DRAFT

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Management Plan for the Fin Whale (*Balaenoptera physalus*), Atlantic Population in Canada

Fin whale

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Fisheries and Oceans Canada
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PREFACE

Under the Accord for the Protection of Species at Risk (1996), the federal, provincial and territorial governments committed to a common approach to the efficient protection of species at risk throughout Canada that includes complementary legislation and programs. Under the *Species at Risk Act* (S.C. 2002, c. 29) (SARA), the Minister of Fisheries and Oceans Canada (DFO) is the competent minister for individuals of aquatic species which are not located in waters administered by the Parks Canada Agency. For the fin whales located in the Forillon National Park, the minister responsible for the Parks Canada Agency (Parks Canada) is the competent minister. Under SARA, the competent federal ministers are required to prepare management plans for species listed as special concern and to report on progress within five years. The competent ministers for the recovery of the fin whale have developed this management plan in collaboration and consultation with government agencies, Aboriginal communities, and non-governmental organizations (list in Appendix B).

Success in the conservation of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan and will not be achieved solely by Fisheries and Oceans Canada, the Parks Canada Agency, or any other competent agency. This plan provides advice to jurisdictions and organizations that may be involved or wish to become involved in activities to conserve this species. In the spirit of the Accord for the Protection of Species at Risk, the Minister of Fisheries and Oceans, and the Minister of Environment Canada invite all responsible jurisdictions and Canadians to support and implement this plan for the benefit of the fin whale and Canadian society as a whole. Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations. The competent ministers will report on progress within five years.

ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

The Atlantic population of fin whales was reduced by whaling during much of the 20th century. Since 1971, however, the species has not been hunted in Canada and sightings remain relatively common off the Atlantic coast and in the Estuary and Gulf of St. Lawrence. The species was designated “special concern” in May 2005 by the Committee on the Status of Endangered Wildlife in Canada and was officially added to Schedule 1 of the *Species at Risk Act* in July 2006 because it was considered likely to become threatened or endangered due to a combination of threats and biological characteristics.

Several factors threaten the Atlantic fin whale population. Those with the highest level of concern relate to noise pollution, such as seismic exploration and navigation. Other threats are the changes in food availability, toxic spills, ship strikes, whaling – still occurring in some countries – and epizootic diseases. Adding to these are threats that need to be monitored closely but with a lesser level of concern: entanglements in fishing gear, marine life observation activities, contaminants, and harmful algal blooms.

The objective of the present management plan is to ensure that anthropogenic threats within Canadian waters do not cause a decline of the population or a reduction of the currently known distribution range in Canada. To reach this objective, several measures are proposed through four approaches: conservation, stewardship and protection of individuals, education and outreach, research and monitoring. These measures require the participation and cooperation of many partners among federal and provincial departments as well as non governmental organizations, universities, and industry associations.

TABLE OF CONTENTS

List of tables

List of figures

LIST OF ACRONYMS

CITES	Convention on International Trade in Endangered Species
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DDT	Dichlorodiphenyltrichloroethane
DFO	Fisheries and Oceans Canada
GREMM	Groupe de recherche et d'éducation sur les mammifères marins
IWC	International Whaling Commission
MARS	Marine Animal Response Society
MDDEP	Ministère du Développement durable, de l'Environnement et des Parcs
MLOA	Marine Life Observation Activities
MPA	Marine Protected Area
PBDE	Polybrominated diphenyl ether
PCB	Polychlorinated biphenyls
SARA	*Species at Risk Act*
SEA	Strategic Environmental Assessment
SSLPM	Saguenay–St. Lawrence Marine Park

1. SPECIES ASSESSMENT INFORMATION FROM COSEWIC

Date of Assessment: May 2005

Common Name (population): Fin whale (Atlantic population)

Scientific Name: *Balaenoptera physalus*

COSEWIC Status: Special concern

Reason for Designation: The size of this population was reduced by whaling during much of the 20th century. However, sightings remain relatively common off Atlantic Canada, and they have not been hunted since 1971. The current abundance and level of depletion compared with pre-whaling numbers are uncertain. The whales face a number of current threats including ship strikes and entanglement in fishing gear, but none is believed to seriously threaten the population.

Canadian Occurrence: Atlantic Ocean

COSEWIC Status History: This species was considered a single unit and designated Special Concern in April 1987. Split into two populations (Atlantic and Pacific) in May 2005. The Atlantic population was designated Special Concern in May 2005. Last assessment based on an update status report.

2. SPECIES STATUS INFORMATION

Fin whales are found in all the oceans of the world. The North Atlantic population inhabits eastern Canadian coastal waters, mostly in summer. The International Union for Conservation of Nature has listed the fin whale as an endangered species and in the United States it is listed as endangered under the *Endangered Species Act* of 1973. In Quebec, the species is on the list of species likely to be designated threatened or vulnerable, in accordance with the *Act Respecting Threatened or Vulnerable Species*.

3. SPECIES INFORMATION

3.1 Species Description

The fin whale is a member of the family Balaenopteridae. It has been called the “greyhound of the sea” due to its fast swimming speed and streamlined body (Figure 1). The fin whale is dark grey or brownish-grey dorsally and on the sides, shading to white ventrally. The color of the lower jaw is asymmetrical – dark on the left and light on the right. This pigment asymmetry continues in the baleen plates, where the right front third are yellowish-white, and the remainder of the right and all of the left baleen plates are a dark blue-grey. This coloration pattern is a distinctive characteristic of the species. Male and female fin whales attain sexual maturity between 5 and 15 years of age (Perry et al., 1999; Aguilar, 2002). Adults reach an average length of 24 m (Aguilar and Lockyer, 1987). Adult females reach lengths of 5 – 10% greater than adult males (Aguilar, 2002; Ralls and Mesnick, 2002). Only the blue whale is larger than the fin whale. The average recorded weight of adults varies between 40 and 50 tons and they can live up to 100 years (Gambell, 1985; Aguilar, 2002).

