

# Recovery Strategy for the Grey Whale (*Eschrichtius robustus*), Atlantic Population, in Canada

## Grey Whale



June 2007



# About the Species at Risk Act Recovery Strategy Series

## What is the *Species at Risk Act* (SARA)?

SARA is the Act developed by the federal government as a key contribution to the common national effort to protect and conserve species at risk in Canada. SARA came into force in 2003 and one of its purposes is “*to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity.*”

## What is recovery?

In the context of species at risk conservation, **recovery** is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of the species’ persistence in the wild. A species will be considered **recovered** when its long-term persistence in the wild has been secured.

## What is a recovery strategy?

A recovery strategy is a planning document that identifies what needs to be done to arrest or reverse the decline of a species. It sets goals and objectives and identifies the main areas of activities to be undertaken. Detailed planning is done at the action plan stage.

Recovery strategy development is a commitment of all provinces and territories and of three federal agencies — Environment Canada, Parks Canada Agency, and Fisheries and Oceans Canada — under the Accord for the Protection of Species at Risk. Sections 37–46 of SARA ([http://www.sararegistry.gc.ca/the\\_act/default\\_e.cfm](http://www.sararegistry.gc.ca/the_act/default_e.cfm)) outline both the required content and the process for developing recovery strategies published in this series.

Depending on the status of the species and when it was assessed, a recovery strategy has to be developed within one to two years after the species is added to the List of Wildlife Species at Risk. Three to four years is allowed for those species that were automatically listed when SARA came into force.

## What’s next?

In most cases, one or more action plans will be developed to define and guide implementation of the recovery strategy. However, in the case of an extirpated species for which recovery is deemed not feasible, no further action is anticipated.

## The series

This series presents the recovery strategies prepared or adopted by the federal government under SARA. New documents will be added regularly as species get listed and as strategies are updated.

## To learn more

To learn more about the Species at Risk Act and recovery initiatives, please consult the SARA Public Registry (<http://www.sararegistry.gc.ca/>) and the web site of the Recovery Secretariat ([http://www.speciesatrisk.gc.ca/recovery/default\\_e.cfm](http://www.speciesatrisk.gc.ca/recovery/default_e.cfm)).

**Recovery Strategy for the Grey Whale (*Eschrichtius robustus*),  
Atlantic Population, in Canada (PROPOSED)**

**June 2007**

**Recovery of this species is considered not technically or biologically feasible at this time**

**Recommended citation:**

Department of Fisheries and Oceans. 2007. Recovery Strategy for the Grey Whale (Atlantic population) (*Eschrichtius robustus*) in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series. Department of Fisheries and Oceans, Ottawa. iv + 8 pp.

**Additional copies:**

You can download additional copies from the SARA Public Registry (<http://www.sararegistry.gc.ca/>)

**Cover illustration:** J. Domm for Fisheries and Oceans Canada.

Également disponible en français sous le titre :

« Programme de rétablissement pour la baleine grise (*Eschrichtius robustus*) dans les eaux canadiennes de l'Atlantique »

© Her Majesty the Queen in Right of Canada, represented by the Minister of Fisheries and Oceans, 2007.  
All rights reserved.

ISBN *to come*

Catalogue no. *to come*

*Content (excluding the cover illustration) may be used without permission, with appropriate credit to the source.*

## **DECLARATION (RECOVERY NOT FEASIBLE)**

This proposed recovery strategy for the grey whale (Atlantic population) has been prepared in cooperation with the jurisdictions responsible for the species, as described in the Preface. The Department of Fisheries and Oceans (DFO) has reviewed and accepts this document as its recovery strategy for the grey whale (Atlantic population) as required by the *Species at Risk Act* (SARA).

The recovery of the grey whale (Atlantic population) in Canada is neither technically nor biologically feasible at this time. Because the population has been extirpated, as well as the unlikelihood of reintroduction of a viable population from a donor population, and the non-existence of an adjacent population to support natural recovery, recovery efforts targeted towards other species in the same geographic area or experiencing similar threats, general conservation programs in the same geographic area, and protection through SARA prohibitions protecting individuals of the species, their residences, and critical habitat will not be effective in re-establishing this population. Recovery could only occur through reintroduction of the species, which is considered not feasible at this time.

