COSEWIC
Assessment and Update Status Report

on the

Fin Whale
Balaenoptera physalus

Pacific population
Atlantic population

in Canada

PACIFIC POPULATION - THREATENED
ATLANTIC POPULATION - SPECIAL CONCERN
2005

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC
Assessment Summary

Assessment Summary – May 2005

Common name
Fin Whale (Pacific population)

Scientific name
Balaenoptera physalus

Status
Threatened

Reason for designation
Currently sighted only infrequently on former whaling grounds off British Columbia. Coastal whaling took at least 7,600 animals from the population between 1905 and 1967, and thousands of additional animals were taken by pelagic whalers through the 1970s. Catch rates from coastal whaling stations declined precipitously off British Columbia in the 1960s. Based on the severe depletion and lack of sufficient time for recovery, it is inferred that present population is below 50% of its level, 60-90 years ago. Individuals continue to be at risk from ship strikes and entanglement in fishing gear.

Occurrence
Pacific Ocean

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 Pacific population was designated Threatened in May 2005. Last assessment based on an update status report.

Assessment Summary – May 2005

Common name
Fin Whale (Atlantic population)

Scientific name
Balaenoptera physalus

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.

Occurrence
Atlantic Ocean

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.

COSEWIC
Executive Summary

Fin Whale
Balaenoptera physalus

Species information

Southern and northern hemisphere fin whales are considered subspecies based on slight morphological differences and suspected reproductive isolation: *B. p. physalus* in the northern hemisphere and *B. p. quoyi* in the southern hemisphere. Common English names include finback and finner. French common names include rorqual commun, baleine à nageoires and baleinoptère commune.

The fin whale is the second largest member of the Balaenopteridae family, after the blue whale (*B. musculus*), and is characterized by its fast swimming speed and streamlined body. The most distinguishing feature is the asymmetrical pigmentation on the lower jaw – dark on the left and light on the right. This asymmetry continues through a portion of the baleen plates.

In Canadian waters, fin whales are most likely to be confused with blue or sei whales. Considerable overlap exists with sei whales with regard to body size, colouration and dorsal fin shape.

Distribution

Fin whales are found in all oceans of the world and generally make seasonal migrations from low-latitude wintering areas to high-latitude summer feeding grounds. Winter distribution appears to be less concentrated. The locations of the wintering grounds are poorly known. Summer concentrations in the western North Atlantic are in the Gulf of St. Lawrence, on the Scotian Shelf, in the Bay of Fundy, in the nearshore and offshore waters of Newfoundland, and off Labrador. In the eastern North Pacific, fin whales are assumed to migrate through Canadian waters, although significant numbers are observed feeding in British Columbia waters throughout the summer.

Habitat

Fin whales are associated with low surface temperatures and oceanic fronts during summer months. In the western North Atlantic, they are found from close inshore to well beyond the shelf break. In the Pacific, only 17% of the commercial catch of fin whales by shore whaling stations was on the continental shelf. The defining characteristic of fin

whale feeding habitat is likely high concentrations of prey, particularly euphausiids and small schooling fish. Characteristics of preferred breeding grounds are unknown.

Biology

Fin whales reach sexual maturity at 5-15 years of age, and physical maturity at about 25. The average length at sexual maturation is about 17 m. Adult animals range from 20-27 m, with animals in the northern hemisphere somewhat shorter (mean length of 24 m), and lighter (40-50 tonnes) than those in the southern hemisphere. Conception and calving are believed to occur in the winter at low latitudes. After a gestation of 11-12 months, calves are born at an average length of 6 m, and are weaned after about 6 months, making the breeding cycle about 2 years long. There is little information on mortality rates.

A staged seasonal migration, with pregnant females moving into high-latitude feeding areas in advance of adult males and resting females, has been reported, but in comparison to the migration pattern of humpback whales, for example, that of fin whales appears diffuse. Not all individuals migrate every year; some spend extended periods on the feeding grounds.

Fin whales have a fairly diverse diet. In the North Pacific, they eat mainly euphausiids, followed by copepods, with some fish and squid. In the North Atlantic, they eat euphausiids, capelin and herring, with considerable variation by location and time of year.

Population sizes and trends

Pre-commercial whaling estimates of fin whale numbers in the North Pacific are in the order of 40,000 – 45,000. By the time commercial whaling there ended, perhaps 13,000 – 19,000 remained, most of them in the eastern half of the basin. Whaling stations in British Columbia took more than 7,600 fin whales. The most recent minimum population estimate for the California/Oregon/Washington region (early 2000s) is about 2,500, and about 5,000 were estimated in the Bering Sea in 1999.

Pre-commercial whaling estimates for the North Atlantic population are also in the order of 30,000 – 50,000. The best available recent estimates for parts of the western North Atlantic are 2,814 (CV=0.21) between Georges Bank and the mouth of the Gulf of St. Lawrence in 1999 and about 380 in the Gulf of St. Lawrence in the mid-1990s.

No good evidence of trend is available for either population.

Limiting factors and threats

The most significant direct threats are ship strikes and entanglement in fishing gear. Fin whales may also be negatively affected by ecological interactions with fisheries but these have not been clearly specified or validated. Human-generated

underwater noise similarly may degrade fin whale habitat and impair communication but details are uncertain. The ways and degrees to which fin whale populations are being affected by chemical pollution and climate change are also unknown.

Special significance of the species

The fin whale is the second largest animal on Earth. It was a pillar of the modern whaling industry. Nowadays fin whales are economically important to whale-watching enterprises in Atlantic Canada, particularly in the lower Bay of Fundy and the St. Lawrence Estuary.

Existing protection or other status designations

The fin whale is listed by IUCN as “endangered” on the basis of large and rapid population declines caused by 20th century whaling. CITES lists the species in Appendix 1, meaning that products are prohibited in commercial trade. The species is listed as “endangered” under the United States Endangered Species Act. The International Whaling Commission’s “moratorium” on commercial whaling remains in effect. Fin whales are hunted under an IWC-sanctioned “subsistence” quota in Greenland.

In Canada, federal Marine Mammal Regulations (Fisheries Act) prohibit disturbance of marine mammals, while three federal agencies (Fisheries and Oceans Canada, Parks Canada, and Environment Canada) have separate enabling legislation to designate protected areas in the marine environment.

COSEWIC HISTORY

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 agencies (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 members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The Committee meets to consider status reports on candidate species.

DEFINITIONS (NOVEMBER 2004)

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 it 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 wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its 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.

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

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Balaenoptera physalus

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SPECIES INFORMATION

Name and classification

Class:	Mammalia
Order:	Cetacea
Famliy:	Balaenopteridae
Genus:	*Balaenoptera*
Species:	*Balaenoptera physalus*
Common name:	Fin or finback whale, rorqual commun

The fin whale was originally referred to as *Balaenoptera musculus* (the blue whale was referred to as *Balanoptera sibbaldii*) until True's (1899) evaluation of Linnaeus' *Systema Naturae*. Subsequently, this species was classified as *Balaenoptera physalus* (L. 1758) (Rice 1998).

Southern and northern hemisphere fin whales are considered geographically separate subspecies: *B. p. physalus* for the northern hemisphere and *B. p. quoyi* (Fischer 1829) for the southern hemisphere. This is based on morphological differences and suspected reproductive isolation due to alternating migratory schedules in each hemisphere (Rice 1998, Aguilar 2002, Notarbartolo-Di-Sciara *et al.* 2003).

English common names for this species include finback and finner. French common names include rorqual commun, baleine à nageoires and baleinoptère commune (Gambell 1985, Jefferson *et al.* 1993).

Hershkovitz (1966) listed a number of names supposedly applied to the fin whale by Aboriginal people.

Description

The fin whale is the second largest member of the family Balaenopteridae, after the blue whale (*B. musculus*). It has been characterized as the "greyhound of the sea" due to its fast swimming speed and streamlined body (Reeves *et al.* 2002). In dorsal view, the head is narrow, measuring about 20-25% of the total body length, with the rostrum particularly pointed, prominent splash guards around the double nares (i.e., nostrils) and a single median head ridge. The eyes lie just above the corners of the mouth. The lower jaw is laterally convex and juts 10-20 cm beyond the tip of the rostrum when the mouth is shut. The dorsal fin is set about three quarters of the way back along the dorsal surface, is falcate or pointed, and can be 60 cm high. Behind the dorsal fin, the caudal peduncle has a sharp, prominent ridge.

The bodies of fin whales are dark grey or brownish-grey dorsally and on the sides, shading to white ventrally. Some individuals have a V-shaped chevron on the dorsal side, behind the head. The colour 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 colouration pattern is diagnostic for the species (Agler *et al.* 1990). The ventral surfaces of the flippers and flukes are also white. The lighter ventral side of the animal may acquire a yellowish tinge in colder waters generally attributed to diatom presence (Gambell 1985, Aguilar 2002). Some adults show scarring indicative of lamprey or remora attachment or nicks and scars on the fins or body that may stem from interactions with fishing gear or other animals (Seipt *et al.* 1990, Notarbartolo-Di-Sciara *et al.* 2003).

Adult females reach lengths 5-10% greater than adult males (Aguilar 2002, Ralls and Mesnick 2002). Adult fin whales in the southern hemisphere are up to 4 m longer than their northern hemisphere counterparts (Bannister 2002), and have longer, narrower flippers (Nemoto 1962).

