# The Fin Whale

### Introduction

The fin whale, *Balaenoptera physalus* Linnaeus 1758, is the second largest member of the family Balaenopteridae (after the blue whale, *B. musculus)*. Mature animals range from 20 to 27 m in length, with mature females being approximately 1.47 m longer than mature males (Aguilar and Lockyer, 1987). All fin whales have a consistent pattern of asymmetrical pigmentation which is particularly recognizable on the head region. The whale's underside, right lip, and right baleen plate are yellow-white, while their main body, left lip, and left baleen plate are a fairly uniform gray-blue color. This asymmetry may be linked to the whale's feeding behavior, but there is no evidence that their unusual coloration gives them any type of predatory advantage over other balaenopterids (Tershy and Wiley, 1992). The dorsal fin is generally falcate with a pointed tip, but it may be quite variable in its shape (Fig. 26).

The fin whale is usually found alone or in small groups, and the species appears to have no well-defined social structure. Like other balaenopterids, they have fringed baleen plates instead of teeth, and ventral grooves which expand during feeding and allow the whale to engulf large quantities of water along with small crustacean and fish prey items.

### Distribution and Migration

Fin whales inhabit a wide range of latitudes between lat. 20–75°N and 20–75°S (Fig. 27) (Mackintosh, 1966; Leatherwood et al., 1982; Anonymous, 1994a). Most migrate seasonally from relatively high-latitude Arctic and Antarctic feeding areas in the summer to relatively low-latitude breeding and calving areas in winter. Arrival time on the summer feeding areas may differ according to sexual class, with pregnant females arriving earlier in the season than other whales (Mackintosh, 1965). The location of winter breeding areas is still uncertain. These whales tend to migrate in the open ocean, and therefore migration routes and the location of wintering areas are difficult to determine.

#### North Pacific

The IWC's Scientific Committee recognized two management stocks in the North Pacific: the East China Sea (Fig. 5) and the rest of the North Pacific (Donovan, 1991). One reason for this broad desig-

Figure 26.—Two fin whales, one noticeably smaller, surface simultaneously revealing their falcate dorsal fins and dark coloration. S. Hill, NMML Collection.

nation is the lack of data on geographic or genetic separation within the species. Because fin whales tend to inhabit such a wide range of latitudes in all seasons, it is hard to predict where individual animals travel during pelagic migrations.

Mizroch et al. (1984b) suggested five possible stocks within the North Pacific based on histological and tagging experiments (Fig. 4, 5) (Fujino, 1960; Rice, 1974; Tershy et al., 1993):

1) East and West Pacific (intermingling around the Aleutian Islands),
2) East China Sea,
3) British Columbia,
4) Southern/Central California to Gulf of Alaska, and
5) Gulf of California.

Discovery tags[38] injected and sometimes recovered during the era of commercial whaling demonstrated possible southern California wintering areas and summering areas ranging from central California to the Gulf of Alaska (Rice, 1974). Other researchers have more recently found year-round concentrations of fin whales off the southern and central California coast, although there is a seasonal peak during the summer and autumn (Barlow, 1995; Forney et al., 1995; Dohl et al.[78]). Fin whales have also been found in summer off Oregon (McDonald et al., 1995; Green et al.[75]) and in summer and autumn in Shelikof Strait (north of Kodiak Island, Alaska) and the Gulf of Alaska (Brueggeman et al.[79]). The Gulf of California is inhabited year-round by fin whales, with a peak in abundance during winter and spring (Tershy et al., 1993; Silber et al., 1994). Whether fin whales found off southern and central California during summer migrate to the Gulf of California for winter awaits further investigation (Barlow et al., 1997). In low latitudes of the eastern tropical Pacific, fin whales are scarce in summer and winter (Lee, 1993; Wade and Gerrodette, 1993).

