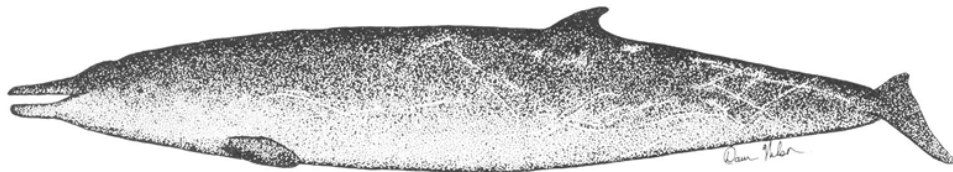


COSEWIC
Assessment and Update Status Report

on the

Sowerby's beaked whale
Mesoplodon bidens

in Canada



SPECIAL CONCERN
2006

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA



COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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Sowerby's beaked whale — Redrawn from Watson (1981) by Dawn Nelson. (Permission pending)

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COSEWIC Assessment Summary

Assessment Summary – November 2006

Common name

Sowerby's beaked whale

Scientific name

Mesoplodon bidens

Status

Special Concern

Reason for designation

This small beaked whale is endemic to the North Atlantic Ocean where it is found mainly in deep, offshore temperate to subarctic waters. Little is known about its biology, fine-scaled distribution, and abundance. It belongs to a family of whales (Ziphiidae) in which acute exposure to intense sounds (especially from military sonar, but also from seismic operations) has led to serious injury and mortality. Seismic operations are currently widespread and military activities involving the use of mid- and low-frequency sonar likely occur at least occasionally in the habitat of this species off Canada's East Coast. Although there is no direct evidence that such sound sources have affected this species, there is strong evidence for lethal effects on individuals of related species. Thus there is reasonable cause for concern about the potential effects on individuals of this species. The potential population-level impacts of this type of mortality are unknown.

Occurrence

Atlantic Ocean

Status history

Designated Special Concern in April 1989 and in November 2006. Last assessment based on an update status report.



COSEWIC
Executive Summary

Sowerby's beaked whale
Mesoplodon bidens

Species information

Sowerby's beaked whale is a medium-sized (4.5-5.5 m) beaked whale (Family Ziphiidae). It is dark grey in colour with light speckling.

Distribution

Sowerby's beaked whales are found only in the North Atlantic. Their distribution is poorly known as few at-sea sightings have been confirmed. From these limited data and stranding locations, they are considered to be the most northern North Atlantic species of *Mesoplodon*, ranging offshore from Cape Cod to Davis Strait in the western Atlantic, and from Norway to Spain in the eastern Atlantic. In the mid-Atlantic the species ranges from Iceland to the Azores and Madeira. A stranding in the Gulf of Mexico may be extralimital.

Habitat

This species is most often sighted in deep water, along the continental shelf edge and slope.

Biology

Little is known about the biology of Sowerby's beaked whales. Their diet appears to be composed mainly of deep-water fish and squid. Although the data are inconclusive, length at sexual maturity for both sexes is approximately 4.7m. They appear to be social, often sighted in groups of 2-6 animals, and mass strandings have occurred.

Population sizes and trends

There are no estimates of population size. The rarity of sightings may indicate that the species is uncommon. Alternatively, it may simply reflect the fact that there has been little search effort in the appropriate areas and that sighting and identifying these whales is exceptionally difficult.

Limiting factors and threats

Sowerby's beaked whales are likely threatened by intense underwater sounds, especially those associated with mid-frequency sonar and seismic surveys. They are also vulnerable to ship strikes and fishing gear entanglement.

Special significance of the species

Sowerby's beaked whale is a member of one of the least known groups of large mammals (the Ziphiidae), and together with the northern bottlenose whale, likely has one of the largest ranges within Atlantic Canada of any ziphiid.

Existing protection and other status designations

Sowerby's beaked whale was assessed as 'Special Concern' by COSEWIC in 1989 and as 'Data Deficient' by IUCN in 1996.



COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.



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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
COSEWIC Status Report

on the

Sowerby's beaked whale
Mesoplodon bidens

in Canada

2006

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SPECIES INFORMATION

Name and classification

Sowerby's beaked whale, *Mesoplodon bidens* (Sowerby 1804), is a medium-sized beaked whale (Family Ziphiidae) found only in the North Atlantic. It is also known as the North Atlantic or North Sea beaked whale and as baleine à bec de Sowerby in French. No subspecies are recognized.