Fin whales can be confused with blue (*B. musculus*), sei (*B. borealis*) and Bryde's (*B. brydei*) whales (Jefferson *et al.* 1993), and with the recently described *Balaenoptera omurai* (Wada *et al.* 2003). However, Bryde's whales tend to be restricted to warmer latitudes (below 40ºN) (Omura 1959), and *B. omurai* is much smaller, and has to date only been found in the western North Pacific. Confusion with these two species in Canadian waters is therefore unlikely.

Morphologically, the fin whale is similar in overall size to the blue whale, but the head is more pointed. Upon close examination, the fin whale has only a single prominent head ridge compared with three in Bryde's whales (Leatherwood *et al.* 1988). The dorsal fin is larger than the blue whale's, and is set farther back and has a shallower rise than those of the sei and Bryde's whales. When a fin whale surfaces, the blowholes are seen first followed by the dorsal fin. In sei and Bryde's whales, the blowholes and dorsal fin usually appear almost simultaneously (Leatherwood *et al.* 1988). The blue whale is the only member of the genus *Balaenoptera* to regularly "fluke up" (i.e., lift its flukes above the surface when starting a deep dive).

On both coasts, there is considerable overlap in body size, colouration, dorsal fin shape, and distribution between fin and sei whales (Kate Wynne, personal communication. University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, 118 Trident Way, Kodiak, AK 99615; Hal Whitehead, personal communication. Department of Biology, Dalhousie University, Halifax, NS, B3H 4J1). This makes the sei whale the species most likely to be confused with fin whales in Canadian waters.

Individual animals can be identified by means of scarring, pigmentation patterns, dorsal fin shapes and nicks (Agler *et al.* 1990). Slight variations in size and pigmentation are documented for different regions in the Northern hemisphere (Aguilar 2002).

DESIGNATABLE UNITS

The Canadian population of fin whales is sensibly divided into two geographically separate units because there is no evidence for, or reason to expect, movement, and therefore demographic or genetic exchange, between the North Atlantic and North Pacific basins. Thus, there are two designatable units—Atlantic population and Pacific population—based on geographical separation. Following Rice's (1998) subspecies designations, both populations would belong to *Balaenoptera physalus physalus*. However, given the lack of a rigorous rationale for recognizing subspecies of fin whales, they are all simply considered *B. physalus* for purposes of this report.

DISTRIBUTION

Global range and stock structure

Fin whales are considered to have a cosmopolitan distribution (Figure 1) and can be found in all major oceans, although they are more abundant in temperate and polar latitudes (Leatherwood *et al.* 1988, Reeves *et al.* 2002). They are found in both coastal shelf waters and on the high seas (Jefferson *et al.* 1993). According to Aguilar (2002), the global density of fin whales is higher beyond the continental slope than closer to shore, and they appear to be absent at the ice edges and in most equatorial areas.

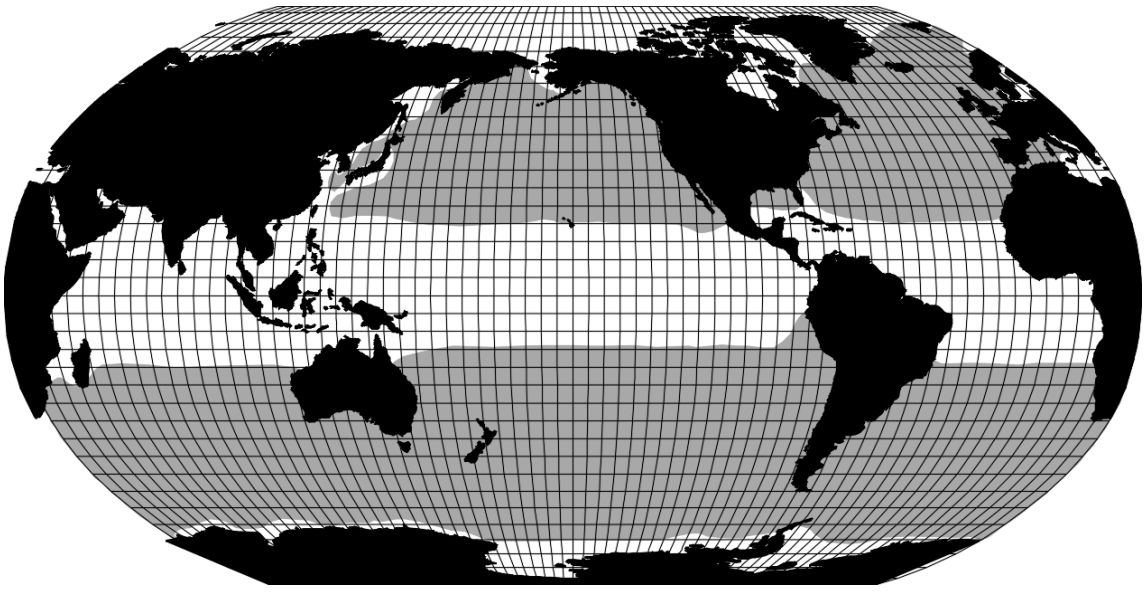

Figure 1. Global distribution of fin whales (grey shaded marine area). From Perry *et al*. (1999). Reprinted with permission.

Cambell (1985) described a North Atlantic summer range extending to the Arctic, and a more widely dispersed winter range extending from the ice edge to the Caribbean. Rice (1998) described the summer range as extending from 75ºN in Baffin Bay and 80ºN in Spitsbergen, southward to 35ºN at Cape Hatteras, with animals sighted from the Grand Banks to the Gulf of Mexico in winter, while Mitchell (1974) suggested fin whales winter around 35ºN, between the North American coast and the continental shelf. The full extent of the summer and winter ranges of the species is poorly documented, likely due to the species' pelagic nature (Notarbartolo-Di-Sciara *et al.* 2003).

In the North Pacific, the known summer range extends northward to 50ºN in the Sea of Okhotsk, 60ºN in the Bering Sea and 58ºN in the Gulf of Alaska, and southward to 40ºN in the Sea of Japan and 32ºN off the coast of California. The known winter range extends from Korea to Taiwan, the Hawaiian Islands and to the Baja California peninsula, although the distribution is believed to be primarily offshore (Leatherwood *et al.* 1988).

The IWC recognises seven stocks of fin whales in the North Atlantic (Donovan 1991), two of which—Newfoundland/Labrador and Nova Scotia—summer largely in Canadian waters. The U.S. National Marine Fisheries Service (NMFS) recognizes only a western North Atlantic stock in its territorial waters. While there may be as many as three Canadian stocks on the east coast—Newfoundland/Labrador, Nova Scotia, and Gulf of St. Lawrence (Mitchell 1974)—the stock structure in the North Atlantic is not well resolved (Waring *et al.* 2002).

Recent genetic analyses distinguished between eastern and western populations of North Atlantic fin whales, but did not identify any significant genetic differences between individuals from the Gulf of St. Lawrence and the Gulf of Maine (Bérubé *et al.* 1998). Coakes *et al.* (in prep.) photo-identified 36 animals near Halifax in 1997, of which 9 had been photographed previously in the Gulf of Maine and three in the Gulf of St. Lawrence. Considerable exchange has been documented throughout the Gulf of St. Lawrence and with Nova Scotia and the Gulf of Maine by researchers operating from Mingan Island, on the north shore of the Gulf of St. Lawrence (Richard Sears, personal communication. Mingan Island Cetacean Study, 285 rue Green, St. Lambert, Québec, Canada, J4P 1T3). These observations imply that at least the putative Nova Scotia and Gulf of St. Lawrence stocks may be from the same population.

The IWC considers the fin whales in the eastern North Pacific a single stock, while NMFS recognizes three stocks in the eastern North Pacific: Northeast Pacific, Hawaii, and California-Oregon-Washington (Carretta *et al.* 2002). Fujino (1960) concluded that the North Pacific contains an eastern and a western population based on histological and marking data. The marking data further suggested that the fin whales off British Columbia may be isolated to some degree.

There is some evidence of more than one stock in the eastern North Pacific, or at least for several feeding grounds. Year-round concentrations of fin whales in the Gulf of California (Tershy *et al.* 1990) involve a genetically isolated population (Bérubé *et al.* 2002). Year-round occurrences are also observed in the south/central California region (Forney *et al.* 1995). Summer aggregations have been documented in Oregon; and summer-fall groups have been observed in the Shelikof Strait/Gulf of Alaska region (Carretta *et al.* 2002). Recovered tags from the eastern North Pacific suggested that fin whales summer between Alaska and central California (Rice 1974).

The Northeast Pacific and the Nova Scotian stocks, and possibly the California-Oregon-Washington stock, are trans-boundary stocks, frequenting habitat in both Canadian and U.S. territorial waters (Figure 2). The core summer range of the putative Gulf of St. Lawrence and Newfoundland/Labrador stocks would be solely in Canadian waters.

