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Saving the North Atlantic right whale in a changing ocean: Gauging scientific and law and policy responses[☆]

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ABSTRACT

North Atlantic right whales (NARW) are one of the most endangered marine animals with a global population of ~400 individuals left. Recent climate-driven shifts in distribution have significantly increased their mortality risk from human activities. After twelve NARWs died in the Gulf of St. Lawrence in 2017 from fishing gear entanglement and ship strikes, Canada adopted measures designed to decrease overlap between these whales and relevant threats. Real-time monitoring of whale distribution combined with dynamic management of shipping corridors and fishing areas proved to be effective in reducing regional mortality to zero in 2018. Yet, this complex system was expensive to implement and caused tension with affected sectors. Following stakeholder consultations, Canada modified the system of static and dynamic measures for the 2019 season. These measures were less effective and eight observed right whale deaths triggered additional emergency responses. This paper reviews scientific and legal tools that were used to implement spatial management of NARW and marine activities between 2017 and 2019. It identifies key legislation that directs the government to protect NARW, such as the *Species at Risk Act* (SARA), as well as the regulatory tools under the *Fisheries Act* and *Canada Shipping Act* and discusses weaknesses in the implementation of these legal frameworks that contributed to compromised outcomes. The paper concludes with recommendations designed to promote recovery and protect endangered species that may undergo similar changes in distributions and threats under ongoing climate and environmental change. The need to strengthen the role of Canada's *Species at Risk Act* in future conservation efforts is highlighted, specifically the need to address the effects of climate change in recovery planning and the importance of expanding critical habitat protections.

1. Introduction

The North Atlantic right whale (*Eubalaena glacialis*) (NARW) is a large, migratory cetacean that previously inhabited most of the North Atlantic Ocean but is now largely confined to the U.S. and Canadian exclusive economic zones (Pace III et al., 2017; Pettis et al., 2017). With about 400 individuals left in the world, it has been assessed as Endangered by the International Union for Conservation of Nature; protected as Endangered under the *Species at Risk Act* (SARA)¹ in Canada and the *Endangered Species Act* (ESA)² in the U.S; and designated Depleted under

the American *Marine Mammals Protection Act*.³ The main cause of its depleted status is historical whaling for this species, which was banned in 1937. Over the past 80 years, the population has not substantially recovered, however, and has been declining since 2010 (Pace III et al., 2017). The main cause of recent declines is the high incidence of human-caused mortality, primarily from ship strikes and entanglement in stationary fishing gear. Low birth rates, possibly due to climate-related changes in prey availability, are thought to be another contributing factor (Meyer-Gutbrod and Greene, 2018).

An unprecedented mortality event occurred in the summer of 2017.

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¹ *Species at Risk Act*, S.C. 2002, c. 29 (SARA).

² *Endangered Species Act*, 16 U.S.C. §1531 (1973).

³ *Marine Mammal Protection Act*, 16 U.S.C. §1361 (1972).

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Twelve NARW were found dead and five live-entanglements were reported in the Canadian Gulf of St. Lawrence (Daoust et al., 2018). Seven necropsies showed that two whales died from entanglement; four had injuries consistent with ship strikes; and one carcass was in an advanced state of decomposition with signs suggesting acute trauma (Daoust et al., 2018). Five right whale deaths were reported in the United States in the same year, bringing the known death toll to 17, or about 4% of the remaining population (NOAA Fisheries, 2019).

A major catalyst for this mortality event was a substantial northwards shift in summer feeding habitat from the Bay of Fundy and Scotian Shelf into the Gulf of St. Lawrence where protective measures to address known threats from shipping and fishing were not in place. This distributional change likely unfolded in the years since 2010 and has been linked to a climate-warming related shift in the availability of a major prey species, the copepod *Calanus finmarchicus* (Meyer-Gutbrod et al., 2018).

Following initial fishery closures and mandatory vessel speed reductions in 2017 in response to the event, the Canadian government engaged in extensive consultations with stakeholders from the fishing and marine transportation industries, Indigenous peoples, provincial governments, National Oceanic and Atmospheric Administration (NOAA) representatives from the U.S., and scientists to agree on protective measures for 2018 (Fisheries and Oceans Canada, 2017a). Adopted measures in 2018, such as rope reduction requirements, fisheries closures and renewed vessel speed restrictions, were highly effective with zero NARW mortality reported in the Gulf of St. Lawrence (Greenhalgh, 2018; Macdonald, 2018). However, given the high value of fisheries in the Gulf, some fishermen perceived such area closures to be unreasonable (Doucette, 2018; Fraser, 2018; The Canadian Press, 2018). Concerns over lost cruise ship visits due to speed restrictions were also raised (Thomson, 2019). Following stakeholder consultations, the Canadian government announced a reduction in the areas subject to mandatory speed limits and season-long fisheries closures (Overton, 2018; Government of Canada, 2019a; Government of Canada, 2019b). These reduced measures as taken in 2019, however, were less successful, with eight deaths recorded in the Gulf of St. Lawrence by August 2019. As such, the longer-term prospects for this species remain uncertain.

Building on previous government reports (Fisheries and Oceans Canada, 2018a; Office of the Auditor General of Canada, 2018) and scientific analyses (Davies and Brilliant, 2019; Record et al., 2019), this article aims to gauge the adequacy of scientific, law and policy responses to the plight of the North Atlantic right whale through a four-part discussion. Part 2 reviews the state of scientific understanding related to the right whale including major threats and their connection to environmental and climate change. Part 3 provides an overview of Canadian laws and policies relevant to marine mammal protection. Part 4 describes the static and dynamic management measures adopted to specifically address the conservation crisis raised by increased mortality in the Gulf of St. Lawrence. Part 5 addresses future directions for scientific research and law and policy developments in support of NARW recovery. The need to strengthen the role of SARA in future conservation efforts is highlighted, specifically the need to address the effects of climate change in recovery planning and the importance of expanding critical habitat protections.

Because NARW are migratory transboundary species, their conservation cannot be ensured by Canada on its own. However, a full discussion of bilateral cooperation mechanisms and initiatives is outside the scope of this paper. Briefly, Canada and the U.S. have been cooperating through the existing bilateral mechanisms namely, the Canada-U.S. Species at Risk Working Group (SARWG) under the Canada – U.S. Transboundary Resources Steering Committee and the North Atlantic Right Whale Consortium (NARWC, n.d.; Bedford Institute of Oceanography, 2018a; Bedford Institute of Oceanography, 2018b). The Steering Committee is a forum for bi-annual discussions between Canada and the U.S. of the issues surrounding integrated ecosystem management in the Gulf of Maine and Georges Bank (Bedford Institute of Oceanography,

2018a). It also coordinates the work of three working groups, including SARWG (Bedford Institute of Oceanography, 2018b). The Consortium is a long-standing association of representatives from academic institutions, conservation organizations, the shipping and fishing industries, as well as different levels of government agencies in Canada and the U.S. (NARWC, n.d.). Through these mechanisms the two countries have been successful at sharing information and resources including scientific data, survey planes, and research vessels (NARWC, 2017; Bedford Institute of Oceanography, n.d.).

2. Scientific understanding

NARW have been studied extensively over the past 30 years and are probably one of the best-known marine mammal species worldwide. They can be identified individually by their unique coloration, scarring and skin deformity ('callosities') patterns, and as such their population can be censused with great accuracy. They are a migratory species that moves predominantly between its wintering and calving grounds off Florida to summer feeding habitats in New England and Canada, although occasional transatlantic return trips by individual whales have been observed. Its primary migratory pathways along the U.S. East Coast encompass some of the busiest maritime waters, extensively used by the shipping, fishing, oil and gas, and other industries. Since 2003, almost 90% of known deaths have been attributed to human-caused trauma, specifically entanglements in fishing gear (58%) and ship strikes (42%), according to a recent study (Sharp et al., 2019). The main entanglement risks come from abundant lobster and crab fishing gear, consisting of large traps set on the seafloor and connected to each other and the surface via heavy ropes. Since millions of such traps are deployed annually in NARW habitat, the risk of whale entanglement, subsequent injury and death remains high. Equally concerning, vessel density in the Northwest Atlantic Ocean is also very high, and slow-swimming NARW are often unable to evade rapidly approaching ships, resulting in severe trauma or death.

The observed lack of recovery from industrial whaling in North Atlantic right whales contrasts with the plight of the closely related southern right whale (*Eubalaena australis*). This species has been similarly affected by whaling, but has since increased by about 7% per year off the coast of Argentina (Cooke et al., 2001) and is now classified as Least Concern by the IUCN. Southern right whales have similar biology as the NARW, but occur in the southern hemisphere where industrial uses are more limited and human-caused mortality much reduced. This contrast supports the notion that North Atlantic right whales could recover if human caused mortality could be greatly reduced or eliminated.

Efforts to reduce NARW mortality have been underway for some time and led to a variety of protective measures, such as the re-routing of shipping lanes in the Bay of Fundy and Roseway Basin, where a large fraction of the population was found feeding on copepod prey in the summer (Vanderlaan et al., 2008; Vanderlaan and Taggart, 2009). These measures combined with favorable prey availability and increased reproductive success caused the population to show signs of recovery from 2000 to 2010. Since then, unfortunately, this trajectory has reversed, as most whales shifted their habitat northwards to the Gulf of St. Lawrence (Meyer-Gutbrod et al., 2018; Davies and Brilliant, 2019). This distributional shift has been linked to rapid regional warming in the Gulf of Maine and the Bay of Fundy, driven by changes in deepwater circulation and surface warming, which led to a decline of cold-water copepods species that represent critical prey for the NARW population (Record et al., 2019). Coinciding with a shift in prey availability, observed birth rates have been depressed in recent years, likely due to changes in female nutritional status and reproductive capacity (Meyer-Gutbrod and Greene, 2018). Furthermore, the Gulf of St. Lawrence is a major shipping route to the Great Lakes, and supports some of the most lucrative crab and lobster fishing in North America, elevating mortality risk from ship strikes and fishing gear entanglements,

respectively (Davies and Brilliant, 2019). With low birth rates and elevated mortality, however, the species has been declining in recent years and is projected to go extinct if current trends continue (Meyer-Gutbrod and Greene, 2018).

In summary, North Atlantic right whales present an interesting case study for a scientifically well-understood species with known threats, which should trigger a decisive policy response given North American endangered species legislation. Complicating this situation, however, are the overlaid effects of climate change, leading to shifts in prey availability, whale distribution, and overlap with human activities. We use the NARW case study here to argue that climate-change related complications are likely to arise for many endangered species today and into the future and should be addressed proactively in the relevant legal and policy frameworks.

3. Canadian laws and policies

An array of Canadian laws and policies provide protections to the North Atlantic right whale. The five main elements include SARA, the *Fisheries Act*,⁴ the *Canada Shipping Act, 2001*,⁵ the *Oceans Act*⁶ and the *Impact Assessment Act*⁷ (previously *Canadian Environmental Assessment Act, 2012*⁸). A review of these key statutes along with corresponding regulations and policies follows.