Morphological description

Sowerby's beaked whales can reach 5.5 m in length, although most are smaller. They are difficult to identify, sharing many characteristics with other beaked whales such as Blainville's beaked whale (*M. densirostris*) and True's beaked whale (*M. mirus*). The ranges of these two species overlap that of Sowerby's beaked whale, but both are considered more temperate species (MacLeod 2000). Diagnostic characteristics include the shape and position of teeth, rostrum length and ossification of the mesorostral canal. In mature males a single triangular tooth normally erupts through the gum line on each side of the lower jaw, about 35% of the distance along the mandible and midway along the gape in adults. The teeth are present but not erupted in females. Sowerby's beaked whales have a longer, narrower rostrum than Blainville's or Gervais' beaked whales (*M. europaeus*). The mesorostral canal in both Sowerby's and Blainville's beaked whales can be ossified, although only the posterior section is ossified in adult male Sowerby's (MacLeod and Herman 2004).

Sowerby's beaked whales have streamlined bodies with small heads; they are dark grey with light speckling (Figure 1). Adults may be scarred. Younger animals tend to be lighter ventrally and unspotted. A small triangular dorsal fin is located approximately two-thirds of the way back from the beak to flukes. The flukes generally have no median notch and the flippers are relatively long (approximately 1/8 body length). Like most beaked whales, they have a long narrow rostrum and a V-shaped groove on the throat. Apart from dentition differences, there is little sexual dimorphism (Mead 1989).

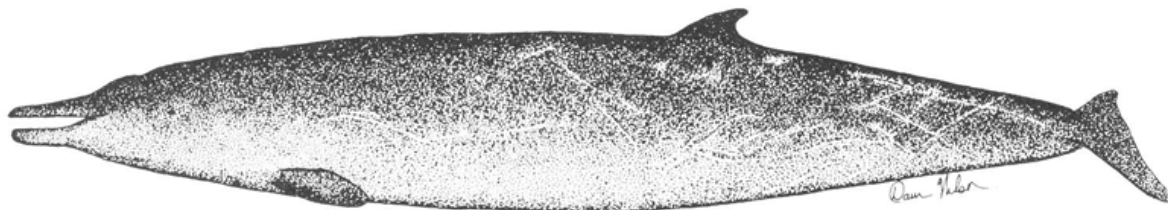


Figure 1. Sowerby's beaked whale. Redrawn from Watson (1981) by Dawn Nelson.

Genetic description

Analyses of mtDNA sequences, which describe maternal lineages from 14 Sowerby's beaked whales from both sides of the North Atlantic, revealed eight variable sites over a 352 base-pair fragment defining seven unique haplotypes (Dalebout 2002; Dalebout pers. comm. 2004). Four haplotypes were found among the seven animals from the eastern North Atlantic, and five haplotypes were found among the seven animals from the western North Atlantic, with the most common haplotypes shared among animals on both sides of the ocean basin (Dalebout pers. comm. 2004). Similar levels of genetic diversity have been observed in other *Mesoplodon* species.

DISTRIBUTION

Global range

The distribution of Sowerby's beaked whales is limited to the North Atlantic Ocean (Figure 2), where it is considered the most northerly of *Mesoplodon* species (MacLeod 2000). Details of the distribution of Sowerby's beaked whale are not well understood. Definitive sightings in the field are rare due to the difficulty of distinguishing the species from other beaked whales (especially sympatric *Mesoplodon* species), its apparent preference for deeper, offshore waters, and its evasive behaviour (Mead 2002). What is known of the distribution of this species is based on relatively few strandings and opportunistic sightings (MacLeod *et al.* 2006). The use of strandings data to determine the range of offshore species has limitations; for example, a carcass may be transported over a great distance by wind and currents before it reaches a shoreline (Mead 1989). Only species-specific reports will be considered in this section, although there are reports of "unidentified beaked whale" and "*Mesoplodon* sp." from several areas, including waters off Iceland (Sigurjónsson *et al.* 1991) and the northeastern United States (Kenney and Winn 1986), the Scotian Slope (Wimmer 2003), and Davis Strait (Whitehead pers. comm. 2004).