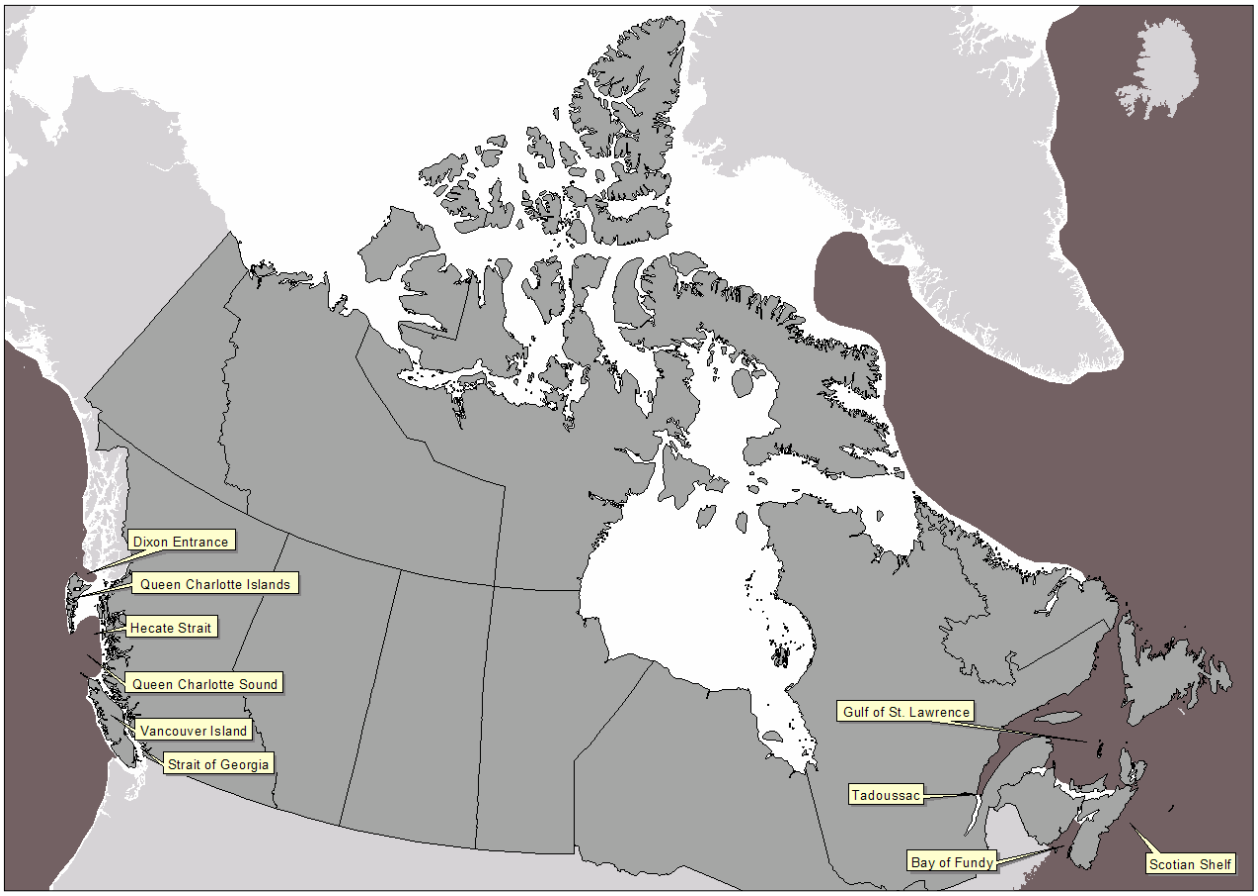

Figure 2. Approximate range of fin whales in and around Canadian waters (darkly shaded marine area).

Canadian range

Fin whales are seen and reported much more regularly in Atlantic than in Pacific waters of Canada. This is at least partially attributable to greater observational effort within the species range in Atlantic Canada.

Fin whales are common along the east coast of North America in the summer months and are also often seen in winter, particularly along the Atlantic coast of Nova Scotia (Brodie 1975, Gaskin 1982). Summer aggregations have been noted off Newfoundland, in the St. Lawrence, on the Atlantic coast of Nova Scotia, and in the Bay of Fundy (Mitchell 1974, Perkins and Whitehead 1977, Sergeant 1977).

The fin whale has been described as the most abundant large whale in the Bay of Fundy from June through fall (Gaskin 1983). The North Atlantic Right Whale Consortium (NARWC) database contains extensive sightings in this region (Kate Bredin, personal communication. Atlantic Canada Conservation Data Centre, Mount Allison University, P.O. Box 6416, Sackville, NB, E4L 1G6). The Species at Risk (SAR) database maintained by DFO (Sean C. Smith, personal communication. Department of Fisheries and Oceans, St. Andrews Biological Station, 531 Brandy Cove Rd., St. Andrews, NB, E5B 2L9) contains concentrations of sightings there and along the edge of the Scotian shelf (Figure 3). The majority of the sightings are from whale watching enterprises in the Bay of Fundy and the marine observer program. Sightings off Labrador and Newfoundland (Figure 4), maintained by DFO's Newfoundland & Labrador Region (Jack Lawson, personal communication. Marine Mammal Section, Newfoundland & Labrador Region, Fisheries and Oceans Canada, P.O. Box 5667, St. John's, NL, A1C 5X1) demonstrate the continued occurrence of fin whales in this area. These data include sightings from aerial surveys conducted in 2002 and 2003, from which estimates of fin whale density and abundance are expected some time in 2005 (J. Lawson, personal communication). A map of sightings from the St. Lawrence was not available.

During aerial surveys between Cape Hatteras, North Carolina and Nova Scotia (1978–1982), fin whales made up 46% of all large whale sightings and 24% of all cetacean sightings (CeTAP 1982). These surveys indicated a wide distribution across the continental shelf, extending well offshore into waters deeper than 2,000 m, showing that few areas between Cape Hatteras and Nova Scotia were not occupied by fin whales at some time during the year (Hain *et al.* 1992).

Fin whales were also sighted on the Scotian Shelf more frequently and in greater overall numbers than any other species on the whaling grounds in the late 60s early 70s (Mitchell *et al.* 1986). Studies conducted on the shelf at various locations from Nova Scotia to Labrador have regularly encountered fin whales (Perkins and Whitehead 1977, Whitehead and Glass 1985, Whitehead *et al.* 1998).

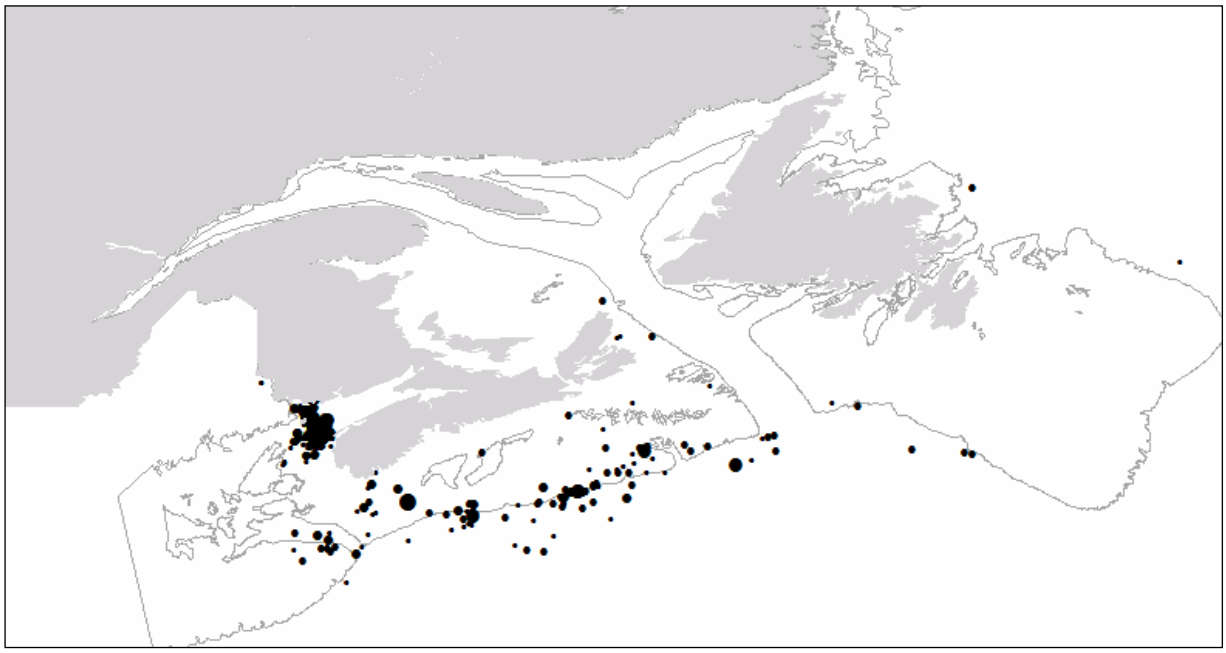

Figure 3. Sighting data from the SAR database from 1998 to 2003, primarily around Nova Scotia, Canada. Bathymetric contour is 200 m. The size of the location markers is proportional to the observed group size. Data provided by S.C. Smith (personal communication), 200 m contour line provided by Stefen Gerriets personal communication).

Some animals summer near Tadoussac, Quebec in the St. Lawrence Estuary (Sergeant 1977), where 88 individuals have been photo-identified between 1986–2001 (Giard *et al*. 2001). About 30% are considered seasonal residents, while the remainder are considered regular or occasional visitors. Since 1998, the photo-id "discovery curve" has levelled off at 2–4 new sightings per year, suggesting a seasonally resident population of approximately 26 animals (Giard *et al*. 2001). On the north shore of the Gulf of St. Lawrence, over 300 different fin whales have been photo-identified since the early 1980s (R. Sears, personal communication).