3.1. Species at Risk Act (SARA)

SARA aims to protect endangered species (VanderZwaag et al., 2011) such as the NARW which was listed as Endangered under the Act in January 2005 (Government of Canada, 2011). SARA prohibits the killing, harming, harassing, capturing or taking of an individual of a listed endangered wildlife species.⁹ A recovery strategy must be proposed and a draft published in SARA's public registry within one year of an endangered species' listing.¹⁰ A final strategy must be included in the public registry within 90 days of the initial registration.¹¹ SARA requires the development of one or more action plans to flesh out measures to address the threats raised in a recovery strategy,¹² but no firm timeline is established for finalizing action plans.¹³ SARA prohibits the destruction of endangered species' critical habitats that are identified in a recovery strategy or action plan.¹⁴ To ensure protection of critical habitats, SARA requires a ministerial statement of how the critical habitat is protected under existing laws¹⁵ or a ministerial order if the critical habitat is not yet legally protected.¹⁶ The statement or order must be issued within 180 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry.¹⁷

The definitions of "habitat" and "critical habitat" refer to an identifiable geographical location as well as the physical and biological features that are used by a species in its life processes.¹⁸ Since the location and special features are tightly linked, a recovery strategy has to

describe both in order to be compliant with SARA.¹⁹ However, there is room for uncertainty in the wording of paragraph 41(1)(c) which provides that the Minister has to identify critical habitat "to the extent possible" based on the best information available at the time the recovery strategy is developed.²⁰ This means that the identified location(s) may change as new research is conducted and available information is re-evaluated.²¹

As explained above, once critical habitat is identified in a recovery strategy, it has to be protected under existing laws (and the details of this protection have to be outlined in a statement) or by a protective order. Protection under existing laws has to be equivalent to the level of protection offered by an order and has to be legally enforceable.²² Since habitat protection measures under the *Fisheries Act*, discussed below, are subject to Ministerial discretion, they do not qualify without an additional enforcement mechanism.²³

Implementation of SARA's protections in relation to the North Atlantic right whale has been slow, as observed for other species listed under the Act (Mooers et al., 2010). Although a recovery strategy should have been prepared by January 2006, a first strategy was not published until June 2009 with further amendment in 2014 (Fisheries and Oceans Canada, 2014). While the Recovery Strategy promised to develop a first chapter of an action plan within two years of the strategy's posting and a second chapter within five years, the first part of an action plan, addressing NARW-fisheries interactions, was only proposed in 2016 and was not finalized in accordance with the required statutory deadline (Fisheries and Oceans Canada, 2016a). The proposed action plan did not cover other threats, such as shipping and contaminants. A broader draft action plan is now under preparation which is expected to also cover other threats, but the plan has not yet been publicly released for comments. A ministerial order to protect critical habitat of the North Atlantic right whale was not registered until 4 December 2017 but only for two previously important NARW concentration areas, the Grand Manan Basin in the Bay of Fundy and Roseway Basin on the Southwestern Scotian Shelf.²⁴

Failures to post recovery strategies within the mandated timelines have been subject of litigation.²⁵ And while there is no dispute that compliance with the timelines is mandatory and not discretionary, the remedy available to the applicants is limited to declarative relief and an order of *mandamus* (commanding the exercise of the ministerial duty), if the Minister has not complied at the time of the hearing. Neither of these remedies can address adverse activities and mortality events that occur while recovery strategies are developed.²⁶

Protection of the North Atlantic right whale's critical habitat remains limited and uncertain under SARA. Additional critical habitat areas, such as the newly occupied area in the Gulf of St. Lawrence, have yet to be identified. Exactly what constitutes destruction of critical habitat remains unclear, however. The Regulatory Impact Analysis Statement, accompanying the *Critical Habitat Order*, highlights that point by noting various activities that may destroy critical habitat, such as capture and removal of prey species, shipping, industrial activities (including pile driving, dredging and construction), seismic surveys, sonar, large-scale

⁴ *Fisheries Act*, R.S.C., 1985, c. F-14.

⁵ *Canada Shipping Act*, S.C. 2012, c. 67 (CSA).

⁶ *Oceans Act*, S.C. 1996, c. 31.

⁷ *Impact Assessment Act*, S.C. 2019, c. 28 (IAA).

⁸ *Canadian Environmental Assessment Act*, S.C. 2012, c. 19 (CEAA, 2012).

⁹ SARA, s. 32.

¹⁰ *Ibid.*, s. 42.

¹¹ *Ibid.*, s. 43.

¹² *Ibid.*, s. 47.

¹³ A recovery strategy must simply state when one or more action plans in relation to the strategy will be completed. *Ibid.*, s. 41(1)(g).

¹⁴ *Ibid.*, s. 58(1).

¹⁵ *Ibid.*, s. 58(5)(b).

¹⁶ *Ibid.*, s. 58(5)(a).

¹⁷ *Ibid.*, s. 58(5).

¹⁸ *Environmental Defence Canada v. Canada*, 2009 FC 878 (*Environmental Defence Canada*).

¹⁹ *Environmental Defence Canada*.

²⁰ SARA s. 41(1) (c); *Alberta Wilderness Association v. Canada (Environment)*, 2009 FC 710 (*Alberta Wilderness Association*).

²¹ *Alberta Wilderness Association*.

²² *David Suzuki Foundation v. Canada*, 2012 FCA 40 (*David Suzuki Foundation*). For a detailed discussion of the case see Stacey (2014).

²³ *David Suzuki Foundation*.

²⁴ *Critical Habitat of the North Atlantic Rights Whale (Eubalaena glacialis) Order*, SOR/2017-262.

²⁵ *Western Canada Wilderness Committee v. Canada (Fisheries and Oceans)*, 2014 FC 148 (*Western Canada Wilderness*).

²⁶ *Western Canada Wilderness*.

tidal energy developments, and dumping and discharge of pollutants.²⁷ However, the Statement does suggest that activities will be assessed on a “case-by-case basis.”²⁸ The Statement further emphasizes that the existing framework of federal regulatory measures is likely to be sufficient to protect the NARW’s critical habitat without the need for additional compliance and administrative measures.²⁹

A guidance document, issued by Fisheries and Oceans Canada (DFO), on the identification of critical habitat for aquatic species at risk also leaves the question of critical habitat destruction uncertain. The document highlights that every proposed activity will be reviewed on a “site-specific basis based on its own merits to determine if destruction will occur.” (Fisheries and Oceans Canada, 2015, p. 7).

SARA provides limited exceptions where activities affecting a listed wildlife species or any part of its critical habitat may be authorized. For example, the competent minister, who is the Minister of Fisheries, Oceans and the Canadian Coast Guard in the case of marine species, may issue a permit or enter into an agreement authorizing a person to engage in an affecting activity,³⁰ but only for three purposes. The activity must either (i) be for scientific research relating to the conservation of the species, or (ii) the activity must benefit the species or be required to enhance its chance of survival in the wild, or (iii) the effect on the species is incidental to the carrying out of the activity.³¹ Three pre-conditions must also be met: the consideration of all reasonable alternatives and adoption of the best solution; all feasible measures to minimize the impact of the activity; and a finding that the activity will not jeopardize the survival or recovery of the species.³² A similar authorization power is granted to the competent minister acting under another Act of Parliament.³³

Such authorization powers have been used sparingly to date in relation to the North Atlantic right whale. For example, permits have been granted to use drones to photograph right whales,³⁴ to disentangle whales,³⁵ and for sampling of carcasses of dead individuals.³⁶

The NARW Recovery Strategy and first proposed Action Plan show many limitations.³⁷ The Recovery Strategy, recognizing the lack of firm estimates of NARW historical abundance, is not able to set a long-term recovery target but only “an interim recovery goal of achieving an increasing trend in population abundance over three generations” (Fisheries and Oceans Canada, 2014, p. 34). The Recovery Strategy sets out only general recovery objectives and management strategies for reducing vessel strikes, fishing gear interactions and injury or disturbance from other threats such as vessel noise, contaminants and pathogens (Fisheries and Oceans Canada, 2014, p. 35–37). It highlights the lack of data for determining additional critical habitat areas (Fisheries and Oceans Canada, 2014, p. 31) and gives scant attention to climate change, simply noting that climate change could be impacting both the local spring and summer distribution of right whales and their calving rate (Fisheries and Oceans Canada, 2014, p. 26). The proposed Action Plan did not prescribe specific types of voluntary or regulatory mitigation measures (Fisheries and Oceans Canada, 2014, p. 4). The Action Plan did not focus on preventing entanglement events by removing fishing activities, for example through spatiotemporal closures (Fisheries and Oceans Canada, 2018a, p. 56).

²⁷ Regulatory Impact Analysis: Statement, Canada Gazette, Part II, Vol. 151, No. 25 (13 December 2017).

²⁸ *Ibid.*

²⁹ *Ibid.*

³⁰ SARA, s. 73(1).

³¹ *Ibid.*, s. 73(2).

³² *Ibid.*, s. 73(3).

³³ *Ibid.*, s. 74.

³⁴ Species at Risk Public Registry, Notice of permit DFO-MAR-2018-06.

³⁵ Species at Risk Public Registry, Notice of permit DFO-18-PNCR-00001.

³⁶ Species at Risk Public Registry, Notice of permit MPO-IML-2018-002.

³⁷ For a detailed review, see Fisheries and Oceans Canada (2018a).

An additional proposed action plan relevant to the North Atlantic right whale, but primarily focusing on the beluga whale, was posted in 2019 (Fisheries and Oceans Canada, 2019a). A proposed Action Plan to Reduce the Impact of Noise on the Beluga Whale (*Delphinapterus leucas*) and Other Marine Mammals at Risk in the St. Lawrence Estuary reviews the threats of noise to four whale populations frequenting the St. Lawrence Estuary, the beluga whale, the blue whale, the fin whale and the North Atlantic right whale. The action plan proposes various recovery measures including: documenting the level of ambient noise in different areas of the Estuary at different times of the year; evaluating the intensity, frequency and propagation of noise emitted by coastal and offshore projects; analyzing the risk of injury or behavioural effects of noise on marine mammals at risk; examining the potential impacts of noise on the prey of marine mammals in the Estuary; conducting a strategic review of all activities contributing ambient noise in order to document their cumulative effects; assessing and introducing management measures to reduce the overall noise level from shipping; and adjusting shipping lanes according to areas highly frequented by marine mammals at risk, while taking into account navigational constraints.