The feasibility determination will be re-evaluated as warranted in response to changing conditions and/or knowledge and, at least every five years as part of the mandatory report on implementation of the recovery strategy.

## **RESPONSIBLE JURISDICTIONS**

Under the *Species at Risk Act*, Fisheries and Oceans Canada is the responsible jurisdiction for the grey whale.

## **AUTHORS**

This document was prepared by Howard Powles (University of Ottawa), and has benefited by reviews from John Loch, (Loch Consulting).

## STRATEGIC ENVIRONMENTAL ASSESSMENT STATEMENT

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 on non-target species or habitats.

Because the Atlantic population of grey whale is extirpated and recovery has been determined to be not feasible, no further recovery action is considered appropriate at this time. Accordingly, this recovery strategy will have no effect on the environment.

## RESIDENCE

SARA defines residence as: “*a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating*” [SARA S2(1)].

Residence protection is a SARA requirement that is separate from recovery strategy development as it relates to the general prohibitions under the Act (Section 33). To facilitate protection, residence descriptions, or the rationale for why the residence concept does not apply to a given species, are posted on the SARA public registry: [http://www.sararegistry.gc.ca/plans/residence\\_e.cfm](http://www.sararegistry.gc.ca/plans/residence_e.cfm).

In the case of an extirpated species for which the recovery strategy does not recommend its reintroduction into the wild in Canada, the prohibition pertaining to the damage or destruction of residence does not apply [SARA S33].

## PREFACE

Fisheries and Oceans Canada has led the development of this recovery strategy for the Atlantic population of grey whale. The development of the recovery strategy has involved: (i) the preparation of a draft addressing SARA requirements for recovery strategies for extirpated species; (ii) the circulation of this draft for review and comment by the provincial governments of Québec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland & Labrador; (iii) public consultations on the draft strategy; and (iv) finalisation of the proposed version for posting on the SARA public registry.

The determination that recovery is not feasible, including the justification, was reviewed as part of the review and consultation process for the recovery strategy. The final decision and wording of the determination were the responsibility of the DFO and took account of the comments received.

## EXECUTIVE SUMMARY

The grey whale is a medium to large-sized mysticete (baleen) whale, with a maximum length of around 15 m. Its skin colour ranges from dark to light grey with various degrees of mottling. Because of a variety of distinctive characteristics, the species is placed in the monotypic family Eschrichtiidae, separate from all other whales.

Historically found in the North Atlantic and North Pacific, the species is currently extant only in the North Pacific where there are two populations. Distribution in the western North Atlantic, including Atlantic Canada, is inferred from the distribution of subfossil remains, historical observations of whaling captains, and distribution and migratory behaviour of the extant eastern Pacific population. Subfossil remains and whaling observations are known from New England to southern Florida. Atlantic grey whales may have visited Canadian waters including the Scotian Shelf, Gulf of St. Lawrence, Grand Banks, and possibly as far north as Hudson Bay.

Grey whales are thought to have become extirpated from the western North Atlantic before the end of the 1800s, and specialists have inferred that the population was extirpated due to harvesting.

There is no information on the biological needs or the critical habitat of the western North Atlantic population of grey whales, which would have included individuals occurring in Canada. Based on information from the eastern North Pacific population, northwest Atlantic grey whales would have required productive feeding grounds in northern waters, shallow warm protected coastal lagoons for breeding and calving in southern subtropical waters, and a migratory corridor, probably within a few kilometers of the shoreline, connecting these areas. The primary historical threat was harvesting, but harvesting large whales is no longer permitted in Canada except for very limited subsistence needs of northern Aboriginal people. Current potential threats to grey whales include entanglement in fishing gear, ship strikes, and degradation of coastal habitats.