In British Columbian waters, fin whales were frequently observed in exposed coastal seas (Hecate Strait and Queen Charlotte Sound) and occasionally in the more protected waters of Queen Charlotte Strait and the Strait of Georgia (Pike and MacAskie 1969). Only about 17% of the catch by British Columbia coastal stations for which positions were recorded was on the continental shelf (Gregr 2004).

Based on a comparison of whaling records from coastal stations around the Gulf of Alaska, Gregr *et al*.(2000) concluded that the species did not appear restricted latitudinally. An analysis of whaling records from British Columbia whaling stations (Figure 5) identified fin whale habitat along the continental shelf, in the exposed inland waters of Dixon Entrance and Hecate Strait, and in a region offshore of northern Vancouver Island (Gregr and Trites 2001).

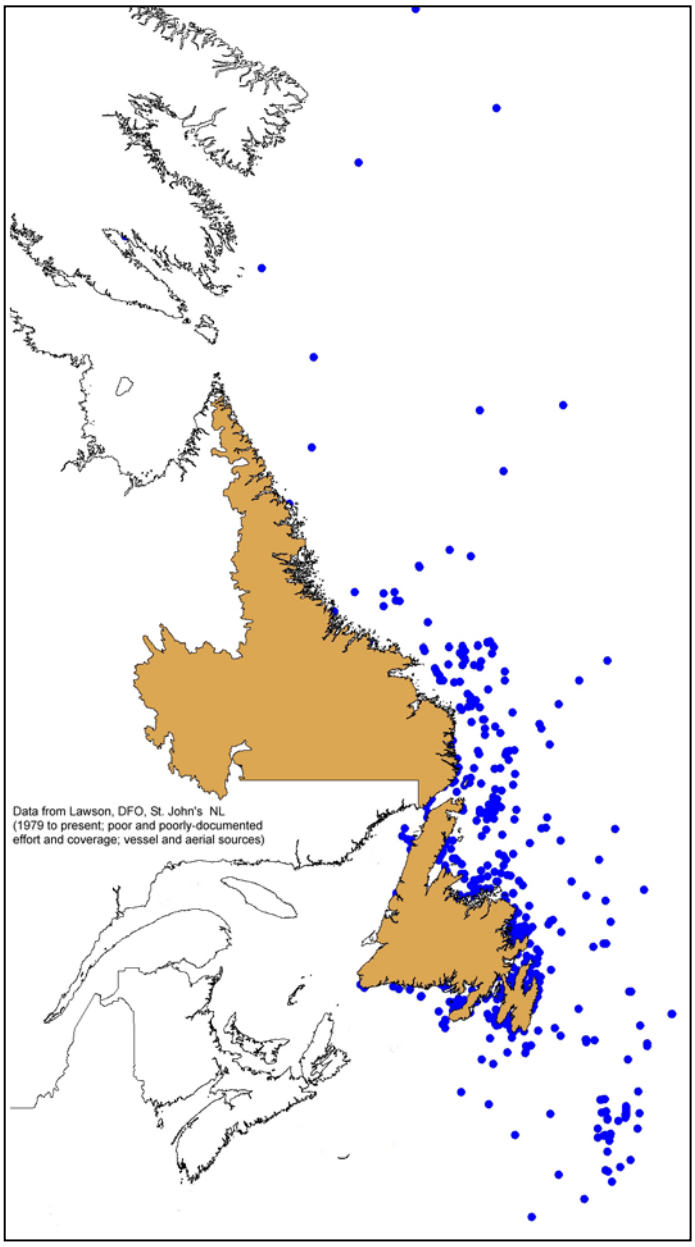

Figure 4. Fin whale sightings in or near Newfoundland and Labrador, since 1979. Primarily from vessel-based platforms of opportunity, these preliminary data are combined over all seasons and have not been corrected for effort. The data reflect the relatively limited survey effort (particularly in offshore waters), and represent where fin whales may occur in this region (J. Lawson, personal communication).

Contemporary sightings of fin whales in British Columbia waters are predominantly from the west coast of Vancouver Island, and the inland waters of Hecate Strait and Queen Charlotte Sound. Recent annual spring and summer cruises (2001–2003) have

regularly recorded fin whales in off-shelf waters, near the shelf edge boundary of Queen Charlotte Sound, in Hecate Strait, and in Dixon Entrance (John K.B. Ford, personal communication. Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, BC, V9R 5K6). Sightings are also reported off the southern end of Vancouver Island in summer (Brian Gisborne, personal communication. Juan de Fuca Express, 427-118 Menzies Street, Victoria, BC, V8V 2G5). Additional surveys conducted in August 2002 and 2003 found fin whales in Queen Charlotte Sound and Hecate Strait (J. Calambokidis, personal communication. Cascadia Research Collective, 218 1/2 W. 4th Avenue, Olympia, WA 98501 USA).

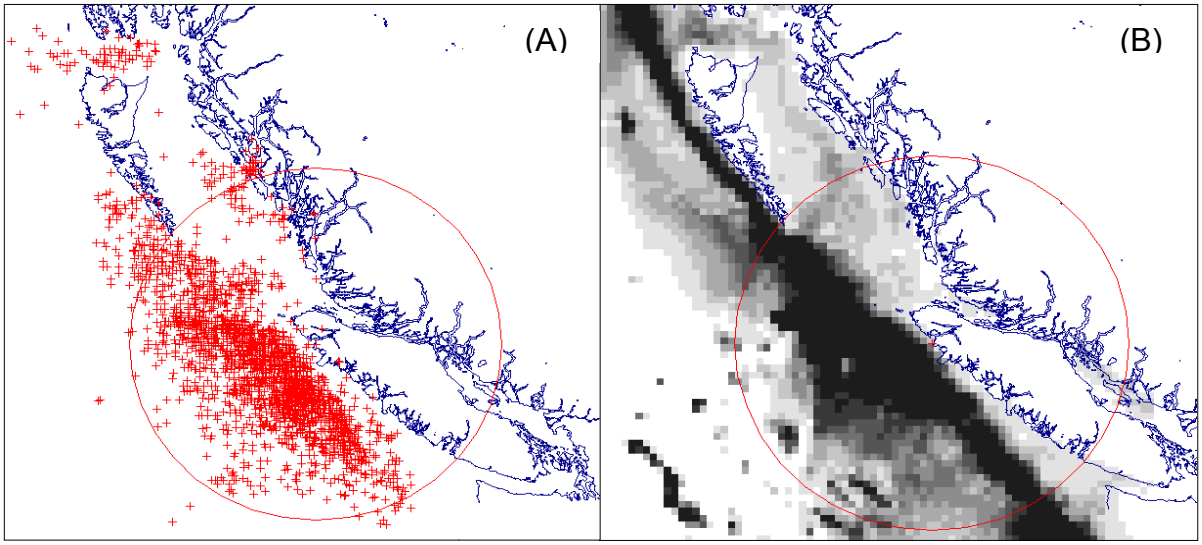

Figure 5. Georeferenced fin whale kills (crosses, panel A) by whalers operating from British Columbia shore stations between 1907 and 1967; and predictions of critical habitat (shaded from low (white) to high (black) probability, panel B) based on a modelled relationships with oceanographic conditions (data from Nichol *et al*. (2002); figures from Gregr and Trites (2001)).

The B.C. Cetacean Sightings Network (BCCSN) contains 83 fin whale sightings from 1985 to 2003; with the majority between 1999 and 2003, and virtually all provided by recreational boaters (Doug Sandilands, personal communication. Vancouver Marine Science Centre, P.O. Box 3232, Vancouver, BC, V6B 3X8). The sightings are concentrated around the Queen Charlotte Islands and in Hecate Strait, with some off the west coast of Vancouver Island (Figure 6). There are no recorded winter sightings, nor are there any contemporary sightings in the Strait of Georgia (J.K.B. Ford, personal communication). The last review of the status of marine mammals in the Strait of Georgia (Calambokidis and Baird 1994) made no mention of fin whales.

NMFS conducted 2-week summer surveys in the northern offshore waters of Washington State each year from 1995 to 2002 and did not sight a single fin whale (Calambokidis et al. 2004). Similarly, aerial surveys off the west coast of Washington and southwest coast of Vancouver Island in the early 1990s also did not spot any fin whales (Green et al. 1992 cited in Calambokidis *et al*. 2004).