One further possible avenue under SARA is the issuance of emergency orders. SARA calls for the competent minister to recommend an emergency order where a species faces imminent threats to its survival or recovery.³⁸ The competent minister is not required to make a recommendation for an emergency order if he or she is of the opinion that equivalent measures have been taken under another Act of Parliament to protect the wildlife species. The Governor in Council may make an emergency order providing for protections including identifying habitat necessary for survival or recovery and prohibiting activities that may adversely affect the species and its habitat.³⁹ Since SARA does not define “imminent threats”, some discretion is left in determining what constitutes an emergency situation. Resorting to the emergency order avenue under SARA would allow an expedited management response without the time needed to develop regulations and avoiding comprehensive consultations. To date, this emergency power has only been exercised in relation to two species (Rehberg-Besler and Jeffries, 2019), the greater sage-grouse and the western chorus frog (Great Lakes/St. Lawrence-Canadian Shield population).⁴⁰ In both cases the issuance of the emergency orders followed litigation.⁴¹

3.2. Fisheries Act, regulations and policy

The *Fisheries Act* is the key statute in the management of Canadian fisheries as well as protection of fish and fish habitat. It applies to right whales because the broad definition of “fish” captures marine mammals.⁴² This statute supports policy and regulatory tools that can be used to minimize the risk of fishing gear entanglements and to protect the whales’ habitat.

3.2.1. Interaction with fishing gear

The entanglement threat posed by stationary fishing gear is addressed in the Policy on Managing Bycatch (Bycatch Policy) developed under the Sustainable Fisheries Framework with a goal of sustainable fisheries that minimize serious harm to bycatch species (Fisheries and Oceans Canada, 2013a; Fisheries and Oceans Canada, 2013b). The Bycatch Policy is implemented through Integrated Fisheries Management Plans (IFMPs). These plans are fishery- and region-specific and outline harvest objectives and management measures for

³⁸ SARA, s. 80(2), 81.

³⁹ *Ibid.*, s. 80(1), 80(4).

⁴⁰ SARA Registry, Emergency Orders.

⁴¹ *Alberta Wilderness Association v. Canada (Environment)*, 2013 FCA 190 (greater sage-grouse); *Centre Québécois du droit de l’environnement v. Canada (Environment)*, 2015 FC 773 (western chorus frog).

⁴² *Fisheries Act*, s. 2(1), “fish”.

sustainable use of the resource (Fisheries and Oceans Canada, n.d.). They also link SARA obligations, recovery strategies, and action plans with fisheries management by providing a way to implement these protective measures (Fisheries and Oceans Canada, 2016a). The 2019 snow crab IFMP for the Estuary and northern Gulf of St. Lawrence acknowledged the risk to NARW posed by the crab fishing gear and the importance of effective protective measures for maintaining access to the U.S. seafood market (Fisheries and Oceans Canada, 2019b). It reminded fishers of the reporting requirements and the protection measures listed in the snow crab Conservation Harvesting Plan including reduced rope lengths and additional gear markings. Monitoring and enforcement of the closure protocol was identified as a priority for the DFO for this fishery.

The IFMP management measures are implemented and enforced through licence conditions. The Minister has authority to specify species, size and quantities of fish permitted to be caught in a fishing area; gear that can be used; open season dates; and information to be reported to DFO (Fisheries and Oceans Canada, 1996).⁴³ Licence conditions for fisheries in the Gulf of St. Lawrence now stipulate mandatory reporting of lost gear (Government of Canada, 2018a; Fisheries and Oceans Canada, 2019c).⁴⁴ Licence conditions are set at the beginning of the season, and once the season is underway, amending them is time consuming. The Minister has to send a notice to a licence holder by registered mail or have a fishery officer personally deliver it.⁴⁵ This makes it difficult to use licence conditions as a flexible response tool to address sudden mortality events as observed in 2017 and 2019 for right whales in the Gulf of St. Lawrence.

Variation orders give the Minister more management flexibility, but they can be used in limited circumstances. First, variation orders may be issued only with respect to fisheries subject to specific regulations. It is unclear how much this is an obstacle since commercial fisheries in the Atlantic, including lobster and snow crab in the Gulf of St. Lawrence are covered.⁴⁶ Second, variation orders may be used only to vary close time, fishing quota, or fish size in a particular area.⁴⁷ They cannot be used to introduce gear changes. Despite the constraints, variation orders were central to DFO's management of the entanglement risk.

Both of these limitations have been addressed by the amendments to the *Fisheries Act* found in Bill C-68, which received Royal Assent on June 21, 2019 and have since come into force.⁴⁸ The amendments provide DFO with more flexible fisheries management tools that allow quick responses to unforeseen events. Fisheries management orders are now available when in the Minister's opinion "prompt measures are required to address a threat to the proper management and control of fisheries and the conservation and protection of fish ..."⁴⁹ Unlike variation orders, fisheries management orders may be issued with respect to any fishery in Canada⁵⁰ tailored to a class of persons or class of licence⁵¹; and impose a broad range of restrictions and conditions with respect to fishing.⁵² An order can be in effect for up to 45 days, subject to the Minister's power of renewal, amendment and revocation.⁵³ Notice requirements remain the same as for variation orders, unless prescribed

otherwise.⁵⁴ The Minister also gained authority to make regulations creating marine refuges.⁵⁵ These areas can be established anywhere in Canadian fishing waters and include prohibitions on the type of gear and vessels used.⁵⁶

3.2.2. Habitat protection

In addition to regulating fishing, the *Fisheries Act* now prohibits "work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat."⁵⁷ Fish habitat is defined as "water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas."⁵⁸ This change means that the risk of NARW death⁵⁹ and harmful alterations, disruption, or destruction of its habitat will need to be considered and mitigated when projects are approved under the *Fisheries Act*.⁶⁰ The Minister also gained authority to establish standards and codes of practice aimed at protecting fish and their habitats as well as preventing pollution.⁶¹ These measures should help improve the general quality of the marine environment and NARW habitat.

3.3. Marine Mammal Regulations

The *Marine Mammal Regulations* (MMR)⁶² set out the management regime for marine mammal- directed fisheries as well as conservation and protection of these animals.⁶³ The regulations impose a general prohibition on disturbing marine mammals.⁶⁴ However, activities authorized under the *Fisheries Act*, *Fishery (General) Regulations* (Fishery Regulations), MMR or SARA are exempt from this prohibition.⁶⁵

Recent amendments to MMR introduced changes and clarifications that are relevant to North Atlantic right whales. Firstly, section 39 now requires the operator of a vessel or fishing gear that comes in contact with a marine mammal to report the incident to the Minister and provide details such as location, species, observed state of the animal and its direction of travel. Together with the obligation to report lost gear, this reporting requirement will provide DFO with the necessary data to estimate the amount of gear lost during a season as well identify geographical and temporal hotspots of interaction.⁶⁶

Secondly, the amendments set minimum distances that have to be observed when approaching marine mammals.⁶⁷ For NARW, the distance is 100 m everywhere in Canadian waters, except for 400 m in the St. Lawrence Estuary.⁶⁸ The amendments also clarified that the prohibition on disturbing marine mammals includes feeding a marine mammal, swimming with it, enticing it to move, or separating it from its group or calf.⁶⁹ The Minister has authority to permit disturbance of a marine mammal if it benefits the individual animal or advances conservation of the species.⁷⁰ This addition addressed the uncertainty around authorizations needed to engage in activities such as research

⁵⁴ *Ibid.*, s. 9.5.

⁵⁵ *Ibid.*, s. 43.3(1).

⁵⁶ *Ibid.*

⁵⁷ *Fisheries Act* at 35(1).

⁵⁸ *Ibid.* at s. 2(1).

⁵⁹ *Ibid.* s. 34.4(1).

⁶⁰ *Ibid.*, s. 34.4(2) and 35(2).

⁶¹ *Ibid.*, s. 34.2.

⁶² *Marine Mammal Regulations*, SOR/93-56.

⁶³ *Ibid.*, s. 3.

⁶⁴ *Ibid.*, s. 7(1).

⁶⁵ *Ibid.* at s. 7(1).

⁶⁶ Regulatory Impact Analysis: Statement, Canada Gazette, Part II, Vol. 152, No. 14 (22 June 2018).

⁶⁷ *Marine Mammal Regulations*, s. 7(3) and 7(4).

⁶⁸ *Ibid.*, Schedule VI.

⁶⁹ *Ibid.*, s. 7.

⁷⁰ *Ibid.*, s. 38.

⁴³ *Fisheries (General) Regulations*, SOR/93-53, s. 22(1).

⁴⁴ Section 27 of the *Fisheries (General) Regulations* also requires gear to be marked with the vessel registration number or the name of the person who owns the gear.

⁴⁵ *Ibid.*, s. 22(2) and (3).

⁴⁶ *Atlantic Fishery Regulations* 1985, SOR/86-21, s.3, Schedule I.

⁴⁷ *Fisheries (General) Regulations*, s. 6(1).

⁴⁸ *An Act to amend the Fisheries Act and other Acts in consequence*, S.C. 2019, c. 14 (An Act to amend).

⁴⁹ *Fisheries Act*, s. 9.1(1).

⁵⁰ *Ibid.*

⁵¹ *Ibid.*, s. 9.1(3).

⁵² *Ibid.*, s. 9.1(1) and (2).

⁵³ *Ibid.*, s. 9.3 and 9.4.

and disentanglement.⁷¹

3.4. Canada Shipping Act, 2001 and Oceans Protection Plan

The *Canada Shipping Act, 2001* (CSA) has a dual objective to ensure safety of marine transportation and protect the marine environment from pollution (Government of Canada, 2017a). The CSA regulatory tools that allow to route ships around whale aggregations and adopt speed limits in high-risk areas have been used to protect marine mammals from ship strikes. For instance, the Government of Canada has worked with the International Maritime Organization to amend the Traffic Separation Scheme (TSS) in the Bay of Fundy and designate an Area To Be Avoided (ATBA) in Roseway Basin, two critical habitat areas for NARW (International Maritime Organization, 2002, 2007; Duff et al., 2013).

The *Collision Regulations*⁷² under the CSA enact the International Regulations for Preventing Collisions at Sea, 1972 and its Canadian modifications.⁷³ In order to respond to new risks, *Collision Regulations* instruct vessels to follow instructions in Notices to Mariners (NOTMARs) and Notices to Shipping (NOTSHIPS).⁷⁴ National navigational warnings (NAVWARNs) are replacing NOTSHIPS starting in 2019 (Canadian Coast Guard, 2019). Ship masters are required to carry up-to-date publications that contain information transmitted in NOTMARs, NOTSHIPS/NAVWARNs or radio navigational warnings and follow directions contained in these notices.⁷⁵ Transport Canada used NOTMARs and NOTSHIPS/NAVWARNs to implement the static and dynamic NARW conservation measures described in Part 4.