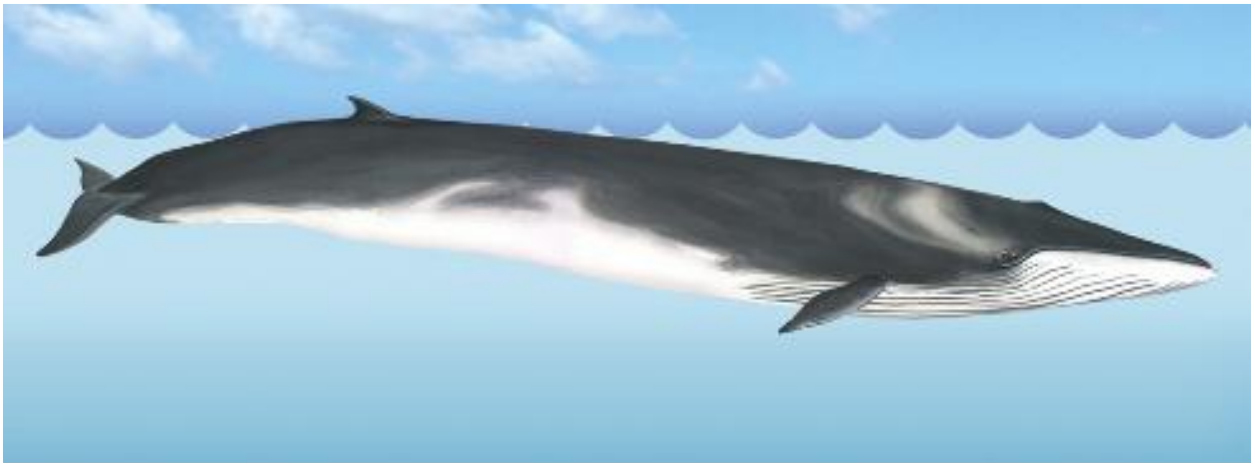

Figure 1. Fin whale (DFO)

Breeding and calving are believed to occur in the winter at low latitudes (Mizroch et al., 1984). After a gestation period of 11 to 12 months, calves are born at an average length of 6 m (Ratnaswamy and Winn, 1993). Agler et al. (1993) have determined that there is a 2.71 year interval between calvings, though a 2.24 year interval is possible.

Though no specific information is available concerning this population, the natural mortality rate of other fin whale populations has been estimated at 4% (Doi et al., 1970; Lockyer and Brown, 1979; Ratnaswamy and Winn, 1993). Sources of natural mortality include predation by killer whales (*Orcinus orca*) or sharks and diseases and parasites such as the giant nematode *Crassicauda boopis* (Lambertsen, 1986; Perry et al., 1999). Hybridization can occur between the blue (*B. musculus*) and fin whales. Several hybrids have been observed in the Atlantic but their reproductive capacity is still unknown (Bérubé and Aguilar, 1998).

3.2 Population and Distribution

3.2.1 Range

Fin whales are found in all the oceans of the world – except the Arctic ocean – in temperate or polar waters (Lambertsen, 1986; Reeves et al., 2002). In the western Atlantic, fin whales have been observed all along the eastern seaboard of North America (Figure 2). Fin whales visiting Canadian waters in the Atlantic could also migrate to Greenland or Iceland; large offshore aggregations of fin whales have been sighted to the southwest of Greenland in the fall.

Most of the information available on the habitat of the fin whale in Canadian waters pertains to the summer feeding grounds. Little information is available on where they spend their winter months or about the location of calving or breeding areas (Reeves et al., 2002). Summer aggregations may be observed in the coastal and offshore waters off Newfoundland and Labrador, in the Gulf of St. Lawrence, on the Atlantic coast of Nova Scotia and in the Bay of Fundy, from May to October (Mitchell, 1974; Perkins and Whitehead, 1977). Although little is known about seasonal migrations, during the winter, a portion of the fin whales off the coast of Newfoundland and Labrador appear to migrate towards Nova Scotia, while those off the Nova Scotian coast seem also to migrate towards the south (Mitchell, 1974; Sergeant, 1977).

Figure 2. Range (in dark blue) of fin whales in the northwest Atlantic

The International Whaling Commission recognizes seven stocks of fin whales in the North Atlantic (Donovan, 1991), including those of Newfoundland and Labrador and Nova Scotia. There may be as many as three Canadian stocks on the east coast, Newfoundland and Labrador, Nova Scotia, and Gulf of St. Lawrence (Mitchell, 1974). However, observations and photo-identification suggest that fin whales in Nova Scotia and in the Gulf of St. Lawrence may be from the same stock (Coakes et al., 2005). Genetic analyses could not distinguish between individuals from the Gulf of St. Lawrence and the Gulf of Maine (Bérubé et al., 1998). Delarue et al (2009) showed that fin whale songs recorded in the Gulf of St. Lawrence were different from songs recorded in the Gulf of Maine, suggesting the presence of two stocks. Fin whale stock structure in the North Atlantic remains largely unknown and they are thus considered to represent one population for the purpose of this management plan.

3.2.2 Population Size and Trends

Fin whale stocks were over-exploited and severely reduced by commercial whaling throughout their distribution range. There are neither reliable estimates of population size prior to the advent of large-scale whaling, nor an estimation of the current North Atlantic fin whale population. The most recent estimate of the total population of fin whales in Canadian waters of the Atlantic, based on aerial surveys, is 890 individuals off the east coast of Newfoundland and Labrador and 462 individuals in the Gulf of St. Lawrence and on the Scotian Shelf (Lawson and Gosselin, 2009). These estimates represent minimum numbers because they were not corrected for diving or undetected animals. Mitchell (1974) estimated that there were 10,800 fin whales off eastern Canada. In 1999, Waring et al. (2002) estimated a population of 2,814 between Georges Bank and the mouth of the Gulf of St. Lawrence, while Kingsley and Reeves (1998) estimated there were 380 individuals in the Gulf of St. Lawrence. Though the demographic trend of the population cannot be accurately identified, it is an indisputable fact that historical commercial whaling significantly reduced fin whale stocks in the northwest Atlantic (COSEWIC, 2005).

3.3 Needs of the Fin Whale

3.3.1 Habitat

Fin whales generally migrate between foraging grounds in high latitudes and calving and breeding grounds in lower latitudes (Sergeant, 1977). However, there have been year-round observations of individuals off the Atlantic coast of Nova Scotia and Newfoundland (Brodie, 1975). The fin whale summer habitat is where surface temperatures are low and where there are oceanic fronts. They are found in both coastal shelf waters and in the high seas (Jefferson et al., 1993). The fin whale feeds on invertebrates such as euphausiids (krill) and copepods, on fish such as Atlantic herring (*Clupea harengus*), capelin (*Mallotus villosus*) and sand lance (*Ammodytes americanus*), and on squid (Sergeant, 1966; Mitchell, 1975; Brodie et al., 1978; Overholtz and Nicolas, 1979; Whitehead and Carscadden, 1985). The summer habitat of the fin whale is generally characterized by dense prey concentrations (Kawamura, 1980).