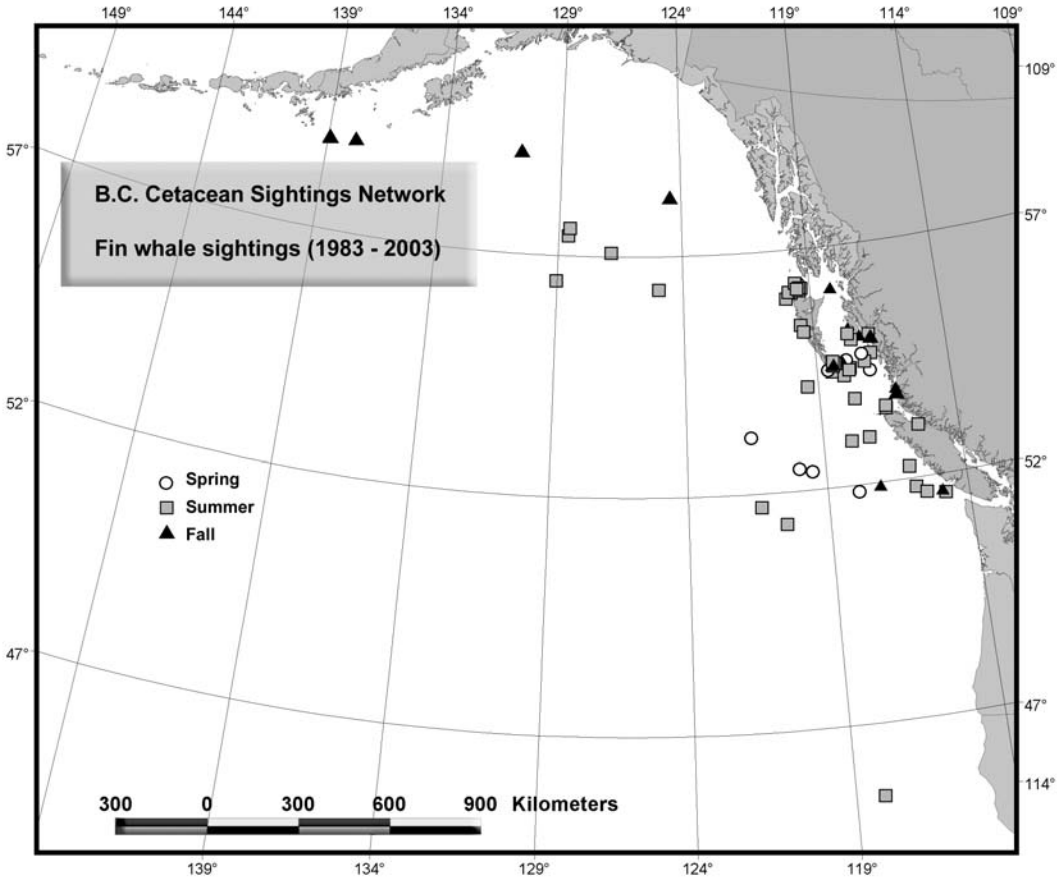

Figure 6. Opportunistic sightings of fin whales in and around British Columbian waters (BCCSN, D. Sandilands, personal communication).

A recent (2004) line-transect survey of British Columbia's inshore waters did not produce enough sightings to generate a population estimate. However, observations in Queen Charlotte Sound and Dixon Entrance served to confirm the limited inshore distribution of the species in the Canadian Pacific (Rob Williams, personal communication, Raincoast Conservation Society, Pearse Island, P.O. Box 193 Alert Bay, BC, V0N 1A0).

HABITAT

Habitat considerations for baleen whales must consider all aspects of the species' life history including: summer foraging grounds, winter calving and mating grounds, year round resident populations, and any specific requirements of the various age or sex classes. Unfortunately, the majority of information on fin whales is for 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), but see *Migration*, below.

Fin whales appear to use both coasts extensively during summer. While populations on both coasts appear to move offshore and possibly southward in winter, they are not completely absent from Canadian waters in winter (see *Migration*, below).

Habitat requirements

The summer habitat of fin whales tends to consist of areas with dense prey concentrations (Kawamura 1980, Gaskin 1982). Woodley (1996) found that in the Bay of Fundy, fin whales occurred primarily in shallow areas with high topographic relief, and their occurrence was correlated with herring and euphausiid concentrations.

Fin whale distribution is associated with low surface temperatures off the northeastern US and in the Bay of Fundy during summer months (Woodley and Gaskin 1996). Hain *et al.* (1992) documented an association with oceanic fronts, areas known for high biological productivity (Herman *et al.* 1981).

Gaskin (1983) noted that there are ample year-round food supplies for fin whales in the eastern Nova Scotia region. This is consistent with Brodie's (1975) year-round observations of fin whales in this region, and with more recent reports of fin whales feeding on herring off Chebucto Head, Nova Scotia, especially in winter (H. Whitehead, unpublished data).

In the St. Lawrence estuary, conditions at the head of the St. Lawrence channel are ideal for concentrating euphausiids. This area forms a seasonal foraging habitat for many marine mammals including fin whales (Simard and Lavoie 1999).

Gregr and Trites (2001) proposed that oceanographic conditions off the north end of Vancouver Island create suitable conditions for the entrainment of phytoplankton and zooplankton. These conditions include the transport of primary production from upwelled areas further south, the wash-out of zooplankton from the continental shelf, and the confluence of major currents creating entrainment features such as fronts and eddies.

Trends

Describing the change in habitat over time for a migratory, pelagic species living in a fluid environment is difficult. Fin whales appear physically capable of searching widely for habitat patches. Thus, localized changes in habitat quality may alter the spatial distribution of the species but not reduce the total amount of habitat available. Changes in total amount of habitat available are more likely to be a function of basin-wide trends in productivity. Changes in fin whale habitat quality or availability will also be a function of the trophic interactions between fin whales, their prey, and their competitors.

Habitat protection/ownership

On both the Pacific and Atlantic coasts of North America, portions of the species' range fall within the Exclusive Economic Zones of the United States and Canada. In

both countries, marine mammals are protected from deliberate disturbance, and consequently this likely provides some degree of habitat protection in some areas (see *Existing Protection or Other Status*, below).

Explicit habitat protection is provided only by the recently designated Gully Marine Protected Area (MPA). The fin whale is one of the many species that use the area (Hooker *et al.* 1999). This area is very small relative to the fin whale's extensive range.

BIOLOGY

Reproduction

Information on the reproductive biology of whales is derived primarily from animals taken during commercial whaling (Lockyer 1984). Fin whales reach sexual maturity at 5 to 15 years of age for both sexes (Perry *et al.* 1999) with the average reported as 6–7 years for males and 7–8 years for females (Aguilar 2002). The average length at sexual maturity in northern hemisphere fin whales is 17.2 m (Mitchell 1974, Ratnaswamy and Winn 1993).

Conception and calving are believed to occur in winter, likely in low latitudes (Mizroch *et al.* 1984, Reeves *et al.* 2002). After a gestation period of 1 –12 months, calves are born at an average length of 6 m. Average length at weaning is about 11.5 m, at approximately 6–7 months of age (Omura 1950, Gaskin 1976, Ratnaswamy and Winn 1993). Females generally undergo a 6-month resting period after weaning a calf. Agler *et al.* (1993) calculated a mean interbirth interval of 2.71 years (n=13), and estimated a potential interval of 2.24 years.

Pregnancy rates have been estimated at between 38% and 50% of adult females (Aguilar 2002). Agler *et al.* (1993) estimated the gross annual reproduction rate of fin whales at 8% based on photographic identification.

Survival

An adult natural mortality rate for fin whales has been estimated at 4% (Doi *et al.* 1970, Lockyer and Brown 1979, Ratnaswamy and Winn 1993). There appears to be no information on survival rates for calves and juveniles.

Possible sources of natural mortality include predation by killer whales (*Orcinus orca*) (Vidal and Pechter 1989) or certain species of sharks (Connor 2000). However, there are no conclusive reports in the literature of successful predation. Considering the speed and size of fin whales, attacks would likely succeed only when old, ill or immature animals are targeted (Perry *et al.* 1999, Aguilar 2002).

Lambertsen (1986) estimated that 90–95% of fin whales in the North Atlantic carry heavy loads of the giant nematode *Crassicauda boopis*. Such loads could be

pathogenic, resulting in renal inflammation and, in extreme cases, kidney failure and death (Lambertsen 1992, Perry *et al.* 1999).

Species characteristics and physiology

Fin whales attain 95% of their maximum body size at 9–13 years of age (Aguilar 2002). The amount of ossification of the vertebral column has been used to estimate physical maturity at approximately 25 years of age in both sexes (Aguilar and Lockyer 1987). Average lengths of adult fin whales range from 24 m in the northern hemisphere to 27 m in the southern hemisphere. Adult females can be up to 2 m longer than adult males (Lockyer and Waters 1986, Ralls and Mesnick 2002, Reeves *et al.* 2002). The average weight reported for adults ranges from 40–50 tonnes in the northern hemisphere to 60–80 tonnes in the southern hemisphere (Jefferson *et al.* 1993, Aguilar 2002). These weight estimates come from commercial whaling data with corrections for fluid loss during flensing (Lockyer 1976, Gambell 1985). Maximum life span may be as high as 100 years (Gambell 1985).

Fin whales rarely raise their flukes on a terminal dive and they only occasionally breach or strike the sea surface with their flukes or flippers. The strong mother–calf bond terminates upon weaning. There is no evidence for long-term social bonds. Fin whales sometimes travel in groups of 2–7 animals, though larger, ephemeral aggregations occur in areas of high productivity (Aguilar and Lockyer 1987).

Migration

It is generally assumed that most fin whales migrate between foraging grounds in high latitudes and calving/breeding grounds in lower latitudes (Macintosh 1965, Sergeant 1977). However, fin whale movements do not appear to be so simple.