3.4.1. Oceans Protection Plan

The Oceans Protection Plan (OPP) is a five-year, \$1.5-billion program launched by Prime Minister Trudeau in 2016 aimed at marine safety, protection of the marine environment from shipping impacts, and engagement with Indigenous and coastal communities (Government of Canada, 2018b). The OPP is relevant to NARW protection in three main ways. First, it supported CSA amendments to strengthen the environmental protection and pollution response provisions, including new tools to help endangered whales (Transport Canada, 2018a). Under subsection 10.1 of CSA, the Minister of Transport now has authority to issue an interim order that “contains any provision that may be contained in a regulation made, under this Act, on the recommendation of only that Minister, if he or she believes that immediate action is required to deal with a direct or indirect risk to marine safety or to the marine environment.” The order can be in effect for up to one year, unless its effectiveness is extended by the Cabinet up to additional two years.⁷⁶ This change gives the Minister a tool to respond quickly to unforeseen events. The amendments also gave the Cabinet authority to make regulations, on the recommendation of the Minister of Transport, “[for] the protection of the marine environment from the impacts of navigation and shipping” with respect to the design, manufacturing and maintenance of vessels; specifying equipment and supplies required on board a vessels; and routing among other provisions.⁷⁷

The second direct benefit to the right whale is the science-based whale review of the recovery measures for three critically endangered whale populations in Canada completed with OPP’s support. For NARW,

the reviewers evaluated the likelihood of the recovery measures proposed and adopted between 2005 and 2016 to achieve the objectives set in the SARA Recovery Strategy and identified priority actions for the future (Fisheries and Oceans Canada, 2017a; Fisheries and Oceans Canada, 2018a). During the reviewed period, Canada has implemented effective measures to reduce vessel strikes in areas designated as critical habitat. However, the whales were not protected from ship strikes outside of these areas. The whales were also not protected from the risk of entanglement in fishing gear as the reviewers concluded that the Canadian government did not adopt any measures to mitigate this risk. With respect to habitat protection and prey availability, measures have been adopted to reduce pollutants and copepod distribution and abundance have been studied. The reviewers recommended measures that included reducing ship strikes and entanglements by minimizing spatial and temporal overlap between high risk activities and NARW. These were adopted by the federal government in 2018 and 2019. Since the review was conducted before the 2017 mortality crisis and subsequent response, it did not touch on the effectiveness of these measures.

Finally, the OPP’s funding of scientific research into impact of pollutants, including noise on whales and their prey as well as development and testing of technologies to detect whales and alert mariners in real-time should benefit NARW in the long-term (Government of Canada, 2019c).

3.5. Oceans Act

Canada’s *Oceans Act* offers two ocean management mandates of relevance to the North Atlantic right whale. First, the Act requires the Minister of Fisheries, Oceans and the Canadian Coast Guard to lead and facilitate the development and implementation of integrated management plans to address all activities affecting Canada’s coastal and marine waters.⁷⁸ Integrated coastal and ocean management planning might assist species at risk protection in various ways such as facilitating the identification of critical habitat areas and encouraging stakeholder acceptance of spatiotemporal measures to avoid conflicts and adverse impacts (VanderZwaag and Hutchings, 2005). A second mandate is for the Minister to lead and coordinate the development and implementation of a national system of marine protected areas (MPAs).⁷⁹ One key objective for designating MPAs is to conserve and protect endangered or threatened marine species and their habitats.⁸⁰

Integrated coastal and ocean management planning has lagged in Canada (VanderZwaag et al., 2012) and has not been of practical value to the North Atlantic right whale. The three completed Large Ocean Management Area (LOMA) plans for the Atlantic region, Eastern Scotian Shelf, Gulf of St. Lawrence and Placentia Bay and the Grand Banks, stand out for their generality in setting of overall goals, objectives and management strategies (West Coast Environmental Law et al., 2017). Unfortunately, major areas of importance to right whales have remained outside the integrated planning process, including the Bay of Fundy and the Gulf of Maine (West Coast Environmental Law et al., 2017).

On the other hand, Canada has made substantial strides in establishing marine protected areas in recent years spurred by its commitment to meeting the Convention on Biological Diversity Aichi target of protecting 10% of marine and coastal areas by 2020 (Fisheries and Oceans Canada, 2016b). In August 2019, Prime Minister Trudeau announced that Canada has surpassed the 10% target with 13.8% of marine and coastal areas being protected (Fisheries and Oceans Canada, 2019d). Fourteen MPAs have been established under the *Oceans Act*

⁷¹ Regulatory Impact Analysis Statement, *supra* note 66.

⁷² *Collision Regulations*, C.R.C., s. 1416.

⁷³ CSA, s. 35(1)(d).

⁷⁴ *Collision Regulations*, s. 7 and 1(1) “NOTMAR” and “NOTSHIP”.

⁷⁵ *Charts and Nautical Publications Regulations*, 1995, SOR/95-149, s. 7; *Collision Regulations*, s. 7.

⁷⁶ CSA, s. 10.1(2)-10.1(3).

⁷⁷ *Ibid.*, s. 35.1. New regulations to protect marine mammals from vessels are being proposed by Transport Canada in its 2019-2021 environmental initiatives plan.

⁷⁸ *Oceans Act*, s. 31.

⁷⁹ *Ibid.*, s. 35(2).

⁸⁰ *Ibid.*, s. 35(1)(b).

including eight in Atlantic Canada.⁸¹ The Government of Canada's most recent commitment is to protect twenty-five per cent of Canada's oceans by 2025 (Governor General of Canada, 2019).

However, attention to marine mammal protection through MPAs has been limited in Canada thus far, although there is a rich literature elsewhere (Hoyt, 2012). Few MPAs established under the *Oceans Act* include a conservation objective to protect marine mammals (Office of the Auditor General of Canada, 2018, para. 2.38). Commercial fishing vessels are estimated to be prohibited in only 10% of the MPA total area (Office of the Auditor General of Canada, 2018, para. 2.40). The establishment of additional MPAs does not guarantee the effectiveness of protective measures (Read et al., 2019), nor the creation of an ecologically appropriate network (CPAWS, 2014; Standing Committee on Fisheries and Oceans, 2018). As such, the value of the expanded protected area network to safeguard threatened whales is unclear, especially considering the dynamic distribution of whales under climate change (Becker et al., 2019; Record et al., 2019).

3.6. Impact Assessment Act and Canadian Environmental Assessment Act, 2012

The federal environmental assessment process is currently in a state of transition. On August 28, 2019 the *Impact Assessment Act* (IAA) came into force. It repealed the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) and replaced the Canadian Environmental Assessment Agency (CEA Agency) with the newly established Impact Assessment Agency of Canada (IA Agency). The IAA expanded the list of environmental factors that have to be explicitly reviewed to include the extent to which the proposed project contributes to sustainability; and the extent to which it helps or hinders Canada's ability "to meet its environmental obligations and its commitments in respect of climate change."⁸² It also broadened the scope of assessment to include economic, social and cultural impacts⁸³ and introduced an early planning phase to the review process.⁸⁴ Despite these changes, the assessment process under IAA remains similar to the process under CEAA 2012 (Doelle and Sinclair, 2019). For instance, under both statutes the provisions apply only to projects on the designated project list; and two process options are available: review by the IA Agency or by a panel (Doelle and Sinclair, 2019).

Under IAA, just like under CEAA 2012, NARW considerations can be incorporated into the assessments of designated projects in two ways. First, changes to fish and fish habitat, as defined in the *Fisheries Act*, have to be described and considered during an assessment.⁸⁵ Analyzing the significance of environmental effects of the project including potential malfunctions and accidents, its cumulative effects, and feasible mitigation measures can also help identify and address NARW concerns.⁸⁶ Mitigation measures that are taken into account during the review have to be included as conditions if the project is approved.⁸⁷

Second, every person who is required to conduct an assessment under IAA (and previously under CEAA, 2012), has to notify the competent minister under SARA when the project "is likely to affect a

listed wildlife species or its critical habitat."⁸⁸ In addition to giving notice "the person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and if, the project is carried out, must ensure that measures are taken to avoid or lessen those effects and monitor them."⁸⁹ These measures have to be consistent with existing recovery strategies and action plans for the species⁹⁰ or the best available information, such as draft documents and COSEWIC status reports, if strategies and action plans are not finalized (Government of Canada, 2010).

Next are examples of how NARWs were considered in the assessments of offshore oil and gas projects conducted by the CEA Agency. These examples will help inform recommendations for the implementation of IAA given the similarities between the old and the new statutes. In Newfoundland and Labrador, eight exploration drilling projects are currently undergoing environmental review. Proponent-proposed mitigation measures and/or draft conditions from the CEA Agency are available for five of these projects (IAAC, n.d.a.; IAAC, n.d.b.; IAAC, n.d.c.; IAAC, n.d.d.; IAAC, n.d.e.). In the environmental reports prepared by the proponents and approved by the Agency, NARW were described as a rarely encountered species in the work areas. Although the 2017 NARW mortality crisis was noted in some reports, none of the mitigation measures were specific to NARW but instead applied to all whales. To minimize the threat of ship strikes, use of established shipping lanes where available, avoiding marine mammal aggregations, speed reductions upon whale sightings, and collision reporting were recommended.

To mitigate noise pollution and disturbance, measures recommended in the Statement of Canadian Practice with respect to Mitigation of Seismic Sound in the Marine Environment were incorporated in all projects (Fisheries and Oceans Canada, 2005). These are also not specific to NARW and involve monitoring for whales using observers and passive acoustics around a safety perimeter (~500 m) and executing sound ramp up and stoppage protocols if a whale is observed within the zone. Project-specific marine mammal monitoring plans developed by the project proponent in consultation with DFO was another measure utilized by the CEA Agency.

Adverse impact of cumulative noise from all anthropogenic activities on highly mobile whales was raised in all five reports. The effect was also described as temporary and reversible and after taking into account the mitigation measures described above, the adverse cumulative impact was determined not to be significant.

In Nova Scotia, one offshore project recently approved by the CEA Agency is still ongoing. BP's Scotian Basin Exploration Drilling Project has been approved to drill up to seven wells approximately 264 km east from the right whale critical habitat in Roseway Basin. In its environmental assessment, the Agency acknowledged that vessel strikes contribute to NARW mortality. However, it concluded that "at the time of this writing, no incidents have been reported on the Scotian Shelf. The slight increase in shipping traffic due to the Project is unlikely to substantially increase the probability of collisions" (Canadian Environmental Assessment Agency, 2018, p. 49). As mitigation measures, the CEA Agency recommended platform vessels avoid the designated right whale critical habitat unless required for safety reasons and observe a speed limit of 10 knots within the project area and 7 knots when any whale is observed within 400 m of the boat. The Agency concluded that these mitigation measures were also sufficient to reduce the cumulative impacts of increased traffic.

With respect to cumulative effects of underwater noise, the Agency recognized that project sound could reach the critical habitat and affect behavior. To mitigate, the Agency directed platform vessels to avoid Roseway Basin and instructed the proponent to consult with DFO if any

⁸¹ See *Basin Head Marine Protected Area Regulations* (SOR/2005–293); *Eastport Marine Protected Areas Regulations* (SOR/2005–294); *Gilbert Bay Marine Protected Area Regulations* (SOR/2005–295); *Gully Marine Protected Area Regulations* (SOR/2004–112); *Musquash Estuary Marine Protected Area Regulations* (SOR/2006–354); *St. Anns Bank Marine Protected Area Regulations* (SOR/2017–106); *Banc-des-Américains Marine Protected Area Regulations* (SOR/2019–50); *Laurientian Channel Marine Protected Area Regulations* (SOR/2019–105).