Three stocks have been designated in U.S. waters of the North Pacific for stock assessment and management purposes: 1) California/Oregon/Washington, 2) Alaska, and 3) Hawaii (Barlow et al., 1997; Hill et al., 1997). Around Hawaii, the fin whale is rarely sighted (Shallenberger[80]; Balcomb[81]), but acoustic recordings off Oahu and Midway Islands suggested a migration into Hawaiian (U.S. EEZ) waters in autumn and winter (Thompson and Friedl, 1982).

### North Atlantic

In 1976, the IWC identified seven stock areas in the North Atlantic (Donovan, 1991) based on "statistical convenience" and history of exploitation (Fig. 28):

[78] Dohl, T. P., R. C. Guess, M. L. Duman, and R. C. Helm. 1983. Cetaceans of central and northern California, 1980-83: Status, abundance and distribution. Contr. 14-12-0001-29090. Final rep. to Minerals Manage. Serv., 284 p.

[79] Brueggeman, J., G. A. Green, K. C. Balcomb, C. E. Bowlby, R. A. Grotefendt, K. T. Briggs, M. L. Bonnell, R. G. Ford, D. H. Varoujean, D. Heinemann, and D. G. Chapman. 1990. Oregon-Washington marine mammal and seabird survey: Information synthesis and hypothesis formulation. Prep. for U.S. Dep. Inter., OCS Study MMS 89-0030.

[80] Shallenberger, E. W. 1981. The status of Hawaiian cetaceans. Rep. MMC-77/23 prep. for Mar. Mammal. Comm., Contr. MM7AC/28, 79 p.

[81] Balcomb, K. C. 1987. The whales of Hawaii, including all species of marine mammals in Hawaiian and adjacent waters. Marine Mammal Fund, San Francisco, Calif., 99 p.