Woodley and Gaskin (1996) found that in the Bay of Fundy fin whales occurred primarily in shallow areas with high topographic relief and their occurrence was associated with Atlantic herring and euphausiid concentrations. In this bay, fin whales feed regularly in the turbulent tidal wakes[1] around the islands (Johnston et al., 2005; Ingram et al., 2007). Hain et al. (1992) documented in waters of the northeastern United States an association with oceanic fronts[2], areas known for high biological productivity. They are also frequently sighted near the thermal fronts[3]

[1] Water currents caused by tides
[2] Contact area between two water masses
[3] Contact area between two water masses of different temperatures

associated with tidal activity along the north shore of the Gulf of St. Lawrence (Doniol-Valcroze et al., 2007). Each summer, fin whales are found at the head of the Laurentian Channel, in the St. Lawrence Estuary, where the cold, deep waters provide favorable conditions for euphausiids and small pelagic fish such as capelin (Simard et al., 2002). Off the coast of Newfoundland and Labrador, the periodic abundance of fin whales is linked to the seasonal aggregations of capelin (Whitehead and Carscadden, 1985), while Abgrall's modeling efforts (2009) suggested that the fin whales offshore of Newfoundland and Labrador appear to prefer deep and cold waters.

4. THREATS

A threat is an anthropogenic factor that affects or could affect the population. The threat assessment can determine which are most significant, for the species or its habitat, in order to define management approaches that should be implemented to prevent a population decline. It is also important to take into account the cumulative and synergistic effects of these threats on the fin whale population. A single threat might not have a significant impact on the population; however, the combined effect of all threats can have important consequences. Furthermore, climate change will likely weigh on the impacts of identified threats to the fin whale, and will alter its habitat. With global warming, atmospheric temperatures should rise on average by 1.5°C to 5.5°C by 2050 in central and southern Quebec (Bourque and Simonet, 2008), whereas the maritime provinces should experience an increase of 2°C to 4°C (Vasseur and Catto, 2008). Climate change is not considered a threat but rather a factor influencing the degree of impact of other threats. Interaction between climate change and each threat will be discussed below, where applicable.

4.1 Threat Assessment

Table 1. Threat assessment table

Threat		Extent	Occurrence	Frequency	Causal Certainty	Severity	Mitigation potential	Level of Concern
Anthropogenic noise	Navigation	Widespread	Current	Continuous	Low	Moderate	High	**High**
	Seismic exploration and military sonar	Local	Current	Recurrent	Low	Moderate	High	**High**
	Onshore and offshore development	Local	Current	Recurrent	Low	Moderate	High	**Medium**
Whaling		Local	Current	Seasonal	High	Unknown	Low	**Medium**
Changes in availability, quantity, and quality of prey		Widespread	Anticipated	Continuous	Low	Unknown	Moderate	**Medium**
Toxic spills		Local	Anticipated	Recurrent	Medium	Low to Moderate	Moderate	**Medium**
Ship strikes		Widespread	Current	Continuous	Medium	Moderate	High	**Medium**
Epizootic diseases		Widespread	Anticipated	Recurrent	Low	Unknown	Low	**Low**
Entanglement in fishing gear		Local	Current	Continuous	Low	Low to moderate	High	**Low**
Marine life observation activities		Local	Current	Seasonal	Low	Low	High	**Low**
Contaminants		Widespread	Current	Continuous	Low	Low to Moderate	Moderate	**Low**
Harmful algal blooms		Local	Anticipated	Recurrent	Low	Low	Low	**Low**

Legend: **Extent**: an indication of whether the threat is widespread or local within the entire distribution range of the species. **Occurrence**: indicates whether the threat is historic, current, imminent or anticipated. **Frequency**: an indication of whether the threat occurrence is unique, seasonal, continuous or recurrent (not annual or seasonal). **Causal Certainty**: an indication of whether the best available information on the threat and on its impact on the viability of the population is of a high, medium or low quality. **Severity**: an indication of whether the severity of the threat is high, medium or low. **Mitigation potential**: feasibility, logistically and financially, of implementing efficient mitigation measures. **Level of Concern**: an indication of whether threat management is, on the whole, of high, medium or low concern. This may take into account the capacity to mitigate or eliminate the threat.

4.2 Description of Threats

4.2.1 Anthropogenic Noise

In addition to the many types of marine traffic, several industrial and military activities have contributed to the increase in ambient sound in the oceans of the world. This increase in anthropogenic noise in the oceans has raised several questions regarding its impact on cetaceans, which use sound to communicate, navigate and feed (Richardson et al., 1995; National Research Council, 2003; Tyack, 2008). Rorquals[4] produce low-frequency sounds, at 0.02 kHz, which can travel over hundreds of kilometres, along with higher frequency pulsating sounds which are likely used for communicating (reviewed in Thompson et al., 1979). The increase in ambient noise renders these sounds more difficult to hear (Mouy, 2007; Stafford et al., 2007; Simard et al., 2008). This increase in ambient sound can be further augmented by reductions in the pH of water. The scenarios proposed by the Intergovernmental Panel on Climate Change demonstrate that the pH of the surface waters of the oceans will decrease by 0.3 globally by 2050 (Brewer, 1997). Hester et al. (2008) have shown that a 0.3 decrease in pH would result in a 40% reduction in the sound absorption of the water mass of frequencies below 10 kHz. Consequently, noise of anthropogenic origin could travel over greater distances and have an increased impact on communication among cetaceans. Anthropogenic noise has several sources, navigation, seismic exploration, military sonar, and onshore and offshore development.

Navigation
Fin whales can be found in busy marine traffic areas such as the Laurentian channel in the St. Lawrence Estuary (Chion et al., 2009). Motorized watercrafts continuously produce broadband noise ranging from just a few Hz to over 100 kHz. Frequencies of peak energy depend on the size of the vessel and propulsion type. For the large merchant ships, the frequency can range between 0.02 and 0.2 kHz, while for smaller craft such as zodiacs, the frequency is higher, approximately between 0.5 and 6 kHz (Richardson et al., 1995; Lesage et al., 1999; Simard et al., 2006; McQuinn et al., 2011).

Seismic exploration and military sonar
The oil and gas industry generates high levels of noise in the ocean, particularly during the seismic exploration phase which creates the highest levels of noise compared with other methods of exploration and phases of resource extraction (Richardson et al., 1995). Seismic exploration uses a powerful sound wave created by air guns, directed towards the sea floor. This noise pollution is localized. Military sonar generally uses mid-frequency sound waves between 3 and 8 kHz that can have a relatively high intensity (more than 200 dB at the source) and travel over great distances. There are several cases of mass stranding of marine mammals that have been linked to military sonar exercises (Filadelfo et al., 2009; Tyack et al., 2011).

Onshore and offshore development
Operating offshore platforms, construction of docks or ports, or construction of any other infrastructure on- or off- shore can produce loud pulse or continuous sounds. These sound sources induce a localized disruption for marine mammals.