⁸² IAA at s. 22(1)(i) and (j).

⁸³ *Ibid.*, s. 22(1).

⁸⁴ *Ibid.*, s. 10–16.

⁸⁵ *Ibid.*, s. 2 "effects within federal jurisdiction", 16(2)(b), 36, 60(1)(a) and 63(1); CEAA 2012, s. 5(1)(a).

⁸⁶ IAA, s. 22; CEAA 2012, s. 19.

⁸⁷ IAA, s. 64(3); CEAA 2012, s. 53(4).

⁸⁸ SARA, s. 79(1).

⁸⁹ *Ibid.*, s. 79(2).

⁹⁰ *Ibid.*

drilling takes place between January and April when underwater sound travels the furthest (Canadian Environmental Assessment Agency, 2018).

For projects that do not require a full environmental assessment but a more limited form of review, section 67 of CEEA 2012 directed federal authorities to ensure that any project that is carried out on federal lands “is not likely to cause significant adverse environmental effects.” Change to fish and fish habitat, as defined in the *Fisheries Act*, was also considered under this provision.⁹¹ Federal authorities had to report to Parliament on their activities under section 67. Between 2012 and 2018, DFO submitted identical reports indicating that the department completed Project Effects Determination Reports based on its internal risk-based approach and that none of the reviewed projects were likely to cause adverse environmental effects. During this time period, only one federal authority reported implementing mitigation measures for marine mammals when approving a project, in this case a dock repair (Government of Canada, 2013; Government of Canada, 2014; Government of Canada, 2015; Government of Canada, 2016; Government of Canada, 2017b; Government of Canada, 2018c).

Under the IAA, federal authorities are required to review non-designated projects on federal land that are “likely to cause significant adverse environmental effects.”⁹² A public notice has to be given indicating that such a review is taking place and inviting the public to provide comments.⁹³ Once a decision is made, it also has to be posted online along with any mitigation measures that were taken into account during the review.⁹⁴

4. Specific law and policy responses to the Gulf of St. Lawrence crisis

This part describes the measures adopted by the Canadian government between 2017 and 2019 to minimize NARW mortality. The government relied on the *Fisheries Act* and CSA to implement the system of static and dynamic fisheries closures and speed restrictions.

4.1. 2017 emergency measures

The federal government was unprepared for the NARW mortality crisis that unfolded in the summer of 2017. The first emergency measure came on July 10 following six successive NARW deaths (Canadian Science Advisory Secretariat, 2017, 2019). It suggested a voluntary 10 knot slowdown for vessels greater than 20 m navigating the restricted zone in the western Gulf of St. Lawrence between the north shore of Quebec and Prince Edward Island (Canadian Science Advisory Secretariat, 2017, 2019) (Fig. 1). These slowdowns were made mandatory on August 11 and stayed in place until January 2018 (Canadian Science Advisory Secretariat, 2019). Transport Canada reported high compliance by the shipping industry with most of the reported violations short in duration and “slightly higher” than the speed limit (Transport Canada, 2017). At least one \$6,000 penalty was issued (Transport Canada, 2017).

To reduce the risk of entanglement, the snow crab fishery in the Gulf of St. Lawrence was closed early on July 20, 2017 (Davies and Brilliant, 2019). This was mainly a symbolic measure since the annual quota had already been caught (Davies and Brilliant, 2019). The Minister of Fisheries, Oceans and the Canadian Coast Guard directed other high-risk fisheries to be “limited, closed or delayed” in order to protect the whales (Fisheries and Oceans Canada, 2017b).

Between June 6 and September 15, 2017, twelve right whales had died in the Gulf of St. Lawrence (Daoust et al., 2018). Seven necropsies were conducted with results showing that four whales died from ship

strikes, two from entanglements in fishing gear, and one cause could not be determined due to the state of decomposition (Daoust et al., 2018).

4.2. 2018 measures

The following year saw a more proactive approach to right whale conservation which included an unprecedented combination of static and dynamic regulatory measures. The first key measure unveiled in the spring of 2018 was the system of fisheries closures intended to minimize the overlap between fishing gear and NARW. These measures were implemented through variation orders authorized by the Fishery Regulations.⁹⁵ Although multiple fisheries were affected, the focus here is on the lucrative snow crab and lobster fisheries that represent the largest risk of entanglement.

Variation Order GVO-2018-014 set the coordinates of the static closure that started on April 28, 2018 and continued until the fisheries closed.⁹⁶ A dynamic closure protocol was described in the Notice to Fish Harvesters: Lobster Conservation Harvesting Plan (Fisheries and Oceans Canada, 2018d) and Notice to Fish Harvesters: Southern Gulf of St. Lawrence Snow Crab Conservation Harvesting Plan (Fisheries and Oceans Canada, 2018c) (Fig. 2). According to the protocol, if at least one NARW was observed inside the designated area, nine grids⁹⁷ were closed to crab and lobster fisheries for 15 days from the last sighting. If no NARWs were observed during at least two aerial surveys, closures were automatically lifted at the end of that period.

In order to be valid, variation order notices had to be broadcast over commercial or marine radio stations, published in a newspaper, posted in the affected community or other means specified in the Fishery Regulations.⁹⁸ Licence holders were given a 48-h notice to retrieve their deployed fishing gear prior to a closure (Fisheries and Oceans Canada, 2018c).

The second successful measure in the federal government’s response was the system of static and dynamic speed reduction zones in the Gulf of St. Lawrence from April 28 to November 15, 2018 (Canadian Coast Guard, 2018). These measures were in addition to the existing Traffic Separation Scheme in the Bay of Fundy and Area To Be Avoided in Roseway Basin.

Transport Canada used a combination of NOTSHIPS and NOTMARS to implement the new whale protection measures. The 10-knot slowdown was mandatory for vessels over 20 m in the zone described monthly in NOTMARS starting with NOTMAR 406/18 (Canadian Coast Guard, 2018; Transport Canada, 2018b). All other vessels were encouraged to observe this speed limit on a voluntary basis (Transport Canada, 2018b). NOTMARS also specified coordinates of the four dynamic sectors that created two shipping corridors (Transport Canada, 2018b). Vessels could proceed at a safe speed within the dynamic zones in the absence of whales. If a whale was spotted, large vessels of 20 m and above were notified through NOTSHIPS of the need to reduce speed to 10 knots in that section. Speed restrictions remained in place for 15 days and could have been extended if the whales remained (Canadian Coast Guard, 2018). If aerial surveillance was not possible for one week, a mandatory slowdown applied until two surveillance flights confirmed the absence of NARW (Transport Canada, 2018b).

Likely as a result of these comprehensive and data-intensive measures, no right whale deaths were recorded in Canada during 2018.

⁹⁵ *Fisheries (General) Regulations*, s. 6(1) and 3(4) and *Atlantic Fishery Regulations*, 1985, SOR/86–21.

⁹⁶ Three out of 4 snow crab areas closed for the season on June 30 (Fisheries and Oceans Canada, 2018c); and 4 out of 7 lobster fishing areas closed on June 30 (Fisheries and Oceans Canada, 2018d).

⁹⁷ DFO used the same grid system for NARW closures as for the management of soft shell/white crab closures in the Gulf (Fisheries and Oceans Canada, 2018d). These are shown on Fig. 2.

⁹⁸ *Fisheries (General) Regulations*, s. 7(1).

⁹¹ CEEA, s. 67.

⁹² IAA, s. 82.

⁹³ *Ibid.*, s. 86(1).

⁹⁴ *Ibid.*, s. 86(2).

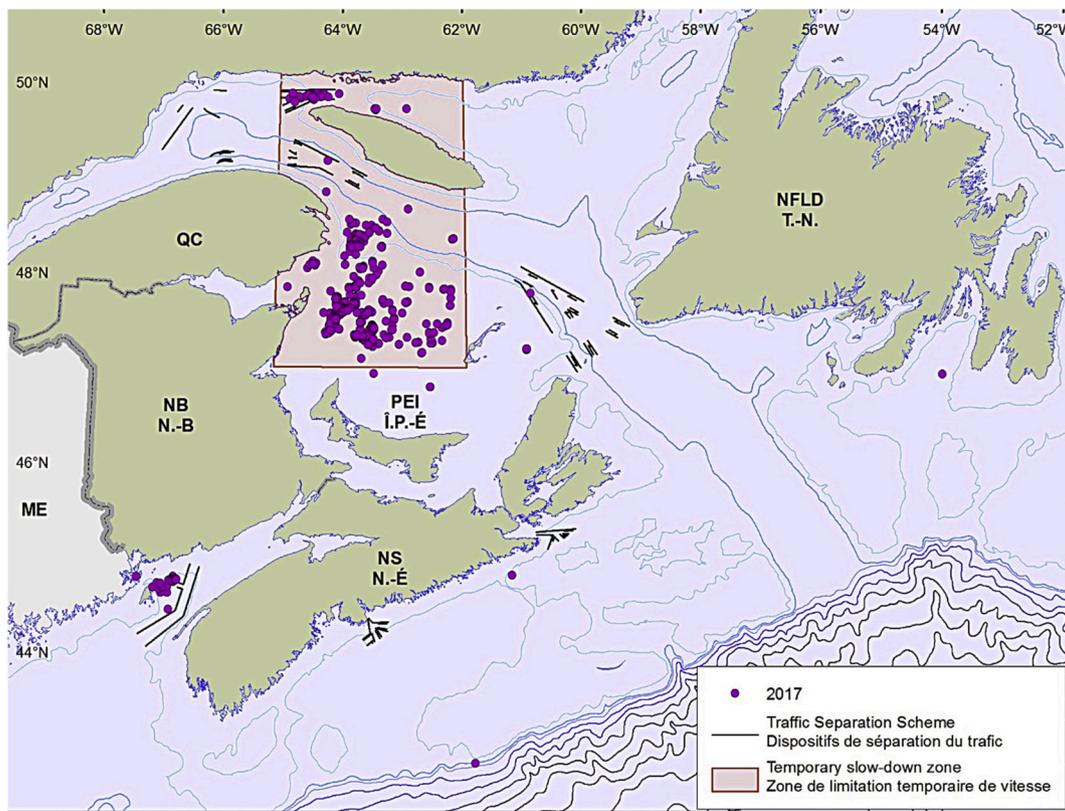


Fig. 1. Conservation measures in 2017. A mandatory slowdown zone implemented in 2017 (pink area) is superimposed on confirmed right whale sightings that year (purple dots). Figure sourced from [Canadian Science Advisory Secretariat, 2017](#).