Recovery of this population is determined to be not feasible. Although individuals exist in the eastern North Pacific to support reintroduction, a large number (more than 100) would be required to re-establish a viable population, and the transport of large whales on this scale has not been shown to be feasible. Even if reintroduction on this scale were feasible, it is highly doubtful that the long migratory pattern and complex ecological relationships essential to the life cycle of this species could be re-established.

## TABLE OF CONTENTS

DECLARATION (recovery not feasible) .....	i
RESPONSIBLE JURISDICTIONS.....	i
AUTHORS.....	i
ACKNOWLEDGMENTS.....	<b>Error! Bookmark not defined.</b>
STRATEGIC ENVIRONMENTAL ASSESSMENT STATEMENT .....	<b>Error! Bookmark not defined.</b>
RESIDENCE .....	ii
PREFACE .....	ii
EXECUTIVE SUMMARY .....	iii
1. BACKGROUND .....	1
1.1 Species Assessment Information from COSEWIC.....	1
1.2 Description .....	1
1.3 Populations and Distribution .....	2
1.4 Needs of the grey whale .....	3
1.4.1 Habitat and biological needs .....	3
1.4.2 Ecological role.....	3
1.4.3 Limiting factors.....	3
1.5 Threats.....	4
1.5.1 Description of potential threats .....	4
2. Recovery feasibility .....	4
2.1 Availability of individuals for re-establishment.....	4
2.2 Habitat availability .....	4
2.3 Potential to mitigate threats to individuals and habitat .....	5
2.4. Existence of effective recovery techniques .....	6
2.5 Recovery feasibility conclusion .....	7
3. CRITICAL HABITAT .....	7
3.1 Identification of the Species' Critical Habitat .....	7
4. CONSERVATION APPROACH .....	7
5. REFERENCES.....	8



# 1. BACKGROUND<sup>1</sup>

## 1.1 Species Assessment Information from COSEWIC

**Date of Assessment:** May 2000

**Common Name (population):**

Grey whale - Atlantic population  
(French: “baleine grise”)

**Scientific Name:**

*Eschrichtius robustus*, Liljeborg 1861

**COSEWIC Status:**

Extirpated

**Reason for designation:**

Extirpated apparently by human hunting, before the end of the nineteenth century

**Canadian Occurrence:**

Atlantic Ocean

**COSEWIC Status History:**

Extirpated before the end of the 1800s. Designated extirpated in April 1987. Status confirmed in May 2000. May 2000 assessment based on new quantitative criteria applied to information from existing 1987 status report.

## 1.2 Description

The grey whale is a medium to large-sized mysticete (baleen) whale. Adult females typically range from 11.7 to 15.2 m in length, while adult males are somewhat smaller at 11.1 to 14.3 m. The grey whale is the only large baleen whale in which the upper jaw extends beyond the lower. Grey whales lack a dorsal fin, but have a low hump and a series of seven to 15 knobs (“knuckles”) along the dorsal ridge. Skin colour ranges from dark to light grey with various degrees of mottling, and animals often bear barnacles or barnacle scars as well as patches of whale lice. Grey whales have two to four throat grooves (pleats that allow the throat region to expand during feeding).

The grey whale has a variety of distinctive characteristics and accordingly is placed in the monotypic family Eschrichtiidae, separate from all other whales.

---

<sup>1</sup> All of the material in this section, except the species information from COSEWIC (Section 1.1), is drawn from Reeves and Mitchell (1987).

Pacific grey whales continue growing to about 40 years of age and may have a maximum age around 70 years. Mean age at sexual maturity is 6-8 years for both sexes. Courtship and mating occur on the southern wintering grounds, and calving and early rearing occur in shallow protected lagoons and bays on the wintering grounds. Gestation time is about 14 months, and most females give birth to a single calf in alternate years. Lactation continues for 6 months. Grey whales feed primarily on benthic amphipods which they filter from bottom sediments on the northern summering grounds, but there is evidence for opportunistic feeding including planktonic crustacea and young fishes. There is evidence of reduced feeding during the winter migration.