[4] Whales of the family Balaenopteridae

Impacts of noise

Reactions to exposure to noise or other types of disturbance take the form of subtle modifications in diving behaviour, brief or prolonged interruptions in normal activities and even short- or long-term avoidance of the areas of disturbance (Richardson et al., 1995; Michaud and Giard, 1997; National Research Council, 2003; Bejder et al., 2006; Weilgart, 2007; Tyack et al., 2011). Fin whales were observed modifying their acoustic behavior, and even leaving an area, during seismic surveys (Clark and Gagnon, 2006; Castellote et al., 2010). Reactions to noise may vary according to the type of behaviour the whales are engaged in. In fact, it has been shown that bowhead whales (*Balaena mysticetus*) can tolerate higher levels of noise while they are feeding than while they are migrating (Richardson et al., 1986; Ljungblad et al., 1988; Miller et al., 2005). In addition, anthropogenic noise may provoke temporary or permanent modifications in auditory thresholds, the production of stress hormones and physical injuries such as the formation of air bubbles in blood or muscles of cetaceans due to an overly rapid effort to surface in order to escape the source of the noise, and even cause death (Ketten et al., 1993; Crum and Mao, 1996; Evans and England, 2001; Finneran, 2003; Jepson et al., 2003; National Research Council, 2003; Rolland et al., 2011).

4.2.2 Whaling

The intensive commercial whaling at the end of the 19th and beginning of the 20th centuries constitutes the principal cause of the decline of the Atlantic fin whale population. More than 10,000 fin whales were hunted off the coast of Newfoundland and Labrador, mostly off the northeast coast, during the first half of the last century (Sergeant, 1966; Abgrall, 2009). Whaling activity remains a threat for the fin whale population. In fact, the species is still hunted in Greenland, where the Aboriginal people have been authorized by the International Whaling Commission (IWC) to continue their subsistence hunt. Greenland presently has a quota of 10 fin whales, allocated by the Commission. The depletion of many stock of the large whale and the uncertainty surrounding population size led the IWC to decide at its meeting in 1982 that there should be a moratorium in commercial whaling on all North Atlantic whale stocks. Iceland filed an objection to the moratorium and in 2006, the country resumed the commercial hunt of fin whales, in order to export the meat to Japan. Iceland’s whaling industry has caught over 270 fin whales since 2008 and, in 2011, the country announced a quota of 154 fin whales (EIA and WDCS, 2011). It is difficult to assess the impact of current whaling on the fin whale population in Canadian waters because the stock structure in the Atlantic is still poorly understood.

4.2.3 Changes in Prey Availability, Quantity and Quality

Evidence of a modification of the North Atlantic ecosystems and trophic chain has been observed. These changes may have several causes, such as overfishing, habitat degradation, pollution and climate change. For example, the decline of predators such as the Atlantic cod (*Gadus morhua*) or the redfish (*Sebastes* spp.) in the Gulf of St. Lawrence could have induced a change in the abundance or distribution of small pelagic fishes such as capelin or Atlantic herring (Bundy, 2005; Savenkoff et al., 2007). Data on the smaller fishes on which fin whales feed are however often unreliable (McQuinn, 2009). Furthermore, it is difficult to predict the impact of changes in small pelagic fish populations, feeding on macrozooplankton, on fin whales because these whales feed on both zooplankton and fish. This dietary breadth may render it less vulnerable to reductions in certain prey, compared to other baleen whales[5] such as the blue whale or the right whale (*Eubalaena glacialis*). However, alterations in the specific composition of available prey and its abundance and density may influence both its nutritional value and its energy input (Lawson et al., 1998). The presence of fin whales is linked closely to the local abundance of prey (Croll et al., 2001).The fin whale feeds by rapidly engulfing its prey, a technique which requires considerable energy and a high density of prey (Acevedo-Gutièrrez et al., 2002). A modification in prey aggregations may have a significant impact on the population of fin whales in the Atlantic. Alterations of the trophic chain in the Atlantic Canadian waters have been detected but are for now largely misunderstood and there is a great uncertainty regarding its impact on fin whales.

The decline of many traditional commercial fish stocks may also put pressure on other fish species, usually less targeted by commercial fisheries, such as capelin, or encourage the development of new fisheries, such as for krill.

4.2.4 Toxic spills

To date, few major toxic spills have occurred in Canadian waters in the Atlantic. The majority of spills have occurred in ports (Villeneuve and Quilliam, 1999). Nevertheless, oil exploration and development can considerably increase the risk of accidents and spills (Kingston, 2005). For example, in November 2004, a large oil spill offshore of St. John's, Newfoundland, was caused by equipment breakdown on a drilling platform. Avian and marine fauna within a radius of 5 km were affected by the spill. Given the relatively limited habitat available in the St. Lawrence Estuary and Gulf, a large oil spill could pose a serious risk for the fin whales frequenting these waters. Climate change is also likely to induce an increase in the frequency and magnitude of extreme climatic events which could in turn increase the risk of accidental toxic spills.

Oil spills may pose a risk for marine mammals due to the toxic vapours that emanate from crude oil, or volatile distillates, which can damage sensitive tissue such as eye, mouth, and lung membranes (Geraci and St. Aubin, 1990). Marine mammals can also ingest spilled material or its metabolites directly or indirectly in contaminated prey. Matkin et al. (2008) have shown how the increased mortality of killer whales off the coast of Alaska was directly linked to the Exxon Valdez oil spill of 1989. Finally, the baleen of baleen whales, like those of fin whales, can temporarily be fouled and obstructed by spilled products, which can lead to feeding problems and to ingestion of petroleum products.

4.2.5 Ship Strikes

There are many important shipping routes in the distribution range of the fin whale and cases of ship strikes have been reported. According to Laist et al. (2001), fin whales are struck by vessels more frequently than other balaenopterids. Several cases of ship encounters with fin whales have been reported in various ports on the east coast of the United States and in the Gulf of St. Lawrence (Jensen and Silber, 2004). Sixteen cases of collisions with fin whales or observations of fresh wounds on fin whales have been reported in the Saguenay–St. Lawrence

[5] Baleen whales consist of whales in which numerous panels of baleen take the place of true teeth

Marine Park between 1992 and 2011. The reported ship strikes involved small boats (zodiacs, sailboats, yachts) and larger vessels. Each year a small number of large whale carcasses, identified as likely fin or sei whales (*B. borealis*), have been documented floating on the Grand Banks of Newfoundland. It is possible that some of these whales have been killed by ship strikes as at least one large whale has been reported struck by a vessel supplying materials to the offshore oil drilling platform (J. Lawson, DFO, pers. comm.). Ship speed will affect the severity of collisions and the mortality risk (Vanderlaan and Taggart, 2007). It is difficult to assess the significance of this threat for the fin whale population because information comes from anecdotal reports and the analysis of carcasses of stranded whales. In addition, ship strikes are likely under-reported because struck and killed animals are apt to sink before they can be observed, or drift far from the strike site. In the case of stranded whales that exhibited marks of collisions, it is not always possible to determine whether the ship strike was the principal cause of mortality, whether it occurred after the whale's death, or whether disease may have made the individuals more vulnerable to collisions. This threat remains a concern because of the increase in shipping and boating traffic, and of the numerous reported cases of collisions.