Sowerby's beaked whales, like other beaked whales, are thought to prefer the deeper waters of the continental shelf breaks and open ocean, only occasionally being found in coastal waters (Kenney and Winn 1986; Kenney and Winn 1987; Lien and Barry 1990). In the eastern North Atlantic, Sowerby's beaked whales range from as far north as the Norwegian Sea (Carlström *et al.* 1997), the waters off Iceland and the British Isles (Lien and Barry 1990; Sigurjónsson *et al.* 1989; Weir *et al.* 2001), and south to Madeira and the Azores (MacLeod 2000). A higher number of strandings in the eastern North Atlantic may indicate a greater abundance of Sowerby's beaked whales than in the western North Atlantic (Lien and Barry 1990; Moore 1966). Strandings and sightings in the western North Atlantic (Table 1) suggest that the species is found off Newfoundland and Labrador (Lien and Barry 1990), Nova Scotia (Hooker and Baird 1999) and the northeastern United States (Lien and Barry 1990; MacLeod 2000). A recent stranding occurred on St. Catherine's Island, Georgia (Tech Times 2004), and a stranding also occurred in the Gulf of Mexico, although the latter has been considered extralimital (Bonde and Oshea 1989).

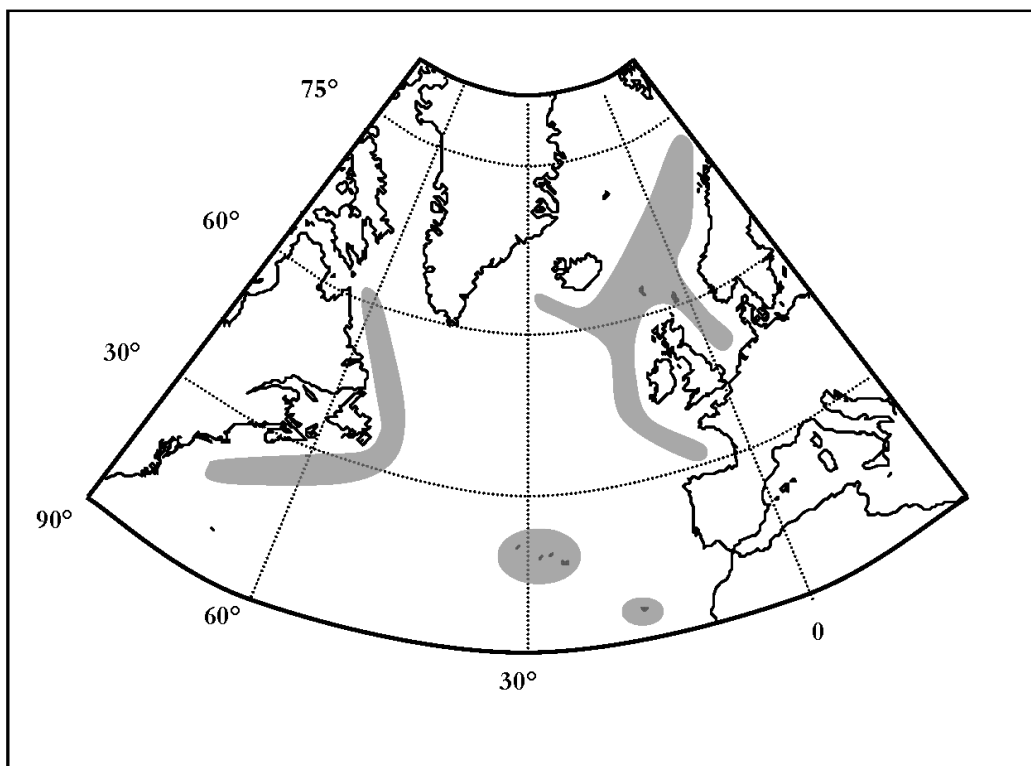


Figure 2. Distribution of Sowerby's beaked whales in the North Atlantic Ocean. Shaded areas represent general locations of known sightings and strandings; however, it is unknown to what extent the species occurs outside these areas. These shaded areas do not necessarily represent isolated populations. Exact stranding locations are not shown because they may not be representative of typical habitat for the species. A stranding in the Gulf of Mexico, along the Florida panhandle, is not reflected here as it has been regarded as extralimital.