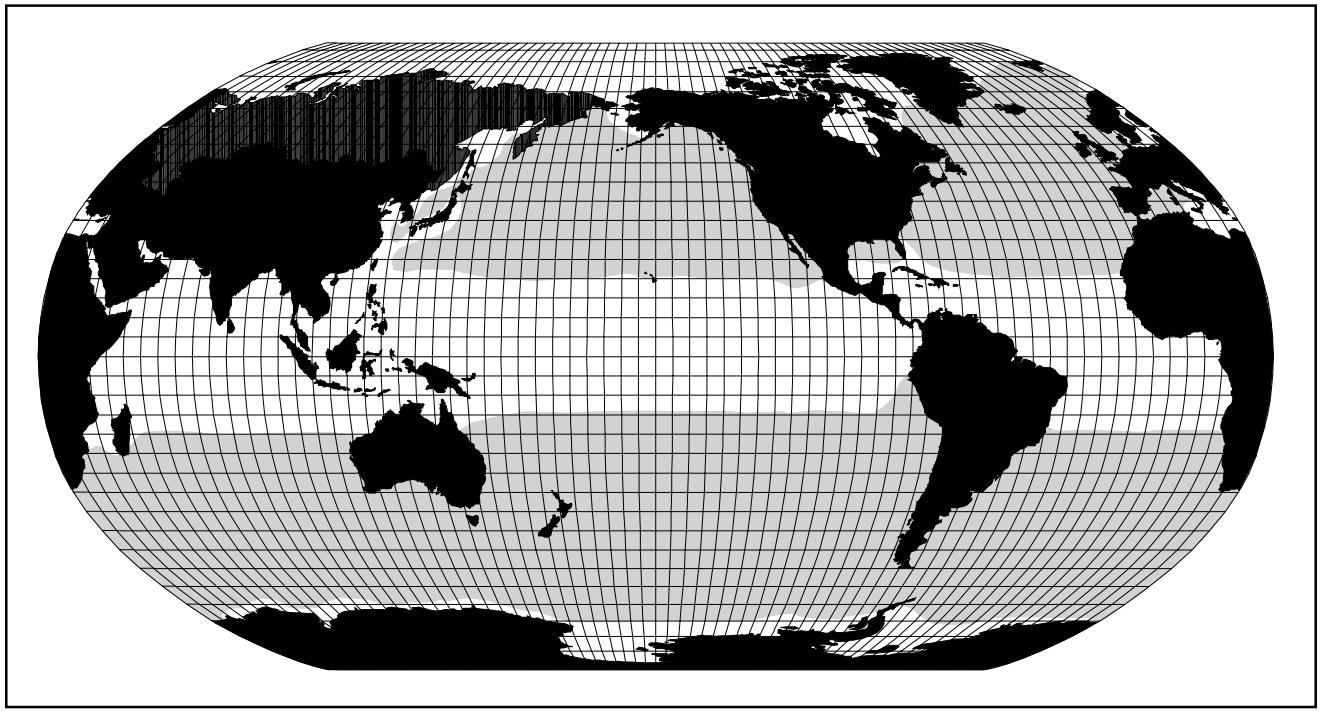

Figure 27.—Worldwide fin whale distribution. Adapted from Mizroch et al. (1984b).

A fin whale breaking the surface. Note the white coloration on the lower lip. S. Kraus, NMML Collection.

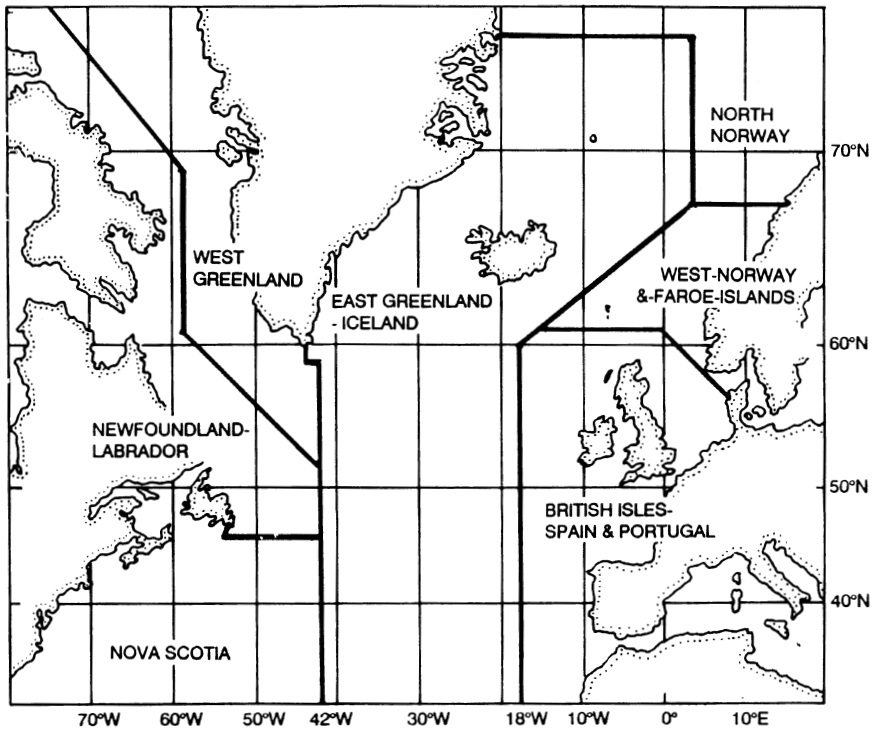


Figure 28.—North Atlantic fin whale stock boundaries recognized by the IWC (Donovan, 1991).

1) North Norway,
2) West Norway-Faroe Islands,
3) British Isles-Spain and Portugal,
4) East Greenland-Iceland,
5) West Greenland,
6) Newfoundland-Labrador, and
7) Nova Scotia.

In 1991, during the Special Meeting on the Comprehensive Assessment of North Atlantic Fin Whales, the IWC's Scientific Committee adopted alternative stock boundaries, which relate to historic catch areas and may be useful for assessing population abundance (IWC, 1992b; Butterworth and Punt, 1992). However, these suggested boundaries were not considered representative of biological stocks by the Scientific Committee (IWC, 1992b).