4.2.6 Epizootic Diseases

In the north Atlantic, cases of mass mortality of marine mammals due to disease appear to be on the rise since the second half of the 20th century (Harvell et al., 1999). According to Harwood (2001), this trend is likely to continue during the 21st century. For example, outbreaks of morbillivirus have caused mass mortalities of cetaceans and pinnipeds in the Atlantic (Duignan et al., 1995; Kennedy, 1998). This increase in the occurrence of disease may be partly attributable to climatic variations and human activities which cause habitat degradation and pollution (Harvell et al., 1999). A great many pathogens may be transmitted to marine mammals through municipal wastewater, septic installations, leaching from landfills, agricultural runoff and commercial shipping (Measures and Olson, 1999; Measures, 2002b, a; Measures et al., 2004). Marine mammals that are immunodepressed or weakened through exposure to contaminants may also be more susceptible to exposure to new pathogens recently introduced into the environment or to pathogens which are already present (Harvell et al., 1999; Marcogliese and Pietrock, 2011).

In Canada, there exists little information on pathogens likely to cause mass mortalities in marine mammals, but the risk remains.

4.2.7 Entanglement in Fishing Gear

Use of fixed gear and gillnets in fisheries constitutes a potential cause of mortality or injury for fin whales. Entanglement in fishing nets and lines can lead to injury, infection and even death through anoxia (absence of oxygen) of fin whales. In some cases, whales entangled in fishing gear experience difficulty moving about and feeding, to the point where reproduction and survival may be compromised (Reeves et al., 1998; Clapham et al., 1999). It is, however, difficult to assess the scope of the threat of entanglements because many probably go unreported or unnoticed. Photo-identification studies have revealed cases of injury and entanglement in fishing gear (Agler et al., 1990). Two fin whales found dead in the Jacques Cartier Strait in 2009 presented signs of entanglement (Banville, 2010) and several anecdotal sightings of entanglement have been reported in the St. Lawrence Estuary. Between 1979 and 2008, 11 fin whales entangled off Newfoundland and Labrador have been reported (Benjamins et al., in press). Fin whales could be large enough to extricate themselves from gear when they do become entangled unlike smaller whales such as the minke whale (*B. acutorostrata*). Fishing gear can however stay entangled on the whale for extended periods of time, resulting in wounds prone to infections.

4.2.8 Marine life observation activities

Marine life observation activities (MLOA), whether by commercial or recreational vessels or by aircraft (helicopters and airplanes) can disturb fin whales, particularly in the St. Lawrence Estuary and at the entrance to the Bay of Fundy where the species is a favourite of sightseers. MLOA have become an important component of the tourism industry in many areas (Tecsult Environnement, 2000; Lien, 2001). For example, in 2005, more than one million people visited the Saguenay–St. Lawrence Marine Park (SSLMP) and the observation and interpretation sites around this marine protected area (SOM, 2006). Of that number, 274,036 participated to marine life observation excursions, 132,194 cruise ship passengers and 73,014 pleasure boaters (SOM, 2006). In 2008, around 135,000 persons participated in a marine life observation activity in Nova Scotia and New Brunswick, between Cape Breton and the Bay of Fundy, and around 138,000 in Newfoundland and Labrador, mostly in the Avalon Peninsula and in St. John's (O'Connor et al., 2009). The effects of MLOA have been demonstrated on several populations of cetaceans worldwide, including dolphins, killer whales and North Atlantic right whales (Kraus et al., 2005; Bejder et al., 2006; Williams et al., 2006). These effects are cumulative and can cause a disruption or interruption of important behaviours, such as feeding, rearing young, or resting, or chronic stress (Wright et al., 2011), which could in turn lead to a depressed reproductive success or survival rate. However, MLOA are concentrated in specific sectors and thus affect only a part of the population. Also, such activities can be managed to reduce the impacts of disruption of marine mammals.

4.2.9 Contaminants

There are many contaminants found in water, sediments and the marine food chain. They come from various sources such as agricultural, industrial and municipal waste, shipping, dredging, oil and gas development, and aquaculture. Even after implementing prohibitions of use and reductions in emissions, many contaminants can remain in the environment for decades. A decreasing trend in concentration levels of some contaminants has, however, been observed, particularly as concerns organochloride compounds such as dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenyls (PCB) (Muir et al., 1999; Hobbs et al., 2001; Lebeuf, 2009). Other toxic chemicals are not subject to regulation or have been the object of recent regulation, such as polybrominated diphenyl ethers (PBDE).

Fin whales are not high in the food chain and will therefore accumulate less contaminants in their tissues, compared with other cetaceans such as belugas (*Delphinapterus leucas*). However, organochlorides have been found in Atlantic fin whale tissues (Gauthier et al., 1997; Hobbs et al., 2001). Higher concentrations of PCBs and chlorinated pesticides tend to be found in males, compared to females, probably due to maternal transfer to the calf during nursing (Aguilar and

Borrell, 1994; Hobbs et al., 2001). Hobbs et al. (2001) recorded a decrease in PCB and DDT concentrations in fin whale tissue between 1971 and 1991. Thus, contaminants are a greater threat to several other cetaceans than they are to fin whales. Nevertheless, the risk of bioaccumulation for this long-lived species remains a concern and the impacts on the health of fin whales of contaminants concentrations in their tissues remain unknown, particularly new emerging chemicals. Also, fin whales can be exposed to toxic compounds, such as polycyclic aromatic hydrocarbons, that do not accumulate in tissues but that can nevertheless have negative impacts.

There are no recent and comprehensive studies on the impact of contaminants on large baleen whales. Overall, contaminants are likely to significantly alter hormonal, reproductive, immune and neurological functions in animal species (Martineau et al., 1987; Béland et al., 1993; Colborn et al., 1993). It is also critical to take into account the synergistic effect of various contaminants, with each other and with environmental factors, which may increase the toxicity of these compounds. (Eriksson et al., 2006; Couillard et al., 2008a; Couillard et al., 2008b). The effects of contaminants may be amplified by climate change or the presence of pathogens. Changes in temperature, pH and salinity stemming from climate change may affect the toxicity and bioavailability of contaminants (reviewed in Schiedek et al., 2007).