There are no data regarding annual movements or site fidelity in Sowerby's beaked whales.

Canadian range

The northern limit of confirmed sightings or strandings of Sowerby's beaked whales in Canadian waters is Notre Dame Bay, Newfoundland (Lien and Barry 1990; Table 1; Figure 2), although it is likely that this species occurs further north. mesoplodonts sighted in Davis Strait (60°07'N, 60°34'W) during the summer of 2003 (Whitehead pers. comm. 2004) were probably Sowerby's beaked whales. As Sowerby's beaked whales have been seen in U.S. waters (Lien and Barry 1990), the southern Canadian limit should be considered the Hague Line. Given the apparent preference of this species for deeper, offshore waters, Sowerby's beaked whale likely ranges to the seaward limit of the 200 mile Exclusive Economic Zone and beyond. All sightings and strandings have occurred in the summer months. This likely does not mean that these whales are absent from Canadian waters during other times of the

Table 1. Date and location of all recorded strandings and sightings of Sowerby's beaked whales in Canadian waters. Only species-specific data are included.

Date	Location	Details	Source
Aug. 25 1952	Chapel Arm, Trinity Bay, Newfoundland (47°45'N, 53°52'W)	Stranding 472 cm male	Sergeant and Fisher 1957
Sept. 23 1953	Wild Bight, Notre Dame Bay, Newfoundland (49°40'N, 55°50'W)	Harpooning live animal 427 cm immature female	Sergeant and Fisher 1957
Sept. 1973	Labrador, Notre Dame Bay, (54°10'N, 58°35'W)	Stranding part of female	Lien and Barry 1990
July 24 1984	Manuels, Conception Bay, Newfoundland (47°35'N, 53°15'W)	Net entanglement	Dix <i>et al.</i> 1986
July 26 1984	Port de Grave, Conception Bay, Newfoundland (47°35'N, 53°15'W)	Stranding (likely entangled animal from 24 July 1984) 410 cm male	Dix <i>et al.</i> 1986
1985	Lower Bay of Fundy	Sighting. Identification tentative	McAlpine and Rae 1999
Aug. 30 1986	Carmenville, Newfoundland (49°07'N, 54°18'W)	Mass stranding 6 animals, 3 examined 495 cm male 485 cm male 495 cm male	Lien <i>et al.</i> 1990
Sept. 18 1987	Norris Arm, Bay of Exploits, Newfoundland (49°07', 55°15'W)	Mass stranding 3 animals, 1 examined 362 cm female	Lien <i>et al.</i> 1990
Sept. 28 1993	Kent County, New Brunswick (46°27'N, 64°38'W)	Stranding. Identification tentative. 480 cm female	McAlpine and Rae 1999
June 20, 1997	Sable Island, N.S.	Stranding. Female	Lucas and Hooker 2000
July 8, 1997	The Gully, N.S. (43°49.4'N, 58°57.6'W)	Sighting 8-10 animals	Hooker and Baird 1999
July 8, 1997	The Gully, N.S. (43°54.6'N, 58°59.1'W)	Sighting at least 3 animals	Hooker and Baird 1999
Aug. 17, 1998	The Gully, N.S. (43°45.9'N, 58°57.4'W)	Sighting 3 animals	Hooker and Baird 1999
Aug. 20, 1998	The Gully, N.S. (43°50.5'N, 58°59.4'W)	Sighting 4-5 animals	Hooker and Baird 1999
July 2003	Port Albert, Notre Dame Bay, Newfoundland	Stranding 490 cm female	Wayne Ledwell pers. comm. 2006
Aug 29, 2003	The Gully, N.S. (43°53'N, 58°57'W)	Sighting 1 male	Whitehead, pers. comm. 2004
November 2003	Boyds Cove, Notre Dame Bay, Newfoundland	Stranding 466 cm male	Wayne Ledwell pers. comm. 2006
June 15, 2004	Western Bay, Conception Bay, Newfoundland (47° 53.25'N, 53°04.93'W)	Stranding 479 cm female	Lawson pers. comm. 2004; Wayne Ledwell pers. comm. 2006

year, but rather may reflect the poor sighting conditions and relative lack of search effort in non-summer months. However, two aerial surveys for cetaceans conducted in the fall of 2002 and 2003 (of limited extent and mostly near shore; G. Stenson pers. comm. 2006) did not observe Sowerby's or any other beaked whales (Lawson pers. comm. 2004). Sowerby's beaked whales may be quite widespread within Atlantic Canadian waters, but details of the range are unknown (e.g., the proportion of the total range that falls within Canadian waters, discontinuities in range, or temporal changes in range).