Underwater listening systems (part of the IUSS) have demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark, 1995). They are acoustically detected year-round in the Norwegian Sea, and vocalizations show a sea-

sonal shift in which whales move southward during autumn and northward during spring in this region. The IUSS tracked fin whales during seasonal migrations along both the western and eastern Atlantic. The autumn southward migration pattern in the western North Atlantic was from Newfoundland-Labrador, past Bermuda, and into the West Indies, while in the eastern North Atlantic, the pattern was from the British Isles to the coasts of Spain and Gibraltar (Fig. 6, 7) (Clark, 1995).

In U.S. waters of the North Atlantic, the NMFS has recently designated one stock of fin whale (Waring et al., 1998). The fin whale is common from Cape Hatteras northward (Fig. 6), where the species accounted for 46% of all large whales and 24% of all cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia during 1978–82 aerial surveys (Waring et al., 1998). The single most important area for this species appeared to be from the Great South Channel, along the 50 m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffreys Ledge (Hain et al., 1992). Fin whales in this region are the dominant cetacean species and therefore most likely have the largest impact on the ecosystem of any cetacean (Hain et al., 1992).

Photoidentification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years (49%) and between years (45%) (Seipt et al., 1990). This apparent site-fidelity may be similar to matrilineally directed site-fidelity in humpback whales (Seipt et al., 1990; Clapham and Seipt, 1991; Agler et al., 1993). Evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Neonate strandings between October and January along the U.S. mid Atlantic coast suggest the possibility of an offshore calving area (Hain et al., 1992).

### Southern Hemisphere

The IWC has divided the Southern Oceans into six baleen whale stock areas (Fig. 9) (Donovan, 1991). These areas may loosely correspond to fin whale stocks, but there is still insufficient distributional data on where these whales breed to validate this designation (IWC, 1992b).

## Current and Historical Abundance

### North Pacific

The most current (1991) population estimate for the entire North Pacific is between 14,620 and 18,630 based on history of catches and trends in CPUE[22] (Braham[3]). Prior to exploitation, there were an estimated 42,000–45,000 fin whales in the entire North Pacific (Ohsumi and Wada, 1974). In the early 1970's, this entire North Pacific population had been reduced to between 13,620 and 18,630 fin whales (Ohsumi and Wada, 1974).

The most recent data from 1991, 1993, and 1996 line-transect surveys of waters off California, Washington, and Oregon yielded an estimated current population abundance of 1,236 (CV = 0.20) fin whales (Barlow[74]). In Alaska, a survey in August 1994, covering 2,050 n.mi of track-line south of the Aleutian Islands, reported only four fin whale groups in this area (Forney and Brownell[68]). No abundance estimates could be calculated for Alaska waters from these sparse data. Also, there is no current abundance estimate available for Hawaiian waters. During the early 1970's, an estimated 8,520–10,970 fin whales occured in the eastern half of the North Pacific (Braham[3]).

If the estimates from the 1970's and 1991 (Ohsumi and Wada, 1974; Braham[3]) are accurate, no increase in fin whale numbers has occurred in the past 20 years despite an IWC ban on whaling in the North Pacific.

### North Atlantic

There is no current estimate for the entire North Atlantic, but each IWC stock area, with the exception of North Norway, has a tentative estimate (Table 13). In the years before exploitation, there were an estimated 30,000-50,000 whales in the entire North Atlantic, and in the decade 1960–70, this population was estimated to number approximately 31,320 whales (Sergeant, 1977).

The most current (1991) population estimate for the western North Atlantic is between 3,590 and 6,300 fin whales based on the catch history and trends in CPUE[22] (Braham[3]). Waring et al. (1998) considered 1,700 (CV = 0.59) fin whales to be the minimum population estimate ($N_{min}$) for an area from the northern Gulf of Maine to the lower Bay of Fundy (Nova Scotia stock) based on line-transect surveys in July through September 1991–92. For the British Isles/Spain and Portugal stock, Braham[3] provided in 1991 an initial, preexploitation population estimate of 10,500 (95% C.I. 9,600–11,400) fin whales.