### **1.3 Populations and Distribution**

Grey whales are restricted to the northern hemisphere and historically were found in the North Atlantic and North Pacific. Currently the species is only extant in the North Pacific where two populations are found. The eastern Pacific population, which has rebuilt to high abundance after being reduced by whaling, migrates between wintering areas on the coast of Mexico and California to summer feeding areas in the Bering, Chukchi and Beaufort Seas. A few individuals form “summer resident” populations between northern California and southern Alaska. The western Pacific population is little known and probably has been reduced to around 100 individuals by historical whaling. These animals move along the coasts of China, Korea and Japan.

Grey whales occurred both in the eastern North Atlantic (at least in the Baltic Sea, North Sea, English Channel and off Iceland but probably much more widely) and in the western North Atlantic, but became extirpated probably due to harvesting during the 18th century.

Distribution in the western North Atlantic, and in Atlantic Canada, is inferred based on the distribution of subfossil remains, historical observations of whaling captains, and the distribution and migratory behaviour of the extant eastern Pacific population. Ten subfossil specimens have been found between Long Island, New York and Ste. Lucie inlet in southeastern Florida. As well, references to the “scrag” whale in historical whaling records, interpreted to refer to the grey whale, are known from New England. Based on the fossil information and behaviour of the Pacific population, western Atlantic grey whales may have used shallow lagoons and bays of southeastern Florida for breeding and calving. By inference from the migratory pattern of the eastern Pacific population, Atlantic grey whales may have visited Canadian waters, including the Scotian Shelf, Gulf of St. Lawrence, and Grand Banks, and may even have entered Hudson Bay.

Grey whales are thought to have become extirpated from the western North Atlantic by the end of the 1800s. Information on this population is extremely sparse but it appears that whalers were familiar with the species prior to its disappearance (thus the few records from whaling captains in the 1700s), and specialists have inferred that the population was extirpated due to harvesting.

## **1.4 Needs of the grey whale**

### **1.4.1 Habitat and biological needs**

There is no information on the biological needs of the western Atlantic population of grey whales, which would have included individuals occurring in Canada. Based on the behaviour of the eastern Pacific population, western Atlantic grey whales would have required productive feeding grounds in northern waters, warm protected coastal lagoons for breeding and calving in southern subtropical waters (probably southeastern Florida), and a migratory corridor, probably within a few kilometers of the shoreline, connecting these areas. Should “summer resident” individuals have occurred in the western Atlantic, as is the case in the eastern Pacific, coastal habitat to support these individuals would have been required.

Feeding habitat on the Arctic summering grounds in the North Pacific is in shallow (less than 60 m) areas with soft bottom sediments. In the Bering Sea grey whales are seen from 0.5 to 165 km from shore, including in shallow coastal lagoons, and tend to avoid areas of heavy ice. High productivity of benthic amphipods would be a requirement given that these animals make up 95% of grey whale diet in northern areas. Summer resident individuals off British Columbia also prefer nearshore shallow habitats with mud or sand bottom. Individuals off British Columbia have also been observed feeding in kelp and eelgrass areas and might use all types of coastal habitats for feeding or other uses. Calving lagoons in Mexico are shallow (less than 4 m), warm (15-20°C), and have sandy or muddy bottoms covered in places by eelgrass beds and mangrove swamps.

Based on these observations, grey whales are very different in their habitat requirements from other large whale species, being much more associated with coastal areas. In particular they require very shallow enclosed inshore areas for calving, near-shore coastal areas for migration, and relatively shallow benthic environments for feeding.

### **1.4.2 Ecological role**

Pacific grey whales play an important role as a benthic predator and resuspend nutrients from benthic to planktonic marine ecosystems. An estimate made in the 1980s suggested that eastern Pacific grey whales turned over some 9% of the available amphipod community, covering a 3500 km<sup>2</sup> area. Population abundance has since increased substantially. Urination and defecation in the water column would contribute substantial amounts of nutrients of benthic origin. Grey whales excavate depressions in the seabed during feeding and as such may play an important role in structuring bottom sediments and the communities which depend on them.