In the North Pacific, Pike (1950) observed that some, mostly young, fin whales appeared to spend the summer feeding off British Columbia. Recent surveys have observed summer fin whale feeding in both shelf-edge and on-shelf waters (J.K.B. Ford, personal communication).

Acoustic monitoring of seafloor hydrophone arrays from September 1991 to August 1992 (Moore *et al.* 1998) showed that fin whale calls occurred year-round at the hydrophone closest to Canada (Site 5, near 45° N). Call counts at this site peaked in February and May, when counts were virtually absent at stations farther south. Additionally, a period of increased call intensity at Site 5 in July-August preceded by about one month a similar pulse of calls at the next station south.

Watkins *et al.* (2000) did not find evidence of large-scale migratory activity in the North Pacific based on acoustic signals. However, the signal used (termed “20-Hz pulses”) has been associated with male breeding displays (Watkins and Schevill 1979). This confounds the interpretation that fin whales do not migrate over large distances in the North Pacific.

Evidence exists for an age-structured migration in the North Pacific (Gregr *et al.* 2000), and in the eastern North Atlantic, where Aguilar (1987) and others have reported a migration order of pregnant females leading, followed by males and resting females, and then lactating females and juveniles. However, Agler *et al.* (1993) found the summering ground arrival times of females with calves did not differ from the arrival times of other individuals in the Gulf of Maine.

In the Atlantic, it has been suggested that the Newfoundland and Nova Scotia stocks move southward in the winter, with the Newfoundland stock moving into the summer grounds of the Nova Scotia stock and the Nova Scotia stock moving further south (Kellogg 1929, Allen 1971, Mitchell 1974). Fin whales also occur in the Gulf of St. Lawrence throughout the summer, ranging into the St. Lawrence estuary (Edds and MacFarlane 1987, Kingsley and Reeves 1998). The Gulf Stream may influence the latitudinal distribution of habitats, making higher latitudes suitable as wintering grounds, thereby accounting for shorter north-south movements (Aguilar and Lockyer 1987).

Year-round observations in areas such as eastern Nova Scotia (Brodie 1975), the Mediterranean (Notarbartolo-Di-Sciara *et al.* 2003) and the Gulf of California (Tershy *et al.* 1990) suggest that not all individuals within a population complete a “full” migration (Mitchell 1974, Tershy and Wiley 1992). Aguilar (1987) also suggested that animals may occasionally remain at higher latitudes throughout the winter, or at lower latitudes throughout the summer.

Fin whales have been described as highly vocal animals, with acoustic activity increasing markedly from late August through fall and again in the mid-winter on the edge of the Scotian Shelf and just offshore. This could be indicative of southward movement in the fall and northward movement in late winter (Clark 1995).

Walker *et al*. (1992) found statistically significant seasonal associations between fin whale sightings and areas of low geomagnetic intensity and gradients, suggesting that fin whales may use the earth’s magnetism to guide migration.

Diet composition

Fin whales forage on a variety of species. Generally in the northern hemisphere they eat small invertebrates, schooling fishes and squids (Jefferson *et al.* 1993, Bannister 2002). The available information supports the assertion by Gambell (1985) that fin whale diet is as much a function of availability as preference.

In the North Pacific, the diet dominated by euphausiids (70%) followed by copepods (25%) with some fish and squid (Kawamura 1980). Flinn *et al.* (2002) examined records of stomach contents for fin whales taken in British Columbia and found similar results.

In eastern Canadian waters, fin whales consume primarily euphausiids and capelin, with euphausiids occurring more frequently early in the year and the capelin

proportion increasing later in the summer (Sergeant 1966). Capelin appears to dominate the diet off Newfoundland (Mitchell 1975, Brodie *et al.* 1978, Whitehead and Carscadden 1985), while in the Bay of Fundy euphausiids dominate the diet once concentrations become available in surface waters (Gaskin 1983). Fin whales in the St. Lawrence estuary presumably take advantage of the high local concentrations of euphausiids and the associated schools of capelin (Simard and Lavoie 1999). They feed alongside humpback whales on euphausiids and schooling fish, although fatty acid analysis confirms that fin whales occupy a higher trophic position (Borobia *et al.* 1995). Fin whales have also been observed feeding on herring off Nova Scotia (H. Whitehead, unpublished data).

Inter-specific interactions

Due to the global overlap in range and diet with other baleen whales, inter-specific competition is likely (Aguilar and Lockyer 1987). Mixed groups of fin and blue whales are common and hybrids occur with surprising frequency (Bérubé and Aguilar 1998). In the Bay of Fundy and off Newfoundland, fin and humpback whales have been observed foraging in the same general areas (Whitehead and Carlson 1988, Katona *et al.* 1993). Fin whales have also been associated with right whales in the lower Bay of Fundy (Woodley and Gaskin 1996) and on the Scotian Shelf (Mitchell *et al.* 1986). Whitehead and Carlson (1988) noted the possibility of interference and exploitation competition between humpback and fin whales when foraging on capelin.

To some extent, large baleen whales, consequent to their depletion by whaling, may have been “replaced” in the ecosystem by ecologically equivalent finfish stocks (Payne *et al.* 1990). Trites *et al.* (1999) suggested that in the Bering Sea some species of fish are significant competitors of whales.

Adaptability

The ability to include small schooling fish in their diet shows that fin whales have some flexibility in their feeding strategy. This may allow the species to better adapt to reductions in particular prey items (e.g., euphausiids) than the more stenophagous blue whale, but perhaps not as well as the more generalist sei whale.

POPULATION SIZES AND TRENDS

Technological advances in the late 1800s allowed whalers to kill and secure these fast moving, negatively buoyant, whales (Tonnessen and Johnsen 1982). Stocks were over-exploited and severely reduced in both the Atlantic and Pacific, and indeed throughout the species’ range. No reliable estimates exist of pre-whaling abundance.

At least 13,337 fin whales were taken in Atlantic Canada between 1903 and 1945, the vast majority of which (11,815) were from Newfoundland-Labrador. The Nova Scotia stock was whaled only from 1964 to 1971 (Meredith and Campbell 1988).

Estimates of contemporary population size include the following: Mitchell (1974) estimated that there were 10,800 fin whales off eastern Canada in the early 1970s. CeTAP (1982) estimated that there were around 5,000 between North Carolina and Nova Scotia in the early 1980s. The best available recent estimate for a part of the western North Atlantic is 2,814 (CV=0.21) between Georges Bank and the mouth of the Gulf of St. Lawrence, based on surveys in July 1999 (Waring *et al.* 2002). Surveys in the mid-1990s yielded estimates of 2,200 (CV = 0.24) between Virginia and the Gulf of St. Lawrence (Waring *et al.* 2002) and about 380 (uncorrected for visibility bias) in the Gulf of St. Lawrence (Kingsley and Reeves 1998). In the central North Atlantic (around Iceland and the Faroe Islands) Gunnlaugsson *et al.* (2002) estimated fin whale abundance at 25,352 (95% CI 19,579 to 32,831) from ship surveys.

A recent genetic analysis suggested that there were once 360,000 fin whales in the North Atlantic (Roman and Palumbi 2003). This estimate is an order of magnitude greater than the most commonly cited value (30,000–50,000) for this ocean. The approach, interpretation, and conclusions of Roman and Palumbi have attracted considerable criticism and comment (i.e., Baker and Clapham 2004, Holt 2004, Mitchell 2004), and there is no scientific consensus for adopting their estimate as a management benchmark.

Pike and MacAskie (1969) regarded the fin whale as the most abundant baleen whale in British Columbia waters. Coastal whaling stations in British Columbia took at least 7,605 fin whales between 1905 and 1967 (Figure 7—Gregr *et al.* 2000). For the entire North Pacific, Ohsumi and Wada (1974) estimated pre-exploitation abundance at 40,000–45,000, reduced by whaling to an estimated 13,000–19,000 by 1973 (of which 8,500–11,000 were assumed to be in the eastern North Pacific).

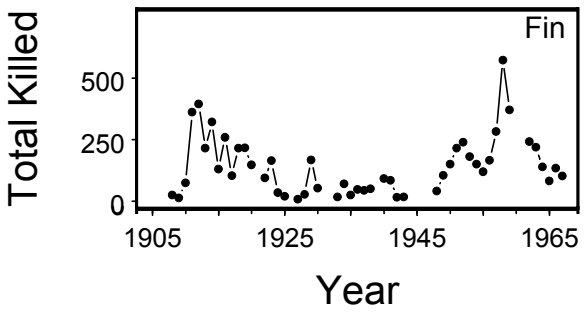

Figure 7. Annual number of fin whales delivered to British Columbia coastal whaling stations (from Gregr *et al*. 2000) during the 1900s. The second peak (1958) reflects a dramatic improvement in the whaling fleet.

Carretta *et al.* (2002) estimated minimum abundance of the California-Oregon-Washington stock at 2,541 individuals. Although slight increases in abundance were observed in the coastal waters of California in the 1980s and 1990s, no significant trend was documented (Carretta *et al.* 2002). Vessel surveys in July–August 1999 produced an estimate of 4,951 (CV=0.29) fin whales in the Bering Sea (Angliss and Lodge 2003).

LIMITING FACTORS AND THREATS

Baleen whale populations are potentially affected by whaling, bycatch in fisheries, ship strikes, disease, and habitat degradation possibly due to altered prey quality or abundance as a result of fishing pressure or pollution (Clapham *et al.* 1999). Acoustic disturbance from shipping and industrial activities is another potential threat.