### Southern Hemisphere

In the Southern Oceans, the most current (1979) population estimate is 85,200 (no CV) fin whales based on the history of catches and trends in CPUE[22] (IWC, 1979). In addition, 15,178 whales (no CV given and uncorrected for probability of sighting) were estimated to occur within surveyed areas south of lat. 30°S by combining data from JSV and IWC/IDCR 1978–88 ship-based surveys (IWC, 1996a). Prior to commercial exploitation these southern stocks were estimated to contain 400,000 fin whales (IWC, 1979).

## Historic Exploitation Patterns

As early as the mid-17th century, the Japanese were capturing fin, blue, and other large whales using a fairly primitive open-water netting technique (Tønnessen and Johnsen, 1982; Cherfas, 1989). In 1864, explosive harpoons and steam-powered catcher boats were introduced in Norway, allowing the large-scale exploitation of previously unobtainable whale species. The North Pacific and Antarctic whaling operations soon added this modern equipment to their arsenal (Tønnessen and Johnsen, 1982). After blue whales were depleted in most areas, the smaller fin whale became the focus of operations. Worldwide, fin whales were severely depleted by commercial whaling activities; over 700,000 were landed in the 20th century (Cherfas, 1989).

### North Pacific

In the early Japanese nearshore net fisheries, 480 fin whales were taken from the mid 1600's to 1913 (Omura, 1986). Between 1914 and 1975, over 26,040 fin whales were caught through-

**Table 13.—Current abundance estimates of North Atlantic fin whale stocks (N.e. = no published estimate; no data for North Norway stock).**

| IWC stock designation | Abundance estimate | Coefficient of variation | 95% C.I. | Source[1] |
|---|---|---|---|---|
| Nova Scotia Stock (U.S. territory): | | | | |
| Cape Hatteras, NC to Nova Scotia | 4,680 (spring & summer) | 0.23 | N.e. | CeTAP[70] |
| Cape Hatteras, NC to Nova Scotia | 194 (summer) | 0.18 | N.e. | Anonymous[7] |
| Cape Hatteras, NC to Nova Scotia | 529 (summer) | 0.19 | N.e. | Anonymous[7] |
| Cape Hatteras, NC to Georges Bank | 35 (summer) | 0.56 | N.e. | Waring et al., 1992 |
| Northern Gulf of Maine and Bay of Fundy | 2,700 (summer) | 0.59 | N.e. | Waring et al., 1998 |
| Newfoundland/Labrador Stock[2] | 13,253 | 1.42 | N.e. | IWC, 1992c |
| West Greenland Stock[3] | 178 | N.e. | 26–382 | Larsen, 1995 |
| East Greenland/Iceland Stock | 11,563 | 0.261 | N.e. | Gunnlaugsson and Sigurjónsson, 1990 |
| British Isles/Spain and Portugal Stock[4] | 17,355 | 0.266 | 10,400–28,900 | Buckland et al., 1992 |
| British Isles/Spain and Portugal Stock[4] | 7,507 | 0.150 | 5,600–10,100 | Goujon et al., 1995 |
| British Isles/Spain and Portugal Stock | 4,485 | N.e. | 3,369–5,600 | Braham[3] |

[1] Source footnote numbers refer to text footnote numbers.

[2] From 1965 to 1972 mark-recapture analyses.

[3] Excludes areas of high density from previous surveys.

[4] The 17,355 estimate covered 415,290 n.mi of trackline; the 7,507 estimate covered 204,929 n.mi of trackline.

out the North Pacific (Braham[3]). The Japanese fishery for fin whales peaked in 1914 when 1,040 whales were captured, and thereafter declined to between 300 and 400 whales per year until World War II. After World War II, the fin whale fishery was never as successful due to the scarcity of animals, and in 1975 the IWC banned fin whale hunting in the western North Pacific.

