulnerability

Four species that regularly occur in the IMMA are threatened with extinction according to the global IUCN Red List: the North Atlantic right whale (*Eubalaena glacialis*) is listed as Critically Endangered (Cooke 2020) and the blue whale (*Balaenoptera musculus*) as Endangered (Cooke 2018a), whereas fin whales (*Balaenoptera physalus*) and hooded seals (*Cystophora cristata*) are evaluated as Vulnerable (Cooke, 2018b; Kovacs et al., 2016). The Canadian Species at Risk Act (SARA) lists the North Atlantic right whale and Northwest Atlantic blue whale as Endangered (Beauchamp et al., 2009; DFO, 2014), and the Atlantic fin whale as a population of Special Concern (DFO, 2016).

Criterion B: Distribution and Abundance Sub-criterion B2: Aggregations

Photo-identification and passive Acoustic Monitoring (PAM) data indicate that the IMMA represents the main aggregation area for the Northwest Atlantic blue whale population during the ice-free period (Comtois et al., 2010; Ramp & Sears, 2013; Simard et al., 2016; Moors-Murphy et al., 2019; Lesage et al., 2018; Davis et al., 2020; Delarue et al., 2022). Over the period from 1980 to 2008, the number of blue whales visiting the IMMA varied between years from less than 20 to up to 109 individuals (Ramp & Sears, 2013). With an estimated population of fewer than 250 mature individuals (COSEWIC, 2012), this would represent at least 5% of the population in years of low occurrence, and 33% or more in years of high frequentation (assuming 33% of the population are juveniles). Mark-recapture analysis also indicates some degree of site fidelity with 67% of the individuals seen over several years (Ramp & Sears, 2013). Blue whales generally enter the IMMA in March each year, with a peak in August-September, and most animals departing by December (Ramp & Sears, 2013; Lesage et al., 2017).

Since at least 2015, the IMMA attracts approximately 30-40% of the Critically Endangered North Atlantic right whale population each year. Right whales are present between May and November, with peak abundance from June to August (DFO, 2018; Crowe et al., 2021; Simard et al., 2019, 2024; St-Pierre et al., 2024; WhaleInsight, 2024). Monthly aggregations in the southern Gulf of St. Lawrence can reach 120 distinct individuals (Crowe et al., 2021; see also St-Pierre et al., 2024), particularly in the Shediac Valley and surrounding waters, where large copepod biomasses accumulate (Sorochan et al., 2023; Johnson et al., 2024).

Harbour porpoises (*Phocoena phocoena*) occur throughout the North Atlantic (Stenson, 2003). In Canadian and U.S. waters, they are suspected to belong to three sub-populations: Newfoundland–Labrador, Gulf of St. Lawrence, and Bay of Fundy–Gulf of Maine, with porpoises on the Scotian Shelf potentially belonging to either the Gulf of St. Lawrence or Bay of Fundy–Gulf of Maine subpopulation (Stenson, 2003; NMFS, 2022; COSEWIC, 2022). During a survey of the entire eastern Canadian seaboard (thus covering the summer range of two populations and part of the range of the 3rd – Fundy-Gulf of Maine – population), the IMMA yielded the highest number of porpoise sightings (Lawson & Gosselin, 2018), suggesting they concentrate in the IMMA. Caution is however needed given these relative abundances are based on raw sightings and not corrected for effort or local weather conditions. Data about patterns in seasonal occurrence of porpoises in the IMMA are scarce, although reports mainly occur during summer (Lesage et al., 2007). Humpback whales (*Megaptera novaeangliae*) in the North Atlantic feed from the Northern Hemisphere spring to autumn in six regions, representing discrete

subpopulations to which humpback whales show high matrilineally-defined site fidelity (Katona & Beard, 1990; Clapham & Mayo, 1987; Palsbøll et al., 2001; Stevick et al., 2006). The humpback whales using the Gulf of St. Lawrence are considered as one of these six subpopulations (Katona & Beard, 1990). All known aggregation areas for this subpopulation, with the exception of the Mecatina Through, fall within the limits of the IMMA (Comptois et al., 2010; see also Doniol-Valcroze et al., 2007; Mosnier et al., 2022). There is no abundance estimate for the subpopulation of humpback whales in the Gulf of St. Lawrence.

Criterion C: Key Life Cycle Activities
Sub-criterion C1: Reproductive Areas

The IMMA is one of three main areas used by the Northwest Atlantic harp seal population for whelping during winter (Stenson et al., 2022). In years when ice conditions are favourable, up to 18% of the pup production for the whole population may occur in the IMMA, representing up to nearly 300,000 pups (Stenson et al. 1993, 2014, 2022). In recent years, poorer ice conditions have led to a decrease in habitat use for whelping, with pup production representing only 3 to 10% (up to 63,000 pups) of total production (Stenson et al., 2022; Goulet et al., in press). Given mating occurs right after pups are weaned, pupping, lactation, and mating are supported by the IMMA.