4.3. 2019 measures

In 2019, the federal government continued with a combination of static and dynamic measures, but the areal extent of the zones of application was decreased and repositioned based on the 2018 monitoring data. The government used the same tools as in 2018 to implement this system: NOTMARs and NOTSHIPs/NAVWARNs for shipping and variation orders for fisheries ([Transport Canada, 2019b](#); [Fisheries and Oceans, 2019d](#)).

Starting on April 28, ships over 20 m were subject to a mandatory 10 knot limit in a large designated area, called the “static zone”. Two dynamic corridors, similar to the ones in place in 2018, remained open to ships to proceed at a safe speed unless a NARW was spotted nearby ([Fig. 3](#)). In that case, a 15-day slowdown was imposed in that section ([Government of Canada, 2019b](#)). The restrictions were lifted at the end of the 15-day period if NARWs were not observed in that area. However, if at least one surveillance flight was not completed within a 7-day period, the restrictions remained in place until NARW absence was confirmed. All other ships were initially asked to observe these slowdowns voluntarily ([Government of Canada, 2019b](#)).

For snow crab and lobster fisheries as well as other non-tended fixed gear fisheries, a season-long static area closure was put in place also starting on April 28 ([Government of Canada, 2019a](#)). The 2019 static closure was about 63% smaller than in 2018, but according to DFO the total protected area stayed the same. The remaining area in the Gulf of St. Lawrence, as well other NARW habitat in Grand Manan and Roseway Basins, was subject to a dynamic closure protocol ([Fig. 4](#)). If one or more NARW were observed, a maximum of nine grids were closed for at least 15 days since the last sighting ([Fisheries and Oceans Canada, 2019e](#)). The dynamic closures did not apply to waters less than 20 fathom deep unless a NARW was observed in those depths ([Government of Canada, 2019a](#)). The 2019 measures also allowed for whale aggregations of three or more or a mother and calf pair to be protected outside of the static and

dynamic management areas. Closures outside the dynamic zone were initially intended to be on a case by case basis ([Government of Canada, 2019a](#)).

After eight whales died in June and early July 2019,⁹⁹ the government responded with additional protective steps ([NOAA, 2019](#)). An interim precautionary shipping measure was put in place on June 26 ([Government of Canada, 2019d](#)). It consisted of a 10 knot speed restriction in the dynamic corridors even when no whales were sighted in the vicinity ([Government of Canada, 2019d](#)). The dynamic approach was re-instated in the shipping corridors on August 1 ([Transport Canada, n.d.](#)). Starting on July 9 and until November 15, all speed restrictions were extended to vessels over 13 m ([Transport Canada, n.d.](#)). The static zone was expanded and divided into northern and southern zones. This allowed speed restrictions to be lifted in one of the zones when adverse weather conditions were in the forecast. A new section was added to the dynamic corridor, and the buffer zone around the dynamic corridor was doubled from 2.5 to 5 nautical miles ([Government of Canada, 2019d](#)). If a NARW was observed in the buffer zone, a 10 knot speed limit was imposed in that section of the dynamic corridor.

For fisheries, the dynamic closure zone for non-tended fixed gear fisheries was extended across the whole Gulf of St. Lawrence ([Government of Canada, 2019d](#)). The dynamic closure protocol came into effect if at least one NARW was observed ([Government of Canada, 2019d](#)).

Both DFO and Transport Canada significantly increased their aerial surveillance effort to locate NARW between June 29 and July 15 with up to 24 flights per week ([Government of Canada, 2019d](#)). It was not announced whether the intense surveillance continued for the remainder of the season.

As of December 2019, a total of eight North Atlantic right whales were confirmed to have died in the Gulf of St. Lawrence, with a possible

⁹⁹ Three whales were confirmed to have died from ship strikes ([NOAA, 2019](#)).

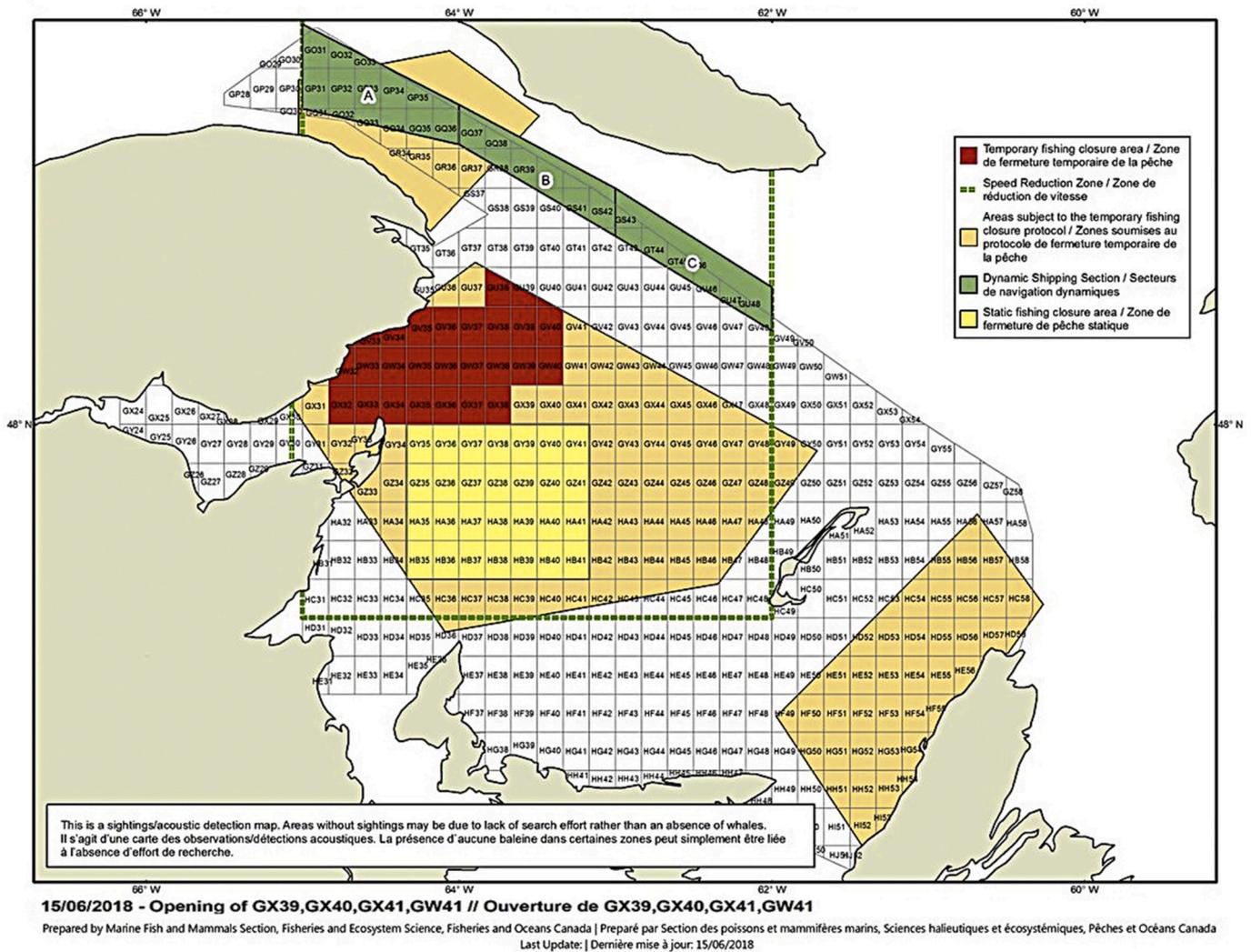


Fig. 2. Conservation measures in 2018. Shown are dynamic slowdown measures in the main shipping corridor (green) as well as static (yellow) fisheries closures and fishing areas subject to the dynamic closure protocol (red and orange) on June 16, 2018. The numbered squares represent the grid system used by DFO to administer the closures. Another shipping corridor was regulated similarly north of Anticosti Island. Figure sourced from Fisheries and Oceans Canada (2018b).

ninth death unconfirmed (NOAA, 2019). The cause of death could be identified with some certainty for three of the whales (all died from ship strikes); the other deaths were still pending full assessment.

5. Charting future directions

5.1. Scientific directions

As the main proximate causes of NARW mortality are well known, there is clear direction as to which threats need to be addressed first to effectively conserve NARW and avoid further population decline (Davies and Brilliant, 2019; Sharp et al., 2019). A scientific challenge that is not fully resolved lies in the dynamic real-time assessment of NARW migration and distribution patterns; this is necessary in order to enable the dynamic management approaches that have been implemented in 2018 and 2019. While this management approach was successful in 2018 and resulted in no known mortalities, 2019 has seen eight deaths (with a ninth unconfirmed). Clearly the whales changed their distribution relative to what was expected from 2018 data, and were intercepted by vessels of unknown type on their path. This suggests that

distributions cannot be assumed to be similar from year to year and need to be updated regularly to better inform dynamic fishing closures and slow-down corridors. One step in this direction is to overlay all know sightings of whales from various observational platforms in one resource, now implemented as Whale Map (<https://whalemap.ocean.ca.l.ca/>). New sensors can also help to detect whales outside of the areas and times that are covered by regular overflights, these include acoustic monitoring (Parks et al., 2011) and whale detection from very high resolution (VHR) satellite imagery (Cubaynes et al., 2019). Major research efforts are currently underway to implement more comprehensive acoustic monitoring of right whales, as well as exploring new ways of automatically detecting whales from air- and space-borne optical sensors.