Along the west coast of North America, some fin whales were taken off California, British Columbia, and Alaska (Fig. 29), but this hunt ceased by 1972. In the rest of the North Pacific and the Bering Sea, catches dropped after the mid 1960's. The IWC issued a ban on commercial whaling for fin whales throughout the North Pacific in 1976.

## North Atlantic

Over 48,000 whales were taken throughout the North Atlantic between 1860 and 1970 (Braham[3]). Fisheries existed off Newfoundland, Nova Scotia, Norway, Iceland, the Faeroe Islands, Svalbard (Spitsbergen), the islands off the British coasts, Spain, and Portugal (Fig. 6, 7, 18). These whales were rarely taken in U.S. waters, except when they ventured near the shores of Provincetown, Mass., during the late 1800's (Clark, 1887; True, 1904).

The fin whale fishery off Spain and Portugal began in 1921, but it took only 7 years for the local stocks to be depleted to the point of being economically unsuitable for further exploitation. Still, fin whaling resumed in the 1950's off northwest Spain where, from 1954 to 1987, a few hundred fin whales were caught each year (Aguilar and Lens, 1981; Sanpera and Aguilar[82]).

## Southern Hemisphere

From 1904 to 1975, there were 703,693 fin whales taken in Antarctic whaling operations (IWC, 1990). Whaling in the Southern Oceans originally targeted humpback whales, but by 1913 this target species became rare, and the catch of fin and blue whales began to increase (Mizroch et al., 1984b). From 1911 to 1924, there were 2,000–5,000 fin whales taken per year. After the introduction of factory whaling ships in 1925, the number of whales taken per year increased substantially. From 1931 to 1972, approximately 511,574 fin whales were caught (Kawamura, 1994). In 1937 alone, over 28,000 fin whales were taken. From 1953 to 1961, the number of fin whales taken per year continued to average around 25,000. In 1962, sei whale catches began to increase as fin whales became scarce. By 1974, less than 1,000 fin whales were being caught per year. The IWC prohibited the taking of fin whales from the Southern Hemisphere in 1976.

Recently released Soviet whaling records indicate a discrepancy between reported and actual fin whale catch numbers by the U.S.S.R. in southern waters between 1947 and 1980 (Zemsky et al., 1995). The U.S.S.R. previously reported 52,931 whales caught, whereas the new data indicates that only 41,984 were taken. One reason for this discrepancy may lie in the mistaken identification of sei whales as fin whales in the original reporting.

## Current Exploitation

From 1988 to 1995, there have been 239 reported kills of fin whales from the North Atlantic (Table 10). There is currently a "subsistence"[34] take of fin whales from the West Greenland stock. The IWC set a catch limit of 19 whales for the years 1995, 1996, and 1997 in West Greenland. All other fin whale stocks had a zero catch limit for those same years (IWC, 1995b). However, Iceland (East Greenland/Iceland stock) reported a catch of 136 fin whales in the 1988/89–1989/90 seasons, but has since ceased reporting fin whale kills to the IWC. Butterworth and Punt (1992) have suggested that a catch of 100 whales per year from this East Greenland/Iceland stock would be a sustainable mortality level.

[82] Sanpera, C., and A. Aguilar. 1984. Historical review of catch statistics in Atlantic waters off the Iberian Peninsula, 23 p. Unpubl. doc. SC/36/014 submitted to Rep. Int. Whal. Comm.