Limiting factors

Factors that could limit the persistence and recovery of this species are primarily a reflection of the overall state of the oceans, and do not lend themselves well to management. These include primarily habitat degradation through reduced prey availability and reduced fitness from chemical pollution.

Reduced prey availability

Whale habitat is commonly associated with the distribution of prey (Gaskin 1982). For example, Whitehead and Carscadden (1985) showed how local whale abundance was related to capelin concentrations. Consequently any reduction in prey availability can be viewed as a reduction in available habitat. Available prey can be reduced in several ways including the direct and indirect effects of commercial fishing, climate change or inter-specific competition (see *Inter-specific interactions*, above).

Chemical pollution

O'Shea and Brownell (1994) concluded that there was no evidence of toxic effects from metal or organochlorine contamination in baleen species (see also Sanpera *et al.* 1996), largely because they feed at relatively low trophic levels. However, other marine mammals are thought to be at risk from immunotoxic chemicals (Ross 2002). Effects that have been shown for marine mammals include depression of the immune system, reproductive impairment, lesions and cancers (Aguilar *et al.* 2002).

Concentrations of organochlorines sufficient to warrant concern were found in fin whale samples taken in the Gulf of St. Lawrence in 1991–92 (Gauthier *et al.* 1997). However, a retrospective analysis comparing these samples to earlier ones collected in 1971–72 off Newfoundland and Nova Scotia found that the St. Lawrence concentrations were significantly lower (Hobbs *et al.* 2001). This is consistent with the decreasing trends found for other marine mammals (principally pinnipeds) in eastern Canada (Hobbs *et al.* 2001), although Muir *et al.* (1999) found that organochlorine contaminants in cetaceans show both increasing and decreasing trends, depending on species and geographic location.

Threats

Fisheries interactions

In the absence of large-scale commercial whaling, entanglement in fishing gear may be the most serious overall threat to baleen whales (Volgenau *et al.* 1995, Clapham *et al.* 1999). One difficulty in assessing the potential threat of entanglements is that many probably go unreported or unnoticed. In Newfoundland, reporting improved with the implementation in 1979 of a program to assist fishermen with entangled cetaceans (Lien 1994).

In Newfoundland, the most commonly entangled whale species are humpback and minke whales (Ledwell and Huntington 2002). Fin whales become entangled but less frequently (Lien 1994). Fatal entanglements have been documented by the Center for Coastal Studies (Bob Bowman, personal communication. Center for Coastal Studies, P.O. Box 1036, Provincetown, MA 02657), and there is also evidence of entanglement (not necessarily fatal) from photo-identification studies (Agler *et al.* 1990).

The recent development of an anchored gill net fishery in the Bay of Fundy is a potential concern. Three humpback whales were found entangled with this gear in September 2003 (Charles B. Schom, personal communication. Surge Inc. Unit C, 157 Water St., St. Andrews, NB, E5B 1A7). Seven fin whales were found entangled in lobster gear on the edge of the southern Scotian Shelf in 2003. However, cause of death was not determined and it is possible the animals became entangled after death (Jerry Conway, personal communication. Resource Management Branch, Department of Fisheries and Oceans, P.O. Box 1035, Dartmouth, NS, B2Y 4T3).

Many entanglements of other baleen whales involve the flukes, and this may also be true for fin whales (B. Bowman, personal communication.). Unlike humpback whales, entanglement scars on the flukes and caudal peduncles of fin whales are difficult to document since fin whales rarely fluke up when diving.

In the Pacific the offshore driftnet fishery is the only fishery in which a fin whale death has been reported in U.S. waters (Carretta *et al.* 2002). Some gillnet entanglements may go unreported if whales swim away with attached gear. Also, Carretta *et al.* (2002) suggest the risk of entanglement for large whales is small because they appear to be able to swim through gear without becoming entangled or causing damage. Fin whales apparently are less likely to die from entanglement than most other cetacean species because of the relatively small size of their flippers and flukes, and because they are large enough to extricate themselves from gear when they do become entangled (Lien 1994).

In British Columbia, no fin whales were identified in cetacean stranding reports from 1990–1996 (Baird *et al.* 1991, Guenther *et al.* 1995, Willis *et al.* 1996), but several incidents of entangled unidentified large whales were reported. During a 2004 survey, a fin whale was observed off southeastern Moresby Island entangled in what appeared to be a crab-pot line (J.K.B. Ford, personal communication).

Most stranded or entangled cetaceans in British Columbia, Newfoundland and Labrador would likely go unseen and unreported because of the remoteness of much of these coasts, particularly if the entangled animal travelled away from fishing areas towing gear. Because of the relative sizes of the continental shelves, fin whales overlap less with coastal fisheries in the northeastern Pacific than in the northwestern Atlantic. Consequently, the potential for interactions with net fisheries is currently much lower for the Pacific population.

Ship strikes

Most ship strikes occur with ships 80 m or longer travelling at 14 kts or faster, and fin whales are struck more frequently than other balaenopterids (Laist et al. 2001). A fin whale was struck in British Columbia in the summer of 1999 (Anonymous 2002), while in 2002, four arrived dead in Puget Sound on the bows of tankers (J. Calambokidis, personal communication). In June 2004, a dead floating fin whale was found off the west coast of Vancouver Island, apparently struck and killed by a ship (J.K.B. Ford, personal communication).

Fin whales have also been found dead on the bows of vessels entering Halifax Harbour (Paul Brodie, personal communication). In a 13-year period, 26% of stranded fin whales in the Mediterranean could be linked directly to ship strikes (Notarbartolo-Di-Sciara *et al*. 2003). Not all ship strikes are fatal. Pesante *et al*. (2000) found that 4% of animals in a photo-identification catalogue bore marks of ship encounters on their dorsal surface or fins.

Ship strikes are likely under-reported because struck and killed animals are apt to sink before they can be observed. There is also speculation that in regions of high ambient ship noise, animals may become habituated with a consequent reduction in avoidance behaviour (R. Sears, personal communication).

In British Columbia, port expansion is being considered near Vancouver to accommodate the largest “super” tankers (VPA 2004). Any increase in commercial vessel traffic and/or vessel size in British Columbia’s exposed shelf waters would be of concern for fin whales. A similar argument could be made for the St. Lawrence seaway, one of the busiest shipping routes on the continent, and for the approaches to Halifax Harbour.

Acoustic disturbance

Anthropogenic noise in the marine environment has increased substantially since the 1950s (Croll *et al.* 2001), and this rapid change in the acoustic environment may have profound implications for marine mammals that evolved in a much quieter environment (Tasker *et al.* 1998). The potential effects of noise on baleen whales include habituation, acoustic masking, avoidance behaviour, temporary hearing loss, and in extreme cases, permanent loss of hearing or other physiological damage (Croll *et al.* 2001).

Concern has primarily focused on industrial noise from offshore oil and gas developments. Numerous studies have documented behavioural responses— primarily avoidance—to seismic surveys (Gordon *et al.* 1998). Fin whales were part of a study conducted by Stone (2003), who found that baleen whales were sighted less frequently and exhibited avoidance behaviour when air guns were firing. In addition, sei and fin whales tended to dive less during these times, possibly because received levels are lower near the surface than at depth (Richardson *et al.* 1995).

Canada's first offshore production project began off Nova Scotia in 1992 (NSPD 2004). Environmental assessments relating to these projects concluded that the associated impact on marine mammals would be negligible to minor and short-term (Davis *et al.* 1998, Thomson *et al.* 2000). However many data gaps, particularly with respect to acoustic propagation (Gordon *et al.* 1998), remain unaddressed.

In British Columbia, concerns regarding oil and gas exploration are relatively new. A recent Royal Society panel (RSC 2004) recommended the lifting of a 30-year moratorium on exploration. However, the panel outlined a rigorous regulatory regime and highlighted the importance of filling numerous data gaps, including the collection of baseline data, and the definition of critical habitat for endangered marine species, prior to commencement of exploratory activities. This is of particular interest for fin whales since areas where they occur in relatively high densities overlap with areas with high hydrocarbon potential.

Whaling

Threats to populations from whaling persist. Fin whales are still hunted in Greenland under the IWC's Aboriginal subsistence whaling exemption. Also, Iceland has expressed interest in resuming whaling for fin whales.

SPECIAL SIGNIFICANCE OF THE SPECIES

The second longest animal on Earth, and perhaps the fastest of all marine mammals, the fin whale was the mainstay of both the Antarctic and Pacific whale fisheries after the over-exploitation of blue and humpback populations.

Fin whales are the focus of whale watching excursions in many areas throughout Atlantic Canada, particularly in the lower Bay of Fundy and the St. Lawrence estuary. The species is not regularly targeted by the commercial whale watching industry in British Columbia.