Strandings and sightings have occurred in the Atlantic waters of Newfoundland and Labrador (Table 1). Several strandings were reported in Newfoundland in the 1980s (Lien and Barry 1990). Fewer reports have been documented since 1988, although two recent strandings have occurred (Table 1).

Reports of Sowerby's beaked whales are less common in waters off Nova Scotia (Table 1). Sowerby's beaked whales have been sighted in the Gully, a large submarine canyon located 150 km offshore on the edge of the Scotian Shelf (Hooker and Baird 1999; Whitehead pers. comm. 2004). The only recorded stranding in Nova Scotia was on Sable Island near the Gully (Lucas and Hooker 2000). There has been only one tentative sighting of a Sowerby's beaked whale in the Bay of Fundy (McAlpine and Rae 1999; Table 1), which suggests that, given the relatively large amount of whale-watching and research effort in that area, the species is probably rare there.

There is a stranding record in the Gulf of St. Lawrence (New Brunswick coast), although the species identification is considered tentative (McAlpine and Rae 1999; McAlpine pers. comm. 2004). There are no records of sightings or strandings in Quebec (Measures pers. comm. 2004), Prince Edward Island (Daoust pers. comm. 2004) or along the Gulf of St. Lawrence coastlines of Newfoundland or Nova Scotia (Lien and Barry 1990).

In the absence of any data to suggest population structure within Canadian waters, a single Designatable Unit is recognized.

HABITAT

Habitat requirements

Sowerby's beaked whales are generally found in deep waters, including continental shelf edges and continental slopes (Lien and Barry 1990; MacLeod 2000; Mead 1989). They have been observed in waters deeper than 1500m.

Habitat trends

The habitat of Sowerby's beaked whale is too poorly known to speculate on trends.

Habitat protection/ownership

Sowerby's beaked whales have been sighted in the Gully (Hooker and Baird 1999), a submarine canyon recently designated as a marine protected area (DFO Canada 2004). No other known or likely habitat of this species is currently protected. Much of the seafloor along the continental shelf and shelf break off Nova Scotia and Newfoundland has been leased to petrochemical companies for possible exploration and exploitation (CNSOPB 2006; CNLOPB 2006a, b, c).

BIOLOGY

Little is known about the biology and life history of Sowerby's beaked whale.

Life cycle and reproduction

Although the timing and age of breeding are unknown, females 483 cm and 505 cm long were sexually mature while a 462 cm female was not. Data concerning male sexual maturity are even more sparse. Males less than 500 cm long are considered immature based on necropsy data (Lien and Barry 1990). However, a study of skull morphology indicated that in the eastern Atlantic 470 cm males had attributes of sexual maturity (MacLeod and Herman 2004).

Behaviour

The social structure is also largely unknown. Almost all sightings in Canadian waters have been of groups of three to ten animals, and two mass strandings have been documented (Table 1). Sowerby's beaked whales are presumed to be deep divers (Mead 2002). Like most other beaked whales, they probably avoid powered vessels (Mead 2002). However, during several recent sightings off Scotland individuals approached the survey vessel (C.D. MacLeod pers. comm. 2004).

Predation

There are no data on predation on Sowerby's beaked whales. Killer whales (*Orcinus orca*) and large sharks are their only likely predators.

Feeding ecology

Based on stomach contents and stable isotope analysis of stranded animals, mid- to deepwater fish and offshore squid appear to comprise the bulk of the diet of Sowerby's beaked whales (MacLeod *et al.* 2003; Ostrom *et al.* 1993).