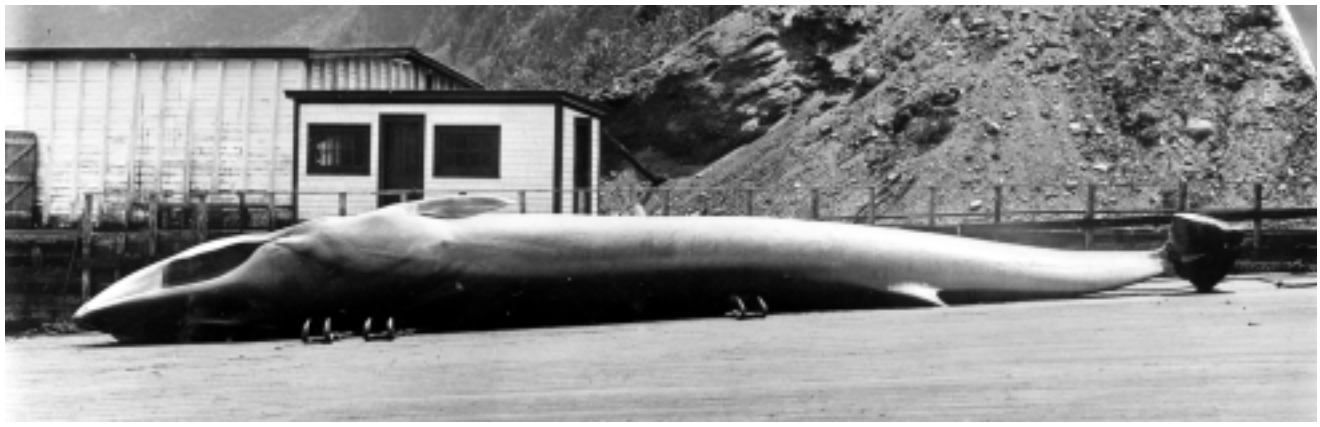

Figure 29.—Fin whale on flensing platform. Note the bicolored baleen plates. University of Washington Special Collections, Lagen Collection, negative UW1611.

## Life History and Ecology

### Feeding

Fin whales spend the summer feeding in the relatively high latitudes of both hemispheres, particularly along the cold eastern boundary currents in the North Pacific and North Atlantic Oceans and in Antarctic waters of the Southern Hemisphere. They are most abundant in offshore waters where their primary prey (e.g. euphausiids) is concentrated in dense shoals.

Fin whales may have a significant impact on marine ecosystems. As an example, the total annual (spring and summer) prey consumption by fin whales along the northeast U.S. continental shelf has been estimated at 664,000 tons per year (Hain et al., 1992). By biomass, fin whales in this area probably consume more food than any other cetacean species. It is assumed that fin whales undergo a partial or complete fast while traveling to lower latitudes in the fall and throughout the winter (Mizroch et al., 1984b).

The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally abundant (IWC, 1992a). For instance, in the Northern Hemisphere they consume schooling fishes, such as capelin, *Mallotus villosus;* anchovies, *Engraulis mordax*; herring, *Clupea harengus;* and sandlance, *Ammodytes* spp. (Mitchell, 1975a; Overholtz and Nicolas, 1979; Kawamura, 1982; CeTAP[70]). Thus, they may be less prey selective than blue, humpback, and right whales. However, fin whales do depend to a large extent on the small euphausiids and other zooplankton species. In the Antarctic, they feed on krill, *Euphausia superba*, which occurs in dense near-surface schools (Nemoto, 1959). In the North Pacific, *E. pacifica*, *Thysanoessa inermis*, *T. longipes*, and *T. spinifera* are the primary prey items. In the North Atlantic, *Meganyctiphanes norvegica* and *T. inermis* are consumed (Nemoto,1959).

There is some speculation, because of the sharing of the Antarctic krill resource between both whale and nonwhale predators, that interspecific competition may be a critical factor in the biology of Southern Hemisphere fin whales (IWC, 1992a). However, there is no direct information on how such ecosystem level interactions may or may not affect the status of baleen whales (Kawamura, 1994; Clapham and Brownell, 1996; Clapham and Brownell[6]). Murphy et al. (1988) and Fraser et al. (1992) suggest that competition among whales and other small krill predators in the Antarctic ecosystem is relatively low.