### **1.4.3 Limiting factors**

No limiting factors for western Atlantic grey whales can be identified since the population is extirpated. The principal factor limiting population growth in Pacific grey whales, as with other large whale species, is the low birth rate (on average one calf every two years for grey whales). Other potential population limiting factors would be as in the “Threats” section below.

## **1.5 Threats**

### **1.5.1 Description of potential threats**

No detailed classification of current threats is possible since the population is extirpated, but potential threats would be similar to those for other large whale species such as the North Atlantic right whale, northern bottlenose whale, or blue whale: entanglement in fishing gear, vessel collisions, acoustic pollution from seismic surveys or other underwater activities, and the bioaccumulation of chemical contaminants. Harvesting would not be a potential threat, since the harvesting of large whales is no longer permitted in Canada and the northwest Atlantic, other than the small Aboriginal subsistence harvests of minke whales in Greenland and bowhead whales in northern Canada (harvesting of small cetaceans such as belugas is permitted for Aboriginal subsistence). Ship collisions and entanglement in fishing gear are known to cause mortality of large whales in Atlantic Canada, and acoustic and chemical pollution are probably degrading whale habitats.

Information on some of the parasites and diseases of grey whales is known, but little knowledge exist of other important pathogens (bacteria and viruses). Potential health threats to the recovery of re-introduced grey whales in the Atlantic may be the spread of disease for which they have no natural immunity from a translocated animal, especially to wild populations already at risk (Measures 2004). Another potential health threat may be toxic algal blooms, given that toxic algal blooms occur in the Atlantic, particularly in coastal areas and with increasing frequency (Moore et al. 2001).

## **2. RECOVERY FEASIBILITY**

The only possible approach to recover this extirpated population would be the reintroduction of a viable population from another area. The recovery of the grey whale (Atlantic population) is not considered feasible at this time, based on examination of a series of issues in the following sections.

### **2.1 Availability of individuals for re-establishment**

Recovery would require that individuals be available to support re-establishment of a viable population. There are no more Atlantic grey whales, but the eastern Pacific population of grey whales could potentially serve as a donor population. The most recent agreed estimate of abundance for the eastern Pacific population was 26,300 individuals in 1997/98 (International Whaling Commission 2006a). Allowable removals from this population are 620 individuals in the period 2003-2007 with a maximum of 140 in any given year, and there are currently no harvests of this population (International Whaling Commission 2006b). Accordingly, this number of individuals is potentially available to support a reintroduction program.

### **2.2 Habitat availability**

For recovery to be feasible, sufficient habitat must be available to support the species or must be made available through habitat management or restoration. Several different habitats would be needed over a wide geographic range and in both Canada and the United States of America (USA) to ensure the re-establishment of a viable population. Some of the necessary habitats are currently impacted in ways which would probably make them unsuitable for grey whale life history stages. The shallow coastal lagoons and bays in southeastern and south-central Florida, the presumed breeding and calving area, are heavily impacted by the urban development of the Florida coastal area and associated industrial and recreational activities. The Southeast Florida Metropolitan Statistical Area, including Palm Beach, Broward and Miami-Dade counties, is the sixth largest in the USA and had a 2002 population of over 5 million (Broward County Planning Services Division 2004). As a result, coastal and nearshore marine habitats are heavily degraded and actions to reduce land-based pollution, improve water quality, and minimize impacts of dredging, filling and coastal construction are required (Florida Department of Environmental Protection 2004). Coastal and nearshore habitats are heavily used by recreational boaters. In Broward County alone there are 43,000 registered recreational vessels and over 100 marinas and boatyards (Florida Sea Grant n.d.). Overall there would be considerable doubt as to whether these coastal habitats could be made suitable for grey whale breeding and calving, which require quiet conditions of good environmental quality (Reeves and Mitchell 1987). In some areas, the coastal habitats required for migration in the eastern USA and Canada are also highly impacted by transport and industrial activities, particularly in the northeastern USA.