POPULATION SIZES AND TRENDS

Search effort

Survey effort for cetaceans in deep waters off Atlantic Canada has been limited. In addition, *Mesoplodon* beaked whales are difficult to sight and identify, and they may avoid boats. Stranding networks in Atlantic Canada have become more active since the late 1970s and the number of strandings reported has increased (Table 1). However, it is difficult to determine if this increase is due to increased effort or an increased number of carcasses ashore (Lien and Barry 1990).

Abundance

No estimate of population size or number of mature individuals within Canadian waters exists for this species. The rarity of sightings suggests that Sowerby's beaked whales are rare, but this may reflect limited effort in the deepwater areas and the difficulties of detecting and identifying the species at sea.

Several surveys have been conducted off the coasts of Nova Scotia and the United States by the US National Marine Fisheries Service and US Bureau of Land Management to assess cetacean populations. Due to difficulties in distinguishing one species of *Mesoplodon* from another at sea, population estimates have been produced only for undifferentiated *Mesoplodon* species. These estimates were based on ship or aerial line transect surveys and were not corrected for $g(0)$, the probability of failure to detect animals on the track line. Thus estimates are negatively biased, especially considering the deep-diving behaviour of mesoplodonts. Each survey covered a different portion of the habitat considered suitable for mesoplodonts and occurred at a different time of the year, therefore the estimates are not directly comparable. However, the surveys from 1978 to 1994 indicated that there were several hundred mesoplodonts in the area from Cape Hatteras to Nova Scotia during the summer months, and that the Georges Bank region may be an area of relatively high density (Blaylock *et al.* 1995).

Fluctuations and trends

No information is available on fluctuations or changes in population size. As the numbers of sightings and strandings are very low (Table 1), apparent increases or decreases in these cannot be attributed to changes in population size.

Rescue effect

Sowerby's beaked whales are found near the continental slope off the Atlantic coast of the United States and likely are part of the same population as those found in Canadian waters. However, there are no data indicating the frequency of movement between Canadian and American waters.

No sightings or strandings of Sowerby's beaked whales have been reported from western Greenland, although search effort in that area is low so the lack of records does not mean these whales do not occur there. Sowerby's beaked whales have been observed off Iceland (Sigurjónsson *et al.* 1989) but it is unknown if individuals move between the eastern and western Atlantic.

A rescue effect is at least plausible.

LIMITING FACTORS AND THREATS

Like most cetaceans, Sowerby's beaked whales are thought to have a low reproductive rate (Mead 1984), which will limit a population's ability to adapt to, or recover from, a disturbance.

There is increasing evidence that mass strandings of beaked whales can be caused by military sonar (Balcomb and Claridge 2001; Frantzis 1998; Jepson *et al.* 2003; Fernández *et al.* 2005; Cox *et al.* 2006). Although sonar has not been directly associated with deaths of Sowerby's beaked whales, the susceptibility of beaked whales in general suggests that whales from all species in the family Ziphiidae can be harmed by exposure to high-energy, mid-frequency sonar. When mass strandings of beaked whales have occurred in association with military sonar deployments, they seem to have involved most or all of the ziphiid genera that inhabit the area (cf. Brownell *et al.* 2005). In other words, there is no reason to believe that the effects are specific to a single species or species group within the Ziphiidae, and therefore it is reasonable (and prudent) to infer that mid-frequency sonars such as those deployed by many modern naval vessels can have lethal effects on all species of *Mesoplodon*, including Sowerby's beaked whales. A number of Canadian military exercise areas are designated on the Scotian Shelf directly offshore from the Maritime Forces Atlantic Headquarters near Halifax (DFO 2006b).

Sowerby's beaked whales also may be vulnerable to other sources of acoustic pollution. Seismic surveys have influenced the behaviour and distribution of other cetaceans (e.g., Miller *et al.* 2006). Although there have been no direct studies of the effects of seismic activities on any species of beaked whale, fatal strandings of Cuvier's beaked whales (*Ziphius cavirostris*) in the Gulf of California have been linked to seismic activities (Hildebrand 2005; Cox *et al.* 2006).

Seismic surveys are common in the offshore waters of Atlantic Canada where licensing and prospecting for oil and gas is being pursued extensively (e.g., see CNSOPB 2006, DFO 2006a for the Scotian Shelf; CNLOPB 2006a, 2006b, 2006c for Newfoundland and Labrador). Such surveys have been increasing over the last decade in the deeper shelf edge and slope waters that comprise the habitat of Sowerby's and other beaked whales.