Another scientific frontier concerns the effects of ongoing climate and environmental change on the distribution of right whales and their prey species (Record et al., 2019). The rationale is that a better understanding of this topic could help to anticipate and predict future changes in right whale distribution, allowing us to assess potential threats over the medium-to long-term. Habitat distribution models can help in this regard and have been successfully applied for other species (Becker

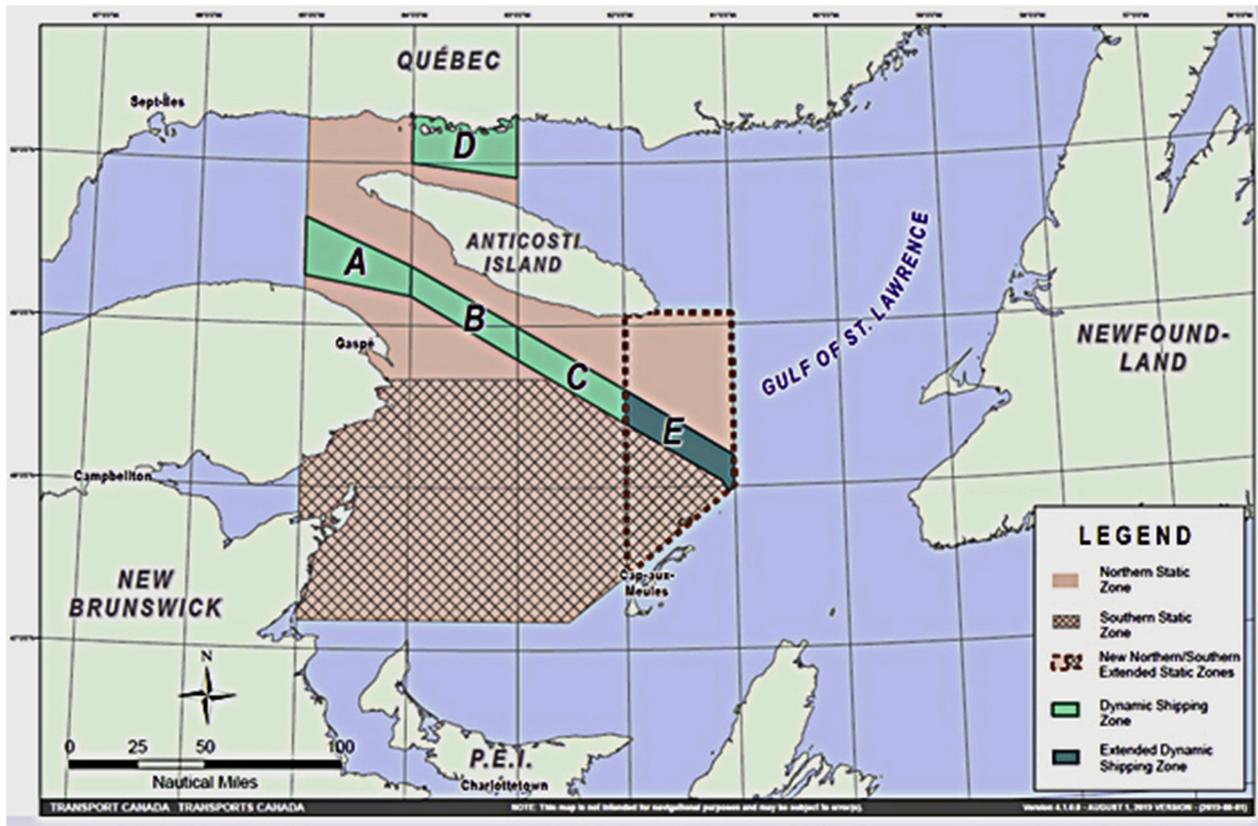


Fig. 3. Additional shipping measures in late summer 2019. Northern and southern static slowdown zones are shown in red and dynamic slowdown measures for shipping corridors are shown in green. Figure sourced from [Transport Canada, n.d.](#)

et al., 2019).

Finally, a major research and development effort is underway to deploy technical solutions to the entanglement problem, mostly by developing ropeless fishing gear that would dramatically reduce entanglement risks for right whales and other species (Myers et al., 2019). Field tests with industry partners to improve ropeless retrieval and marking systems are underway, as well as the creation of data sharing and communications protocols for ropeless gear location marking. This development effort needs to be matched by regulatory procedures and enforcement capacity to incentivise the rapid adoption of ropeless gear, particularly in NARW critical habitat (Myers et al., 2019).

5.2. Law and policy directions

5.2.1. Implementing and strengthening SARA

While recent Canadian imposition of dynamic management measures, such as fisheries closures under the *Fisheries Act* and vessel speed restrictions under the *Canada Shipping Act*, have had positive results for the NARW, SARA has not played a substantial role to date, and various shortcomings stand out. The legislation itself displays various weak points including the lack of clear timelines for action plans and no mention of the need to seriously consider climate change threats and projections in recovery planning efforts (Hutchings et al., 2016). SARA implementation has lagged in relation to the NARW with an action plan still to be finalized and minimal identification and designation of critical habitats.

Various possible improvements of SARA to better protect species at risk have already been identified outside the NARW context. These suggestions include, among others: amending the Act to set clear timelines for developing and finalizing action plans (Hutchings et al., 2016); setting clearer procedures and processes for recovery planning

(VanderZwaag et al., 2012); and subjecting recovery strategies and action plans to independent peer review (Mooers et al., 2010).

In light of the growing awareness of climate change and the threats it poses to oceans and coasts, the time seems ripe to ensure greater attention to climate change effects in recovery planning (McClure et al., 2013; Falberg, 2015; Liebesman et al., 2009). This might be encouraged under SARA in various ways. SARA itself might be amended to require climate change and changes in ocean acidity to be specifically addressed in recovery planning (Hartman et al., 2014). Regulations might be passed under SARA¹⁰⁰ fleshing out the requirements for recovery strategies and action plans to consider the latest climate change and ocean acidity projections and to base management strategies and actions based on those projections.

Additional guidance might be also developed under SARA on how climate change will be addressed. A SARA policy or strategy on climate change adaptation might be forged to spell out the implications for recovery targets and habitat conservation. Such a policy or strategy might draw from the United States' experience (Liebesman et al., 2009). In 2016, the National Marine Fisheries Service (NMFS) adopted a revised Guidance for Treatment of Climate Change in NMFS Endangered Species Act Decisions which seeks to clarify the implications of climate change for species at risk protection (NOAA, 2016). For example, the guidance document calls for a more proactive approach to designation of critical habitats by including unoccupied habitats expected to become suitable and essential to threatened species in the face of climate change (NOAA, 2016). The NARW appears to present an illustrative case study of such a species.

Bolstering the protection of critical habitat under SARA should also

¹⁰⁰ SARA, s. 41(4) and 49(2).

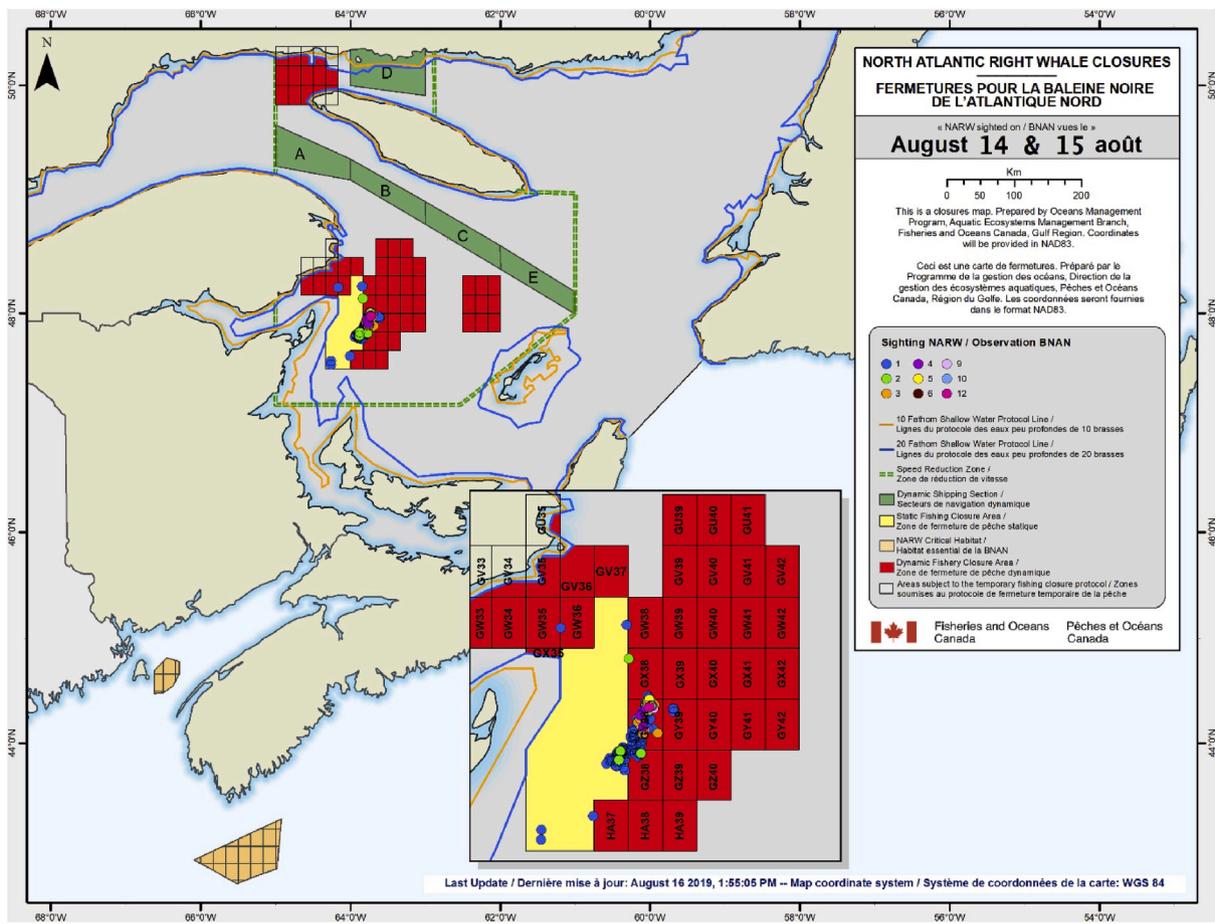


Fig. 4. A snapshot of static and dynamic conservation measures in effect on August 14–15, 2019. The green contour line shows the static speed reduction area and yellow represents the static fisheries closure area. The dynamic shipping corridor is in green. Red are the fishing areas closed under the dynamic protocol, which at this time was applied to the entire Gulf of St. Lawrence. Figure sourced from [Fisheries and Oceans Canada \(2019f\)](#).

be considered. Specific protective measure might be spelled out in future critical habitat orders rather than simply relying on the general prohibition against critical habitat destruction. SARA might even be amended to establish a consultation process whereby any governmental action, such as funding or project authorization, which is likely to destroy or adversely impact critical habitat would be subject to review and a biological opinion requirement. Such a consultation process might be modelled on the U.S. approach under section 7 of the *Endangered Species Act* whereby federal agencies are required to consult with the National Marine Fisheries Service where proposed actions are likely to destroy or cause adverse modification to the critical habitat of a listed marine species. The NMFS provides “advice” in the form of a biological opinion ([Rohlf, 2014](#)).

Since action plans are critical for moving from intentions to concrete management measures, the strengthening of action plan implementation should also be a priority. Specific regulations might be passed under SARA to implement measures included in an action plan. Regulations might also be developed to protect critical habitat that is identified as unprotected in an action plan. Such regulatory powers under SARA have not been used to date.

The existing action plan monitoring and reporting requirement under SARA might also be subject to critical review. Section 55 of SARA requires the competent minister to monitor the implementation of an action plan and progress towards meeting its objectives and to report on action plan implementation and its ecological and socio-economic impacts five years after the plan comes into effect. A copy of the report must be included in the public registry. Future action plan monitoring and reporting might be enhanced on various fronts including: subjecting

action plans to an independent performance review process to critically assess successes and shortcoming; shortening the reporting timelines from five years to two-three years; and requiring subsequent action plan reviews on an ongoing basis. The challenge of assessing the ecological impacts of SARA action plans under the present section 55 has been recognized by Fisheries and Oceans Canada ([Canadian Science Advisory Secretariat, 2014](#)).