4.2.10 Harmful Algal Blooms

In cetaceans in all the world's oceans, there has been an increase in cases of poisoning due to harmful algal blooms (Harvell et al., 1999). In the summer of 2008, a harmful algal bloom causing a red tide extending over 600 km^2 in the St. Lawrence Estuary resulted in the deaths of several cetaceans including a dozen belugas and harbour porpoises (*Phocoena phocoena*), dozens of seals and thousands of birds, invertebrates and fish (L. Measures, DFO, unpubl. data; S. Lair, Université de Montréal, unpubl. data). This red tide was caused by *Alexandrium tamarense*, microscopic algae which are naturally present in the Gulf of St. Lawrence. The algae produce a neurotoxin called saxitoxin which provokes intermittent neurological disruptions which may result in death. A fin whale was found stranded off Tadoussac not long after the red tide event and a toxicological analysis revealed the presence of saxitoxin in tissues (S. Lair, Université de Montréal, unpubl. data). The spread of this natural phenomenon is probably due to particularly abundant precipitation during the summer of 2008 which caused a rise in temperature and a decrease in salinity in the surface waters, favourable conditions to the proliferation of algae (M. Starr, DFO, unpubl. data). Cetaceans ingest this neurotoxin through their prey, a case of poisoning through the food chain. Global warming and subsequent changes in the rainfall regime may lead to an increase in the frequency and intensity of algal blooms and augment this significant threat to cetaceans. Furthermore, the presence of toxic algae as cysts after an algal bloom could make red tides more common in sectors where they have already occurred (M. Starr, DFO, unpubl. data).

5. MANAGEMENT

5.1 Objective

The objective of the present management plan is to ensure that anthropogenic threats in Canadian waters do not provoke a decline in the population or a reduction in the currently observed Canadian range.

5.2 Actions Already Completed or Currently Underway

Several actions have been taken to prevent the decline of the fin whale population. Although these measures do not always specifically target the fin whale, they benefit the population.

5.2.1 Conservation

International Protection

The fin whale is listed in Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which lists the endangered species for which commercial trade is prohibited. However, both Iceland and Japan hold reservations to the listing of fin whales by CITES and thus continue the commercial trade of fin whale meat. The International Whaling Commission moratorium on commercial whaling provides protection for the fin whale even though the subsistence hunt continues in Greenland and it is hunted commercially in Iceland. This country objected to the moratorium proposed by the IWC. In the United States, the fin whale is protected under the *Marine Mammal Protection Act* of 1972 and the *Endangered Species Act* of 1973, where it is listed as endangered.

Canadian Protection

The fin whale has been protected since 1993 under the *Marine Mammal Regulations* of the *Fisheries Act*, which prohibit disturbance of marine mammals. These regulations have been revised recently to include measures such as a minimum 100 m approach distance with marine mammals. In Quebec, the species is on the list of species likely to be designated threatened or vulnerable, in accordance with the *Act Respecting Threatened or Vulnerable Species*. This act is administered by the Government of Quebec.

Since 1998, a moratorium on the issuance of new licenses for all the unexploited forage species (including krill and sand lance) was put in place by the Minister of Fisheries and Oceans and is still in force in eastern Canada. This moratorium could prevent an increase in fishing pressure on certain preys of fin whales. Individual animals that frequent protected sites administered by Parks Canada, such as the Saguenay–St. Lawrence Marine Park and the waters of Forillon National Park, are protected under the *Saguenay–St. Lawrence Marine Park Act*, the *Canadian National Parks Act,* and their regulations.

The Saguenay–St. Lawrence Marine Park (SSLMP)

The Marine Park was officially established on June 10, 1998 under two laws enacted by the Canadian and Quebec government, the *Saguenay–St. Lawrence Marine Park Act* (1997) and the *Act respecting the Saguenay–St. Lawrence Marine Park*. Covering a 1,245 km² area, the marine park is under the joint administration of both the Parks Canada Agency, for the Government of Canada, and the Ministère du Développement durable, de l'Environnement et des Parcs du Québec (MDDEP), along with the Société des établissements de plein air du Québec. The *Regulations on Marine Activities in the Saguenay–St. Lawrence Marine Park* (2002) are part of the federal legislation and are enforced by a team of park wardens. The number of excursion vessels allowed in the park is controlled by a system of permits, as are vessel speed, duration of presence at observation sites, and maintenance of minimum distances from whales. The Quebec legislation prohibits seismic exploration and oil and gas development within the park. Marine Park regulations provide for zoning which would serve as an essential management tool to attain the conservation and utilization objectives of the marine park in an ecologically sustainable manner. A management plan for activities at sea in the marine park was also produced following an increase in traffic in the Estuary.

Marine Protected Area (MPA)

The Gully Marine Protected Area was created on the Scotian Shelf in May 2004. It is located 200 km off the coast of Nova Scotia, close to Sable Island. It contains a deep-water canyon which attracts various species of marine mammals, including the fin whale. Fishing is prohibited within the MPA, thus providing some protection against entanglement. Oil and gas exploration and extraction is also prohibited within the MPA.

Fisheries and Oceans Canada identified several areas of interest for future MPAs in waters used by the Atlantic fin whale. In Quebec, the St. Lawrence Estuary MPA project covers 6,000 km^2 adjacent to the Saguenay–St. Lawrence Marine Park. The specific goal of the project is the long-term protection and conservation of marine mammals, their habitat and food resources. The area under consideration covers the sector where human pressures on marine mammals outside the park are most intense (MLOA, shipping). In Newfoundland and Labrador, the Laurentian Channel has been identified as an area of interest. It has been identified as an ecologically significant area for the fin whale because of the Cabot Strait, which is an important migration corridor for marine mammals. It is also an area of increased productivity due to the upwelling along the offshore slope and channel.

Prohibition of Oil and Gas Exploration and Extraction

In the summer of 2011, the *Act to limit oil and gas activities* was unanimously adopted by the Assemblée nationale du Québec. Under this bill, oil and gas activities in the St. Lawrence River upstream of Anticosti Island and on the islands situated in that part of the river are prohibited.

Reducing ship strike risks

In 2011, a working group on shipping was formed to examine possible solutions to mitigate the impacts of this activity on the environment, particularly on whales, in the Saguenay–St. Lawrence Marine Park and the proposed St. Lawrence Estuary MPA. This group is co-presided by DFO and Parks Canada and includes representatives of the industry and marine mammal experts. For its first year, the working group is discussing means to prevent ship strikes with cetaceans.

5.2.2 Outreach and Education

Outreach

Each year, Parks Canada organizes training sessions for skippers of excursion vessels in the Saguenay–St. Lawrence Marine Park to familiarize them with the best practices in the observation of marine mammals (regulations on marine activities, biology and ways of diversifying excursions). These training sessions are mandatory for skippers and kayak guides wishing to operate within the park. This training is available, but not mandatory, for naturalists. Parks Canada and Parcs Québec also conduct various activities in the field, such as an educational tour and patrols to acquaint visitors with park regulations. A pamphlet on park regulations, designed for the general public, is now widely distributed. A guide on ecoresponsible practices for captains and naturalists was developed by them in order to educate the public on conservation and limit the impacts of marine life observation activities.