Although not conclusive, the above observations suggest that Sowerby's beaked whales are vulnerable when exposed to intense underwater sounds. As is true of other beaked whales, exposure to loud sounds may, in some circumstances, lead to serious injury or death. Although Cuvier's beaked whales are the commonest of the beaked whales to mass strand, this may reflect, in part, that their carcasses usually float after death, whereas the carcasses of at least one of the *Mesoplodon* species (*M. densirostris*) more often sink (IWC in press).

Beaked whales, but not specifically Sowerby's beaked whales (identifications were often made only to family or genus), were taken incidentally (bycaught) in the U.S. swordfish/tuna/shark drift gillnet fishery before this fishery closed in 1999 (Blaylock *et al.* 1995; G. Waring pers. comm. 2004). Since this closure, no by-catch of beaked whales has been reported off the U.S east coast (G. Waring pers. comm. 2004). In 1984, a single Sowerby's beaked whale was found entangled in fishing gear in Manuels Cove, Newfoundland. The live whale was successfully disentangled; however, it stranded two days later in the same area (Dix *et al.* 1986). It is unclear what role the entanglement played in the death of this animal, as Sowerby's beaked whales are only rarely found in coastal waters. Although Sowerby's beaked whales have not been reported as by-catch in the U.S. swordfish/tuna/shark longline fishery, there have been several reports of another beaked whale species (the northern bottlenose whale, *Hyperoodon ampullatus*) entangled in similar gear in Atlantic Canadian waters (e.g., Gowans *et al.* 2000). Sowerby's beaked whales also may be susceptible to at least occasional entanglement in longline gear.

The Sowerby's beaked whale that stranded on Sable Island in 1997 (Table 1) had several long fresh gashes on its sides and eight broken ribs below these gashes. This type of injury is consistent with a ship strike and suggests that, like other cetaceans, Sowerby's beaked whales are sometimes hit by vessels (Lucas and Hooker 2000).

Many chemical pollutants bioaccumulate in the blubber and other tissues of cetaceans. A mature male Sowerby's beaked whale that stranded in eastern England contained higher levels of chromium, nickel, copper, zinc, arsenic, selenium, cadmium and mercury than many other stranded cetaceans in the UK, although most of these levels were within previously established ranges for marine mammals (Law *et al.* 2001). Mercury concentrations were particularly high in this individual (Law *et al.* 2001).

SPECIAL SIGNIFICANCE OF THE SPECIES

The beaked whales are among the least known groups of mammals. Of the five beaked whale species in Atlantic Canadian waters, Sowerby's beaked whale and the northern bottlenose whale have the largest Canadian ranges.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

Sowerby's beaked whale is listed by the IUCN as 'Data Deficient' (IUCN 2004). It is listed in Appendix II of the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora; CITES 2004). Within Canada the species was assessed in 1989 by COSEWIC as 'Special Concern' (originally 'Vulnerable'; Lien and Barry 1990).