5.2.2. Revisiting the Oceans Act

Various future amendments to Canada’s *Oceans Act* might also be considered to strengthen MPA and integrated ocean planning implementation. The Act might set out requirements for the development of MPA management plans and open the door to more dynamic management through periodic reviews of MPA boundaries and zones in light of changing ocean conditions, particularly climate change and ocean acidity ([West Coast Environmental Law et al., 2017](#), p. 19). The Act might also spell out specific authority to designate MPAs as climate change “insurance policies,” that is to ensure adequate adaptation measures are taken to buffer the stresses of changing oceans ([Hutchings et al., 2019](#), p.30). To enhance integrated ocean planning, the Act might be amended to call for marine spatial planning (MSP); give explicit regulatory power to put integrated plans into practice; and set approval requirements for proposed activities within plan areas ([West Coast Environmental Law et al., 2017](#), p. 19).

In the fall of 2018, funding was secured to allow Fisheries and Oceans Canada to advance marine spatial planning in Canada, but details have not been released yet except for initial public announcement of a commitment to advance MSP off of Canada’s Pacific North Coast

(Northern Shelf Bioregion). On 21 June 2018, Prime Minister Justin Trudeau announced the conclusion of a new agreement between the Government of Canada and 14 Central and North Coast First Nations, the Reconciliation Framework Agreement for Bioregional Oceans Management and Protections, to coordinate ocean management efforts including marine spatial planning and developing a network of protected areas (Office of the Prime Minister, 2018).

Hastening the speed at which MPAs can be established is a further direction which is in the process of being addressed. Bill C-55,¹⁰¹ receiving Royal Assent on 27 May 20, 19¹⁰², grants the Minister of Fisheries, Oceans and the Canadian Coast Guard authority to designate marine protected areas by ministerial order instead of resorting to the more time-consuming route of developing regulations. Such a ministerial order would be limited to five years. It remains to be seen if and how such authority will be exercised in the Atlantic.

5.2.3. Bolstering fines under the Shipping Collision Regulations

Ship strikes is one of the common causes of NARW deaths, and the government relied on speed restrictions in 2018 and 2019 to decrease the risk. Based on the compliance figures from Transport Canada, between April 28, 2018 and August 8, 2018, 212 cases of violations have been reported (Transport Canada, 2019a). The total number of ships monitored in the speed restriction zone was 2,256, thus about 10% of vessels did not comply. Out of the reported violations, only 3 fines were issued, 12 were under review, and 197 have been closed. Cases were closed due to insufficient evidence of a violation, for example instances where wind and wave conditions may have temporarily increased the speed of a vessel (MacKinnon, 2018a). Fines were at the minimum end of the \$6,000 to \$25,000 administrative penalty range because the majority of the violations did not exceed more than 1 knot over the limit (MacKinnon, 2018a, 2018b).

The following year between April 28 and August 23, approximately 3,091 vessel transits were observed across the speed restriction zones (Transport Canada, 2019a). Two hundred and ninety-four vessels were recorded as exceeding the speed limit; out of these, 10 penalties were issued, while 42 were under review. The remaining 242 cases were closed (Transport Canada, 2019a). The penalties range from \$6,000 to \$25,000 remained the same in 2019, but information on the severity of violations was not provided.

The compliance figures show that the majority of vessels comply with the speed restrictions voluntarily. However, since ship strikes is one of the leading causes of NARW deaths, consideration should be given to using increased fines as an additional deterrent. Subsection 38(1) of the CSA allows on summary conviction for fines of up to \$1,000,000 or a prison term not exceeding 18 months or both for violations of a regulation that implements Canada's international obligations.¹⁰³ It may therefore be possible to impose fines that are more substantial than are currently in place.

Consideration should be also given to reviewing the existing investigative techniques and developing new ones. Currently only a fraction of recorded violations results in penalties. Ensuring that investigations are not limiting the number and types of penalties that are applied could also contribute to compliance and ensure the fairness of the penalty system.

¹⁰¹ An Act to amend the Oceans Act and the Petroleum Resources Act, S.C. 2019, c. 8.

¹⁰² *Ibid.*

¹⁰³ These obligations are listed in Schedule 1 and include the Convention on the International Regulations for Preventing Collisions at Sea, 1972. See CSA, s.35 (1) (d).

5.2.4. Clarifying species at risk considerations in environmental assessments

With IAA coming into force very recently, the federal government is still drafting regulations and policies to implement the new regime. The following three recommendations are aimed at making the assessment process more effective at identifying, evaluating and mitigating the impacts of designated projects on NARW and other marine species at risk.

5.2.4.1. Policy guidelines. Clarifying how SARA obligations fit within the new process of impact assessment under IAA should be the first step. In 2010, Environment Canada and Parks Canada through SARA-CEAA working group developed a guideline titled "Addressing Species at Risk Act Consideration under the Environmental Assessment Act for Species under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada" (the "Guidelines") (Government of Canada, 2010). The Guidelines provide a detailed overview of how to include SARA considerations in all stages of assessments under the *Canadian Environmental Assessment Act, 1992* from notification of the responsible minister to determination of significance and subsequent monitoring. These Guidelines should be updated to reflect the legislative changes that have taken place and expanded to include marine species under the responsibility of Fisheries and Oceans Canada.

In the updated Guidelines, special attention needs to be given to the assessment of cumulative effects on SARA-listed species. Most of these species are already significantly affected by multiple threats in their environment to the point that their survival is at risk (Government of Canada, 2010). In the offshore exploration projects reviewed in Part 3, none conducted cumulative assessment for ship strike risk and underwater noise disturbance specifically for NARW. Instead, the risks to marine mammals were evaluated as a group. This approach runs the risk of overlooking the needs of a species that is on the brink and requires special mitigation. Next recommendation builds on the importance of assessing cumulative impacts.

5.2.4.2. Regional and strategic assessments. Regional and strategic assessments are authorized under ¹⁰⁴, but the Act does not provide guidance on when and how to use these tools. For highly migratory species at risk like NARW, these two tools could be useful for assessing and addressing cumulative effects as both are intended to review issues in a relatively large geographical area before any specific projects are proposed (Government of Canada, 2010; Doelle et al., 2012). Looking at an area broader than one project could allow, for example, to estimate an overall "noise budget" and to assess the risk of ship strikes from all sources (Faulkner et al., 2018; Merchant et al., 2018). Regional and strategic assessments could also help plan mitigation measures that extend beyond immediate work areas such as non-disturbance corridors (Doelle et al., 2012).

Strategic assessments that have been completed for offshore oil and gas activities in Nova Scotia and Newfoundland and Labrador compile information that would be helpful for project-level assessments but miss the opportunity to develop a framework of mitigation measures to help guide project-specific conditions (Stantec, 2014a, 2014b, 2017, 2019). For instance, in the most recent draft assessment that looks at the middle Scotian Shelf, right whales are recognized as a priority conservation species found in the study area (Stantec, 2019). The assessors indicated that effects on this species will have to be considered in all future project-level environmental assessments and mitigation measures in addition to the ones common in the industry may have to be developed on a project-by-project basis in consultation with Fisheries and Oceans Canada.

¹⁰⁴ IAA, s. 92 and 95.

Similarly, in the two strategic assessments conducted on the Scotian Shelf around Roseway Basin, the NARW designated critical habitat, cumulative effects were found to be “potential increase in underwater noise; and potential increase in mortality risk” (Stantec, 2014a at 7.5). The assessors recommended that specific mitigation measures be developed on a project by project basis when the timing and spacing of activities is known (Stantec, 2017). The same recommendations were made in the strategic assessment of Western Newfoundland and Labrador, a region that includes the Gulf of St. Lawrence in proximity to the areas where shipping and fishing are restricted to protect NARW (AMEC, 2014).

5.2.4.3. Monitoring and follow up. Our last recommendation draws attention to the importance of monitoring and follow-up activities. Monitoring the effects of an approved project on a listed species is an obligation under subsection 79(2) of SARA. Moreover, the requirements of a follow-up program are one of the factors that have to be considered during an assessment process.¹⁰⁵ But despite these obligations, attention to monitoring and follow up has been lacking over the last 25 years (Doelle, 2018). This is worrying for species at risk because mitigation measures are relied upon to justify project approval,¹⁰⁶ and follow up measures that respond to the observed environment are essential to adaptability. Mitigation measures may need to be modified or new ones implemented if adopted measures are not effective, observed effect is greater than anticipated, or if there is a change in the composition of species in the area (Government of Canada, 2010).

6. Conclusion

The North Atlantic right whale case study shows that the Canadian legal system has the capacity to adapt to changes in the environment, and challenges to endangered species that arise from such changes. Government was able to rely on existing tools quite creatively in order to respond to a quickly developing mortality crisis brought about by climate-driven changes in critical habitat and species distribution. The federal government also quickly passed amendments to the *Canada Shipping Act*, the *Fisheries Act*, and the *Oceans Act* in order to give the responsible Ministers better tools to respond in a timely manner.

However, this case study also sheds light on the limitations of ad-hoc policies and the shortcomings of SARA in protecting marine species at risk over the long term. SARA may be described as currently “failing the NARW” on many fronts. The NARW Recovery Strategy failed to emphasize the threats of climate change and to recognize the imminence of those threats. A comprehensive action plan to implement a recovery strategy for NARW has yet to be finalized. Critical habitat designations for the species are still limited and largely paper exercises.

Despite these shortcomings, Canada is now considering a range of future options for protecting the North Atlantic right whale more effectively. New measures include incentives towards developing ropeless fishing gear, implementing large protected areas, lessening vessel noise, and developing real-time whale alerts that could improve adaptive management of migratory species.

Expansion of speed restriction zones has also been suggested (Oceana Canada, 2019); however whether such expansion should cover the entire Gulf of St. Lawrence is likely to be a controversial question.

Building on these efforts and expanding their scope to other species,

¹⁰⁵ IAA, s. 22(1)(k).

¹⁰⁶ In *Tsileil-Waututh Nation v. Natural Resources Canada*, 2018 FCA 153, the Federal Court of Appeal rejected the approach taken by the National Energy Board not to include project-related marine shipping in its definition of a project because this amounted to NEB recommending approval of the project without mitigation measures. See paras. 453–456.

Canada has yet to take advantage of the opportunities offered by SARA to comprehensively address climate change impacts on marine species at risk. In light of the NARW case study, Canada should move quickly to address some of SARA’s major limitations including a lack of firm timelines for action plans, and lack of legislative or regulatory mention of the need to fully consider climate change threats. A government policy on how climate change will be considered under SARA-related decisions also seems overdue. In conclusion we suggest that protective law and policy measures and scientific efforts needed for North Atlantic right whale recovery are still lacking and need to be improved in order to ensure the recovery of this endangered species, and others like it.

Declaration of competing interest

The authors have no conflicts to declare.

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