During the observation season, the Groupe de recherche et d'éducation sur les mammifères marins (GREMM) publishes a weekly bulletin entitled Whale Echo intended for vessel captains and naturalists and containing information on current projects and activities under way to protect the whales.

DFO provides annual public education and outreach to the tour boat operators, the Newfoundland and Labrador kayak club, and the public. This outreach includes a description of whales and their behaviour, threats to their survival, relevant federal regulations, and the Voluntary Code of Conduct for whale watching in the province.

Best practices guide

Since 2007, a best practices guide for the observation of marine mammals in Quebec, developed in collaboration with the marine mammal observation industry, DFO and Parks Canada, has been made available to educate the general public on the safe observation of marine mammals. In Newfoundland and Labrador, tour boat operators operate within the guidelines of a Voluntary Code of Conduct, which is intended to reduce the risks to the whales and the boats during interactions.

Eco-Whale Alliance

Marine tour business owners, Parcs Québec, Parks Canada and the GREMM have come together to ensure the responsible practice and sustainable development of whale watching activities in the Saguenay–St. Lawrence Marine Park. This initiative includes a guide for eco-responsible practices for captains and naturalists, as well as the creation of an Eco-Baleine Fund to support research, training and educational activities associated with the whale watching activities.

5.2.3 Stewardship and protection of individuals

The National Marine Mammal Response Program

Fisheries and Oceans Canada is responsible for assisting marine mammals and sea turtles in distress. In collaboration with conservation groups and non-governmental organizations, DFO supports marine mammal incident response networks in all regions under the umbrella of the Marine Mammal Response Program.

Quebec

Between 1982 and 2002, DFO and the St. Lawrence National Institute of Ecotoxicology monitored stranded marine mammals in the St. Lawrence Estuary. The GREMM took over the monitoring in 2003, and in 2004 created the Quebec Marine Mammal Emergency Response Network, in collaboration with thirteen partners including DFO and Parks Canada. The Network's mandate is to organize, coordinate and implement appropriate measures to reduce cases of accidental death of marine mammals, to come to the aid of animals in difficulty, and to promote the acquisition of knowledge based on analyses of dead, stranded or drifting animals in the Quebec waters of the St. Lawrence. The coordination and call centre of the Network are the responsibility of the GREMM.

Gulf

In the Gulf region, DFO fishery officers act as first responders for incidents involving marine mammals. Fishery officers will respond to various incident types involving dead or alive marine mammals and will also collect data and take pictures while on site. Various related tools and training have been provided to fishery officers in order to help them respond safely and effectively to these incidents. Employees of the DFO Gulf Region also work with non-governmental organizations.

Maritimes

The Marine Animal Response Society (MARS) is a charitable organization dedicated to marine mammal conservation in the Maritime Provinces through education, research and rescue. This organization has a call centre and coordinates rescue of stranded and entangled marine mammals with the help of several partners, including DFO. In the Bay of Fundy, the Campobello Whale Rescue Team will intervene if a cetacean is entangled in fishing gear.

Newfoundland and Labrador

The Whale Release and Stranding Group was initiated in Newfoundland and Labrador a few decades ago to provide fishermen, partners and the general public the means to report cases of entanglement, injury or death of marine mammals and to provide a team ready to assist marine mammals in difficulty. The group also provides public outreach opportunities and collects data and samples for DFO in the region.

5.2.4 Research and monitoring

Research on the species' biology

In the Quebec region, several organizations including the Mingan Island Cetacean Study, the GREMM, DFO and Parks Canada collaborate on research to fill in knowledge gaps on biology and ecology of fin whales in Canadian waters. This research aims to:

1. Better document the distribution, the use, and the fidelity to the St. Lawrence Estuary and north-west Gulf;
2. Determine the seasonal and yearly variations in diet in the St. Lawrence Estuary and north-west Gulf;
3. Determine the abundance, distribution and habitat characteristics, including prey, required by fin whales in Canadian waters;
4. Contribute to the study of the population structure in the Atlantic, either by genetics or photo-identification.

In the Newfoundland and Labrador region, DFO collaborates with several non-governmental organizations (including researchers in Saint-Pierre and Miquelon) and industry partners on research on biology and ecology of fin whales. This research aims to:

1. Document the distribution, habitat use, and acoustic exposure on the Grand Banks and on the south coast of Newfoundland;
2. Determine the abundance of fin whales in Canadian waters;
3. Study the stock structure in the Atlantic, either by acoustics or genetics.

Research on entanglements and ship strikes

The Marine Mammal Response Program and its many collaborators collect data on entanglements and ship strikes. Several studies have been carried out to assess the impacts of these threats on marine mammal populations, including the fin whale.

Study of marine life observation activities (MLOA)

The GREMM and Parks Canada have studied MLOA since 1994 in the SSLMP by placing observers on excursions vessels. The research project aims to characterize MLOA, assess the distribution of marine animals on the sighting areas, and evaluate the impact of current management measures in the region. The study area was extended in 2005 with the help of DFO to include the proposed St. Lawrence Estuary MPA.

Research on contaminants

Many studies have been done or are being done to assess the impacts of contaminants or to mitigate them. Stranded carcasses are an opportunity for DFO and university researchers to determine concentrations and types of contaminants accumulating in fin whales.

5.3 Strategic directions for management

In order to prevent the decline of the Atlantic fin whale population, several measures are listed in the table below (Table 2). These measures are grouped according to four approaches:

1. Conservation and management: these measures aim to protect fin whales and their habitat through policies and regulations and their enforcement.
2. Outreach and education: these measures aim to educate and raise awareness of the stakeholders of their activities' impact on fin whales.
3. Stewardship and protection of individuals: these measures aim to protect threatened fin whales through direct actions.
4. Research and monitoring: these measures aim to fill in knowledge gaps on the population and the threats affecting it.

Fisheries and Oceans Canada encourages other agencies and organizations to participate in the conservation of the Atlantic fin whale through the implementation of this management plan. The activities implemented by Fisheries and Oceans Canada will be subject to the availability of funding and other required resources. Where appropriate, partnerships with specific organizations and sectors will provide the necessary expertise and capacity to carry out the listed action. However, this identification is intended to be advice to other agencies, and carrying out these actions will be subject to each agency's priorities and budgetary constraints.

Table 2. Implementation schedule.
The main approaches are detailed with management measures (first column) aiming to mitigate the threats presented in the 'threats' column. The 'Potential partners' column suggests stakeholders who may be interested in implementing those measures. The 'Timeline' column identifies a potential implementation schedule. Measures are classified according to their priority level.