TECHNICAL SUMMARY

Mesoplodon bidens

Sowerby's beaked whale

Baleine à bec de Sowerby

Range of Occurrence in Canada: Atlantic Ocean

Extent and Area Information	
• <i>Extent of occurrence (EO)(km²)</i>	>20,000 km ²
• <i>Specify trend in EO</i>	Unknown
• <i>Are there extreme fluctuations in EO?</i>	Unlikely
• <i>Area of occupancy (AO) (km²)</i>	>20,000 km ²
• <i>Specify trend in AO</i>	Unknown
• <i>Are there extreme fluctuations in AO?</i>	Unlikely
• <i>Number of known or inferred current locations</i>	Unknown
• <i>Specify trend in #</i>	Unknown
• <i>Are there extreme fluctuations in number of locations?</i>	Unlikely
• <i>Specify trend in area, extent or quality of habitat</i>	Likely declining due to increasing seismic operations
Population Information	
• <i>Generation time (average age of parents in the population)</i>	Probably 15-30 years (extrapolating from other beaked whales)
• <i>Number of mature individuals</i>	Unknown
• <i>Total population trend</i>	Unknown
• <i>% decline over the last/next 10 years or 3 generations</i>	Unknown
• <i>Are there extreme fluctuations in number of mature individuals?</i>	No
• <i>Is the total population severely fragmented?</i>	Unlikely
• <i>Specify trend in number of populations</i>	Unknown
• <i>Are there extreme fluctuations in number of populations?</i>	No
• <i>List populations with number of mature individuals in each:</i>	
Threats (actual or imminent threats to populations or habitats)	
– Acute exposure to intense sound (especially from military sonar and seismic operations) has been shown to affect some species of beaked whales, including in lethal ways. The population-level implications for Sowerby's beaked whale are uncertain but could be significant.	
• <i>Status of outside population(s)?</i> USA and elsewhere in temperate North Atlantic: Occur but unknown population size.	
• <i>Is immigration known or possible?</i>	Unknown
• <i>Would immigrants be adapted to survive in Canada?</i>	Likely
• <i>Is there sufficient habitat for immigrants in Canada?</i>	Likely
• <i>Is rescue from outside populations likely?</i>	Unknown
Quantitative Analysis	Not available
Current Status	
COSEWIC: Special Concern (April 1989/November 2006) IUCN: Data Deficient	

Status and Reasons for Designation

Status: Special Concern	Alpha-numeric code: Not applicable
Reasons for Designation: This small beaked whale is endemic to the North Atlantic Ocean where it is found mainly in deep, offshore temperate to subarctic waters. Little is known about its biology, fine-scaled distribution, and abundance. It belongs to a family of whales (Ziphiidae) in which acute exposure to intense sounds (especially from military sonar, but also from seismic operations) has led to serious injury and mortality. Seismic operations are currently widespread and military activities involving the use of mid- and low-frequency sonar likely occur at least occasionally in the habitat of this species off Canada's East Coast. Although there is no direct evidence that such sound sources have affected this species, there is strong evidence for lethal effects on individuals of related species. Thus there is reasonable cause for concern about the potential effects on individuals of this species. The potential population-level impacts of this type of mortality are unknown.	
Applicability of Criteria	
Criterion A: (Declining Total Population): There is no information on population trends.	
Criterion B: (Small Distribution, and Decline or Fluctuation): AO and EO > 20,000 km ² .	
Criterion C: (Small Total Population Size and Decline): Total population size is unknown.	
Criterion D: (Very Small Population or Restricted Distribution): Total population size is unknown.	
Criterion E: (Quantitative Analysis): No quantitative analysis is available.	

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BIOGRAPHICAL SUMMARY OF REPORT WRITERS

Shannon Gowans conducted field research on North Atlantic beaked whales between 1993 and 1999. She received her doctorate degree in 1999 from Dalhousie University. Her doctoral thesis focused on the social organization and population structure of northern bottlenose whales off Nova Scotia. After completing her degree, she established a non-profit research organization (Blind Bay Cetacean Studies, with Peter Simard) to conduct research on cetaceans off the coast of Halifax. She received an NSERC post-doctoral fellowship which she completed at Texas A&M University at Galveston, where she studied the social and population structure of Atlantic white-sided and white-beaked dolphins. She is now an assistant professor in Marine Sciences at Eckerd College, St. Petersburg, Florida. She plans to continue studying the evolution of cetacean social structure by investigating social structure and their ecological correlates in Atlantic coastal *Lagenorhynchus* dolphins and bottlenose dolphins in Tampa Bay, Florida.

Peter Simard conducted research on North Atlantic beaked whales between 1994 and 1997. He received his honours bachelor's degree in 1995 from Dalhousie University. His thesis focused on oceanographic correlates of the distribution of northern bottlenose whales. He co-authored a report for World Wildlife Fund, Canada, proposing the Gully as a marine protected area. Since completing his thesis he established Blind Bay Cetacean Studies to conduct research on cetaceans near Halifax, along with Shannon Gowans. His primary research interests are the links between physical oceanography and cetacean distribution. He has also been involved with stranding networks in Canada and the US.

COLLECTIONS EXAMINED

University of Rhode Island cetacean sighting data base

NMFS Stranding data base

NMFS Fisheries observer database

Whitehead Lab records

DFO Observer records

MARS stranding records

NFLD stranding records