### **2.3 Potential to mitigate threats to individuals and habitat**

The potential to mitigate or avoid significant threats to the species or its habitat must also be considered in assessing recovery feasibility. For Atlantic grey whales, threats could possibly be mitigated, but it is doubtful that threats could be removed effectively enough to allow the increase of a small re-introduced population. Key threats to other large cetaceans in the northwest Atlantic include entanglement in fishing gear, vessel strikes, chemical accumulation and acoustic pollution. Entanglement in fishing gear and vessel strikes are documented causes of mortality for eastern Pacific grey whales (Reeves and Mitchell 1987). Reduction of mortality from vessel strikes and fishing gear entanglement is a central theme of recovery efforts for the endangered North Atlantic right whale which migrates between the southeastern US and eastern Canada. Some success in reducing the impact of these threats has been achieved, but this population is showing no signs of recovery from a low population level (ca 300 individuals) in the current threat environment, which is assumed to be generally similar to that which would be faced by re-introduced grey whales. Such threats do not seem to be having a significant impact on the eastern Pacific grey whale population, but that population is currently abundant. Even low removals due to these threats could have a significant impact on a small re-established Atlantic grey whale population.

Health risks associated with translocating marine mammals have been recognized as a potential threat to the conservation of species at risk and some best practices have been recommended (Measures 2004). Any reintroduction would require a risk assessment of the threat of translocating grey whale pathogen and parasites from a donor population to the Atlantic and what these 'novel and exotic' pathogens may mean for resident species, particularly those already at risk such as the endangered northern right whale.

With respect to habitat threats, it is not certain that threats to key habitats, particularly subtropical coastal and lagoon habitats needed for calving, could be mitigated to allow grey whales to use them successfully. As noted above, these environments are currently subject to very intense recreational use and are impacted by explosive urban development, such that conditions would be practically impossible for calving and rearing of young cetaceans. The environmental problems of these areas have been recognized for many years, and efforts are under way to restore degraded coastal and nearshore environments in this area. Substantial efforts will, however, still be required over many years (Florida Department of Environmental Protection 2004). Further, restoration of these essential habitats is under the jurisdiction of authorities in the USA and could not be mandated under SARA.

## **2.4. Existence of effective recovery techniques**

Recovery techniques which have been proven effective must exist if this population is to be re-established. The reintroduction of a population of large whales to an area from which they have been extirpated, and the associated re-establishment of their migratory routes (with related 'ecological learning' issues) has never been attempted or completed successfully, and appears unlikely to be feasible.

The introduction of well over 100 mature individuals would probably be necessary to lay the basis for the re-establishment of a viable population of grey whales in the Atlantic. Populations of less than 250 mature individuals are considered "endangered" under the risk assessment criteria used by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the International Union for the Conservation of Nature and Natural Resources (IUCN) (COSEWIC 2004a). The western Pacific population of grey whales is apparently not recovering from a reduced population size of around 100 individuals, while the North Atlantic right whale is showing no signs of recovery from a population of some 300 individuals.

The transport of small whales in limited numbers (e.g. killer whales) is possible, and there is a documented report of live capture, holding and subsequent release to the wild of a newborn grey whale (Reeves and Mitchell 1987), but the transport of large whales, of breeding size, has not been successfully attempted. This transportation would probably be feasible on an individual basis, but enormous (essentially infeasible) efforts would be required to transport the number of individuals necessary to establish a breeding population.

Even if the transportation of many whales were possible, it is extremely doubtful that re-introduced individuals could re-establish the complex and lengthy seasonal migration pattern which appears to be essential for the species in the eastern Pacific. Migration from subtropical to northern areas is typical of many large whales (e.g. right whales, humpback whales), but the eastern Pacific grey whale has the longest migration route of any mammal and the migratory pathway would have to link much more specific habitats for successful completion of their life cycle than for other large whale species.