Northwest Atlantic hooded seals migrate from the Arctic near Greenland in late autumn to the waters off the east coast of Canada, near Newfoundland (Front), or into the Gulf of St Lawrence (Gulf), where pupping occurs on the pack-ice in March (Sergeant, 1976; Hammill, 1993). When last assessed in 2005, ice conditions were favourable and approximately 6% of the total pup production (6,600 pups in 2005) for the population occurred within the IMMA (Stenson et al., 2006). Given mating occurs right after pups are weaned, pupping, lactation, and mating are supported by the IMMA.

Sub-criterion C2: Feeding Areas

The IMMA encompasses two main oceanographic features of the hydrodynamic circulation in the Gulf of St. Lawrence (the Gaspé Current and the Anticosti Gyre), and a large portion of the deep Laurentian Channel, which ends abruptly in the Lower St. Lawrence Estuary. Intense tidally driven upwelling along abrupt topographical features, and complex water mass movements over shallow areas (Saucier et al., 2009; Sourisseau et al., 2006; Savenkoff et al., 2017) together result in high concentration–aggregation of persistent krill and small pelagic fish biomasses in the IMMA, creating highly favourable foraging conditions in the Lower St. Lawrence Estuary and northwestern Gulf of St. Lawrence for marine mammals and other species (Bailey et al., 1977; Ménard, 1998; Marchand et al., 1999; Simard & Lavoie, 1999; Lavoie et al., 2000; Saucier & Chassé, 2000 and references therein; Ouellet, 2007). Prey densities are further enhanced in the southern Gulf of St. Lawrence by relatively shallow depths, which interacts with zooplankton vertical movements, trapping prey within easily accessible depths for marine mammals (e.g., Johnson et al., 2024).

Archival dive data and area-restricted search behaviours documented through satellite tagging indicate that blue and fin whales forage intensively within the IMMA during the ice-free period (Doniol-Valcroze et al., 2011, 2012; Kot et al., 2014; Lesage et al., 2017; Roy et al., 2018; Guilpin et al., 2019; Ramp et al., 2024), a behaviour echoed by other rorqual species for which lunge feeding at or near the surface has been reported on a regular basis (e.g., Lynas & Sylvestre, 1988; Kot et al., 2014; Christiansen et al., 2015; see also Doniol-Valcroze et al., 2007;

Naud et al., 2003). Foraging for humpback whales is evidenced by their documented fattening while in this IMMA (Narazaki et al., 2018; Aoki et al., 2021). Since at least 2015, approximately 30-40% of the critically endangered North Atlantic right whale population aggregates in the IMMA each year between May and November (DFO, 2018; Crowe et al., 2021; St-Pierre et al., 2024; Simard et al., 2019; 2024; Whale Insight, 2024). While direct evidence for feeding behaviour is still limited in the literature (see Wright et al., 2024), timing of use, high numbers of individuals observed, and high biomasses of copepods observed in the IMMA during the right whale feeding period (Sorochan et al., 2023; Plourde et al., 2024) indicate feeding is the main purpose for use of the IMMA (see also Gavrilchuk et al., 2021; Johnson et al., 2024).

Evidence of foraging for harbour porpoises is supported by stomach contents (Fontaine et al., 1990), bycatch in fisheries operating within the IMMA (Lesage et al., 2006), and timing of their presence (e.g., corresponding to their feeding period; Lacroix Lepage, 2018).

Both the species that qualify for IMMA criteria and those indicated as 'supporting species' are likely attracted to the area for its productivity and feeding opportunities. While harp and hooded seals use the area for pupping on ice, fall, winter and spring diving and diet data indicate they also enter the IMMA to feed (Sergeant, 1991; Beck et al., 1993; Hammill et al., 2005; Bajzak et al., 2009; Vacquié-Garcia et al., 2024).

Figure 3: Fin whale (*Balaenoptera physalus*). Photo credit: DFO.

Criterion D: Special Attributes
Sub-criterion D2: Diversity

Fifteen species are known to occur in the IMMA on a regular basis. They include the seven species presented above, as well as the common minke whales (*Balaenoptera acutorostrata*), belugas (*Delphinapterus leucas*), long-finned pilot whales (*Globicephala melas*), grey seals (*Halichoerus grypus*), white-sided dolphins (*Leucopleurus acutus*), white-beaked dolphins (*L. albirostris)*, harbour seals (*Phoca vitulina*) and sperm whales (*Physeter macrocephalus*; Lesage et al., 2007; Doniol-Valcroze et al., 2007; Lawson & Gosselin, 2009, 2018; Comtois et al., 2010; Ramp & Sears, 2013; Truchon et al., 2013; Lacroix Lepage, 2018; St-Pierre et al., 2024). This area is among those described as having the highest species diversity off eastern Canada (e.g., Lesage et al., 2007; Convention on Biological Diversity, 2014). The Northwestern Gulf of St. Lawrence is influenced by both Arctic and more temperate waters, which likely enhances species diversity. While a wider diversity of marine mammal species may be reported in other more temperate areas off the eastern U.S. (e.g., Schick et al., 2011), the IMMA still stands out as an area with an exceptionally high diversity of marine mammals in the Northwest Atlantic.

Supporting Information

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