Measures	Threats	Potential partners	Timeline	Priority
1. Conservation and management				
1.1. Improve and extend the scope of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment so that it applies to all noise-producing activities (e.g., sonar)	Noise	• DFO • Natural Resources Canada • Transport Canada • National Defense • Provincial governments • Industries	2 years	High
1.2. Maintain the moratorium on permits for new forage species fisheries.	Prey availability	• DFO	Current	High
1.3. Develop management measures, particularly in the SSLMP and the proposed St. Lawrence Estuary MPA to reduce risks of ship strikes.	Ship strikes	• DFO • Parks Canada • Transport Canada • Shipping industry	5 years	Medium
1.4. Reduce the emission of pollutants from sources such as storage sites, landfills, wastewater treatment facilities, industries, agricultural runoffs, oil platforms, etc.	Contaminants	• Environment Canada • Provincial governments • DFO	10 years	Medium
1.5. Put in place the St. Lawrence Estuary MPA.	MLOA, ship strikes, noise	• DFO	10 years	Medium
1.6. Develop regulations or enforce existing regulations to control the introduction of toxic pollutants, particularly emerging contaminants, into the environment.	Contaminants	• Environment Canada • Provincial governments • DFO	Current	Medium

Measures	Threats	Potential partners	Timeline	Priority
1.7. Revise, adopt and enforce the *Marine Mammal Regulations* and the *Regulations on Marine Activities in the SSLMP* particularly by maintaining an adequate distance between vessels and whales throughout the Canadian range of the fin whale.	MLOA	• DFO • Parks Canada	Current	Low
1.8. Increase MLOA surveillance patrols in the distribution range during the tourist season.	MLOA	• Parks Canada • DFO	5 years	Low
2. Stewardship and protection of individuals				
2.1. Put in place prevention measures to reduce or prevent entanglements in fin whale concentration areas	Entanglement in fishing gear	• DFO • Parks Canada • Non-governmental organizations • Fishers organizations	3 years	Medium
2.2. Maintain the National Marine Mammal Response Program in Canada.	Entanglement in fishing gear	• DFO • Parks Canada • Observation networks • Non-governmental organizations • Fishers organizations	Current	Low
3. Outreach and education				
3.1. Develop a best practices protocol designed for each user type navigating within the Canadian range.	Ship strikes	• DFO • Parks Canada • Navigation industry • MLOA • Boaters associations	5 years	Medium
3.2. Inform boaters, ship owners and industries producing high levels of noise on their negative impacts on the fin whale population.	Noise	• DFO • Parks Canada • Transport Canada	5 years	Medium

Measures	Threats	Potential partners	Timeline	Priority
		• Boaters associations		
3.3. Implement an educational strategy on marine mammals throughout the range of the fin whale.	Ship strikes, noise, MLOA, entanglements	• Parks Canada • Boaters associations • DFO • Non-governmental organizations • Shipping industry	5 years	Low
4. Research and monitoring				
4.1. Assess the population numbers and trends, concentration areas and stock structure of fin whales in Atlantic Canadian waters.	All	• DFO • Universities • Non-governmental organizations	10 years	High
4.2. Characterize sources and levels of sound in different sectors of the distribution range; identify problematic areas; conduct research on the effects of noise pollution.	Noise	• DFO • Parks Canada • Universities • Non-governmental organizations	3 years	High
4.3. Monitor mitigation measures in inshore or offshore projects producing noise pollution	Noise	• DFO • Industries	2 years	High
4.4. Study the fin whale's diet, and prey abundance and distribution.	Prey availability	• DFO • Universities • Non-governmental organizations	10 years	Medium
4.5. Compile and record incidents involving ship strikes and entanglement of fin whales.	Entanglement in fishing gears, ship strikes	• DFO • Parks Canada • Fishers organizations • Navigation industry • Non-governmental organizations	Current	Medium

Measures	Threats	Potential partners	Timeline	Priority
4.6. Establish collaboration with international partners to better understand the ecology of the fin whale across its entire Atlantic range.	All	• DFO • Universities • Non-governmental organizations	10 years	Medium
4.7. Determine the long and short-term effects of disturbance by MLOA on the fin whale.	MLOA	• DFO • Parks Canada • Universities • Non-governmental organizations	Current	Low
4.8. Assess concentrations of various problematic contaminants in fin whale tissue, prey and environment.	Contaminants	• DFO • Universities • Non-governmental organizations	10 years	Low
4.9. Study diseases and parasites affecting fin whales.	Epizootic diseases	• DFO • Universities • Non-governmental organizations	10 years	Low

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APPENDIX A: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

The distribution range and diet of the fin whale and other baleen whales overlap. Sightings of mixed groups of fin whales and blue whales are not uncommon and hybrids have been observed (Bérubé and Aguilar, 1998). Several researchers have recorded the presence of fin whales and humpback whales (*Megaptera novaeangliae*) feeding in the same sectors in the Bay of Fundy and off the coast of Newfoundland (Whitehead and Carlson, 1988; Katona et al., 1993). Fin whales have been observed alongside right whales at the entrance to the Bay of Fundy (Woodley and Gaskin, 1996) and on the Scotian Shelf (Mitchell et al., 1986). The management measures proposed in the present plan will benefit all these species.

APPENDIX B: RECORD OF COOPERATION AND CONSULTATION

Fisheries and Oceans Canada organized a working group composed of experts from the fields of science and management, independent researchers from non-governmental organizations, and one representative each from the Aboriginal communities and the marine observation industry to revise and approve the first draft of the present management plan. A technical workshop on management planning for the fin whale was held in March 2011, providing a platform for sharing information and expertise on the fin whale, Atlantic population, and to develop this management plan. This workshop proved to be very useful in completing the Management Plan for the Fin Whale, Atlantic Population. Furthermore, a draft of the management plan was sent to participants present at the workshop but also to those who could not attend. All had a chance to contribute to this plan.

Participants in the workshop on the development and implementation of a management plan for the fin whale, Atlantic population

Jacinthe Beauchamp	Fisheries and Oceans Canada (Quebec)
Hugues Bouchard	Fisheries and Oceans Canada (Quebec)
Marcelle Deslauriers	Fisheries and Oceans Canada (Quebec)
Suzan Dionne	Parks Canada (Quebec)
Thomas Doniol-Valcroze	Fisheries and Oceans Canada (Quebec)
Jack Lawson	Fisheries and Oceans Canada (Newfoundland and Labrador)
Véronique Lesage	Fisheries and Oceans Canada (Quebec)
Mark McGarrigle	Fisheries and Oceans Canada (Gulf)
Nadia Ménard	Parks Canada (Quebec)
Robert Michaud	Groupe de recherche et d'éducation sur les mammifères marins

Participants who could not attend the workshop but contributed to the plan

Mathieu Bergeron	Fisheries and Oceans Canada (Quebec)
Guy Cantin	Fisheries and Oceans Canada (Quebec)
Pierre Léonard	Essipit Community
Catherine Merriman	Fisheries and Oceans Canada (Maritimes)
Richard Sears	Mingan Island Cetacean Study