## **2.5 Recovery feasibility conclusion**

In summary, recovery of the grey whale (Atlantic population) appears neither biologically nor technically feasible at the present time. Biologically, the ability of individuals from a different area to learn the complex migratory pathway which appears essential to successful completion of the life cycle of this species seems highly questionable. Recent experience has shown that the recovery of populations of large whales from very depleted states (several hundred individuals) is biologically difficult. The technical feasibility of transporting the large numbers of whales needed to support the re-establishment of a viable population has not been demonstrated. The technical feasibility of restoration of the coastal habitats necessary for calving, breeding, and the north-south migration has also not been demonstrated, and in any case, jurisdiction for restoration of the essential calving and rearing habitats is outside Canada.

## **3. CRITICAL HABITAT**

### **3.1 Identification of the Species' Critical Habitat**

Because the population is not extant and there is essentially no information on historical ecology or habitat use of northwest Atlantic grey whales, it is not possible to identify critical habitat for this population. As noted above, important habitats would have been on feeding grounds, on calving grounds, and in migratory corridors linking these two areas.

## **4. CONSERVATION APPROACH**

Further conservation action for the Atlantic grey whale is not possible given that the population is extirpated and recovery is not feasible. That said, it is still possible and important to educate Canadians about the species that we have lost, such as the grey whale (Atlantic population).

## 5. REFERENCES

Broward County Planning Services Division 2004. The southeast Florida MSA. Broward-by-the-Numbers 20 (March 2004), 3pp. <http://www.co.broward.fl.us/planningservices/bbtn20.pdf>

COSEWIC 2004a. COSEWIC's assessment process and criteria. 12 pp. [http://www.cosewic.gc.ca/pdf/assessment\\_process\\_e.pdf](http://www.cosewic.gc.ca/pdf/assessment_process_e.pdf)

COSEWIC 2004b. COSEWIC assessment and update status report on the grey whale (Eastern North Pacific population) *Eschrichtius robustus* in Canada. Committee on the Status of Endangered Wildlife in Canada. vii + 31 pp. ([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm))

Florida Department of Environmental Protection 2004. Southeast Florida Coral Reef Initiative: a Local Action Strategy. Florida Department of Environmental Protection, Coral Reef Protection Program, Miami, FL. 19 pp. [http://www.coralreef.gov/las/pdf/SEFCRI\\_LAS\\_FINAL\\_20May05.pdf](http://www.coralreef.gov/las/pdf/SEFCRI_LAS_FINAL_20May05.pdf)

Florida Sea Grant n.d. Florida Sea Grant Extension Program. [http://www.flseagrant.org/staff/extension/broward\\_agt\\_bio.htm](http://www.flseagrant.org/staff/extension/broward_agt_bio.htm) (viewed September 2006).

International Whaling Commission 2006a. Whale population estimates. <http://www.iwcoffice.org/conservation/estimate.htm> (consulted September 2006).

International Whaling Commission 2006b. Catch limits and catches taken. <http://www.iwcoffice.org/conservation/catches.htm> (consulted September 2006).

Measures, L.N. 2004. Marine mammals and "wildlife rehabilitation" programs. Can. Sci. Adv. Res. Doc. 2004/122. 35p.

Moore, S. E., Urban R., J., Perryman, W. L., Gulland, F., Perez-Cortes M., H, Wade, P. R., Rojas-Bracho, L. and Rowles, T. 2001. Are gray whales hitting "K" hard? Marine Mammal Science 17: 954-958.

Reeves, R. R. and E. Mitchell. 1987. COSEWIC status report on the grey whale *Eschrichtius robustus* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa. 1-35 pp. Available from COSEWIC Secretariat, c/o Canadian Wildlife Service, Environment Canada, Ottawa (Ontario) K1A 0H3. (content of this report was substantially repeated in Reeves, R. R. and E. Mitchell, 1988, Current status of the grey whale, *Eschrichtius robustus*. Canadian Field-Naturalist 1092: 369-390)