Extensive archeological investigations of middens, using genetic techniques, are being carried out at Ozette in Washington State and at Barkley Sound on southern Vancouver Island. Humpback and grey whales dominate the remains at both sites. Fin whales represent less than 1% of the remains at Ozette, and have not been found at Barkley Sound (Alan D. McMillan, personal communication. Department of

Anthropology, Douglas College, P.O. Box 2503, New Westminster, BC, V3L 5B2). The Marine Mammal SSC had no information to suggest that the fin whale has played a major role in any Native culture or economy in Canada.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

Globally, the International Union for the Conservation of Nature (IUCN) lists the fin whale as "endangered" because of the depletion of populations by whaling (Baillie and Groombridge 1996). Under the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the fin whale is listed in Appendix I, a category that includes species threatened with extinction, with the intention of halting commercial trade. The Convention on the Conservation of Migratory Species of Wild Animals lists the fin whale in Appendix I (endangered). It is also listed in Appendix II, which denotes a species that would benefit from international cooperation. The IWC moratorium on commercial whaling provides protection to fin whales although they are hunted in Greenland for "subsistence."

In the United States the fin whale is protected under the Marine Mammal Protection Act of 1972 and under the Endangered Species Act of 1973, where it is listed as endangered.

In Canada, marine mammals are protected from disturbance by the Fisheries Act. The Saguenay-St. Lawrence Marine Park Act, passed in February 2002, imposed proximity and speed restrictions on all vessels operating in the area. Additional duration restrictions were included for marine tour operators (DOJ 2004). The park contains 1,138 km^2 of marine environment at the confluence of the Saguenay River and the St. Lawrence estuary, a region with the richest krill aggregations yet documented in the Northwest Atlantic (Simard and Lavoie 1999).

Enabling legislation is in place for three federal agencies to protect marine habitat: The Oceans Act requires Fisheries and Oceans Canada to define Marine Protected Areas; the Canada National Marine Conservation Areas Act charges Parks Canada with the delineation of National Marine Conservation Areas; and the Canada Wildlife Act allows Environment Canada to designate Marine Wildlife Areas. Thus, the designation and coordination of these various types of protected areas will require coordination among these three agencies.

Fisheries and Oceans Canada is in the process of developing a regulatory framework based on existing national whalewatching guidelines. These regulations are expected to be in place sometime before 2006 (Marylin Joyce, Pacific Region, Department of Fisheries and Oceans, 200–401 Burrard Street, Vancouver B.C., V6B 3S4).

Fin whales on both coasts were designated by COSEWIC as "Rare" in 1987. This was changed to "Vulnerable" in 1990 when the "Rare" designation was dropped. They were reclassified again in November 2001 by COSEWIC.

SUMMARY OF STATUS REPORT

While current and pre-exploitation estimates of population size in both the North Atlantic and the North Pacific are imprecise, there is no doubt that these populations were reduced by commercial whaling. There is no conclusive evidence on population trends. Directed surveys are needed.

Efforts to estimate population size for this species are confounded by its extensive range and the potential confusion with sei whales. The expense associated with large-scale surveys is a significant limiting factor, particularly in the more remote, offshore waters of British Columbia, Newfoundland and Labrador.

The fin whale is less constrained in its diet than either the right whale or the blue whale. Like the sei and humpback whales, it preys on small schooling fish as well as zooplankton. This flexibility in diet may make it more capable of adapting to changing ecological conditions.

Direct threats include entanglement in fishing gear, particularly in Atlantic Canada, and ship strikes. Neither of these threats is abating. Habitat degradation from acoustic pollution, chemical contamination and reductions in prey populations is also a concern.

TECHNICAL SUMMARY

Balaenoptera physalus
Fin whale rorqual commun
Atlantic Population
Range of Occurrence in Canada: Northwest Atlantic Ocean

Extent and Area Information	
• *Extent of occurrence (EO)(km²)*	>20,000 km²
• *Specify trend in EO*	None known
• *Are there extreme fluctuations in EO?*	No
• *Area of occupancy (AO) (km²)*	>20,000 km²
• *Specify trend in AO*	None known
• *Are there extreme fluctuations in AO?*	No
• *Number of known or inferred current locations*	
• *Specify trend in #*	None known
• *Are there extreme fluctuations in number of locations?*	No
• *Specify trend in area, extent or quality of habitat*	None known
Population Information	
• *Generation time (average age of parents in the population)*	20–30 years
• *Number of mature individuals*	Unknown
• *Total population trend:*	Unknown
• *% decline over the last/next 10 years or 3 generations.*	No indication of decline
• *Are there extreme fluctuations in number of mature individuals?*	No
• *Is the total population severely fragmented?*	No
• *Specify trend in number of populations*	None known
• *Are there extreme fluctuations in number of populations?*	No
• List populations with number of mature individuals in each: not applicable	
Threats (actual or imminent threats to populations or habitats)	
- Collisions with large vessels - Interactions with fisheries including entanglement in gear - Noise pollution from industrial and recreational activities - Chemical pollution	
Rescue Effect (immigration from an outside source)	
• *Status of outside population(s)?* Similarly depleted	Similarly depleted
• *Is immigration known or possible?*	Yes, possible
• *Would immigrants be adapted to survive in Canada?*	Likely
• *Is there sufficient habitat for immigrants in Canada?*	Unknown
• *Is rescue from outside populations likely?*	Yes, likely
Quantitative Analysis	None available
Current Status: COSEWIC: Special Concern (May 2005)	

Status and Reasons for Designation

Status: Special Concern	**Alpha-numeric code**: N/A
Reasons 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.	
Applicability of Criteria **Criterion A** (Declining Total Population): Although whaled over the last 3 generations, the level of decline and current abundance are uncertain. **Criterion B** (Small Distribution, and Decline or Fluctuation): AO and EO > 20,000 km^2. **Criterion C** (Small Total Population Size and Decline): No evidence of current decline. **Criterion D** (Very Small Population or Restricted Distribution): Unlikely to be less than 1,000 mature individuals. **Criterion E** (Quantitative Analysis): No quantitative analysis has been undertaken.	

TECHNICAL SUMMARY

Balaenoptera physalus
Fin whale rorqual commun
Pacific Population
Range of Occurrence in Canada: North Pacific

Extent and Area Information	
• *Extent of occurrence (EO)(km²)*	>20,000 km²
• *Specify trend in EO*	None known
• *Are there extreme fluctuations in EO?*	No
• *Area of occupancy (AO) (km²)*	>20,000 km²
• *Specify trend in AO*	None known
• *Are there extreme fluctuations in AO?*	No
• *Number of known or inferred current locations*	
• *Specify trend in #*	Unknown
• *Are there extreme fluctuations in number of locations?*	Unknown
• *Specify trend in area, extent or quality of habitat*	None known
Population Information	
• *Generation time (average age of parents in the population)*	20–30 years
• *Number of mature individuals*	Unknown
• *Total population trend:*	Unknown
• *% decline over the last/next 10 years or 3 generations.*	Unknown
• *Are there extreme fluctuations in number of mature individuals?*	No
• *Is the total population severely fragmented?*	No
• *Specify trend in number of populations*	None known
• *Are there extreme fluctuations in number of populations?*	No
• List populations with number of mature individuals in each: not applicable	
Threats (actual or imminent threats to populations or habitats)	
- Collisions with large vessels - Interactions with fisheries including entanglement in gear - Noise pollution from industrial and recreational activities - Chemical pollution	
Rescue Effect (immigration from an outside source)	Similarly depleted
• *Status of outside population(s)?*	
• *Is immigration known or possible?*	Yes, possible
• *Would immigrants be adapted to survive in Canada?*	Likely
• *Is there sufficient habitat for immigrants in Canada?*	Unknown
• *Is rescue from outside populations likely?*	Yes, likely
Quantitative Analysis	None available
Current Status: COSEWIC: Threatened (May 2005)	

Status and Reasons for Designation

Status: Threatened	**Alpha-numeric code**: A1d

Reasons for Designation:
Currently sighted only infrequently on former whaling grounds off British Columbia. Coastal whaling took at least 7,600 animals from the population between 1905 and 1967, and thousands of additional animals were taken by pelagic whalers through the 1970s. Catch rates from coastal whaling stations declined precipitously off British Columbia in the 1960s. Based on the severe depletion and lack of sufficient time for recovery, it is inferred that present population is below 50% of its level, 60–90 years ago. Individuals continue to be at risk from ship strikes and entanglement in fishing gear.

Applicability of Criteria

Criterion A (Declining Total Population): Given the extent of whaling in the Northeast Pacific (the fin whale catch off British Columbia was in sharp decline when shore whaling ceased in 1967 after taking many thousand animals) as well as the low potential rate of increase, the population is likely to be less than 50% of its abundance 3 generations ago (A1d).

Criterion B (Small Distribution, and Decline or Fluctuation): AO and EO > 20,000 km^2.

Criterion C (Small Total Population Size and Decline): A small population but no evidence of current decline.

Criterion D (Very Small Population or Restricted Distribution): Numbers migrating through BC waters are unknown.

Criterion E (Quantitative Analysis): No quantitative analysis has been undertaken.

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Authorities contacted

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Edward Gregr is an ecologist specializing in the distribution of, and habitat use by marine mammals. His detailed examination of the historic whaling records from British Columbia provided insight into how the large whale species may have once used the waters off Canada's Pacific coast. Edward has developed habitat models for the five largest whale species, sea otters, Steller sea lions, abalone, and several species of freshwater fish. Edward continues to study the distribution and spatial ecology of marine mammals in the eastern North Pacific, and is also actively involved in defining critical habitat and marine protected areas.

COLLECTIONS EXAMINED

No collections were examined in the preparation of this report.