### Reproduction

Age at sexual maturity for both sexes ranges from 5 to 15 years (Lockyer, 1972). The average length at sexual maturity for both males and females is approximately 17.2 m (Mitchell, 1974a; Lockyer and Brown, 1979; Ratnaswamy and Winn, 1993). Conception occurs during a 5-month winter period in either hemisphere. After a 12-month gestation period, a single 6 m calf is born (Mizroch et al., 1984b). Between 6 and 11 months after birth, and at a length of 12 m, the immature fin whale is weaned (Best, 1966; Gambell, 1985). The mean calving interval for fin whales is 2.7 years, with a range of between 2 and 3 years (Agler et al., 1993).

### Natural Mortality

The causes of natural mortality in fin whales are poorly understood. Despite harboring many endoparasites, it is only the giant nematode, *Crassicauda boopis*, that appears to be pathogenic (Lambertsen, 1986; 1992). The inflammation of the renal arteries and potential kidney failure, which infestations of *C. boopis* cause, may be a factor in limiting the recovery of some fin whale stocks (Lambertsen, 1992).

Presumably killer whales rarely prey on fin whales. If such attacks do occur, they likely go undetected by humans, thus accounting for the scarcity of information. Immature, ill, or very old individuals may be subject to mortality or serious injury from either killer whale or shark attacks under certain circumstances.

Estimated annual rates of natural mortality are higher in mature females than mature males (Aguilar and Lockyer,

1987; Lockyer and Sigurjónsson[83]). Reasons for this are speculative, but may be due to reproductive stresses (Aguilar and Lockyer, 1987). The generally accepted natural mortality rate for adult fin whales is 4%, with a range of 4–6% (Clark, 1982; de la Mare, 1985). This rate may be higher in immature individuals of both sexes.

## Human-related Mortality

### *Fisheries Interactions*

There are no reports of fisheries-related fin whale mortality in the North Pacific (Hill et al., 1997). However, Barlow et al. (1997) noted that a conflict may exist in the offshore drift gillnet fishery in California and Mexico. Serious injury or mortality caused by entanglement in fishing gear may go undetected if fin whales swim away carrying portions of the gear or if entanglements occur far from shore. However, fishermen report that large blue and fin whales usually break through nets without entangling and with very little damage to the net (Barlow et al., 1997).

In U.S. North Atlantic waters, there were no reported mortalities from fisheries activities from 1989 to 1993, but an entanglement database maintained by the NMFS Northeast Regional Office from 1975 to 1992 includes nine occasions of fishing gear entanglement. Two of these entanglements resulted in known death to the whales, five of the whales were recorded trailing fishing line of an unspecified source, and three were entangled in lobster-pot line (Blaylock et al., 1995). In a review of 1992–96 data from this same NMFS database, an additional three whales had net and rope marks or had line wrapped around mouth and tail, suggesting fishery interactions (Waring et al., 1998). The total mortality and serious injury from North Atlantic fisheries-related incidents is considered biologically insignificant with regard to their estimated PBR level[37] (3.4 whales per year, Waring et al., 1998), but the full range of fisheries that may interact with fin whales have not been thoroughly investigated (Blaylock et al.,1995).

One concern is the potential impact of overexploitation of fish stocks by commercial fishery operations in the North Atlantic. Fin whales are an integral part of the North Atlantic ecosystem (Hain et al., 1992), and several fish species taken in commercial fisheries are also fin whale prey (e.g. herring, mackerel, etc.). Conversely, fin whales were implicated in the decline of herring stocks on Georges Bank in the middle and late 1970's (Sissenwine et al., 1984).

### *Vessel Collisions*

It is possible that ship strikes affect all fin whale stocks, but because of their pelagic nature, they go unreported because injured or killed animals do not strand. In U.S. waters of the North Pacific, one death due to ship collision was reported in 1991 (Barlow et al., 1997). In U.S. waters of the North Atlantic, there are nine records of ship collisions, boat strikes, or propeller scars between 1980 and 1994 (Blaylock et al., 1995) and four such records between 1991 and 1995 (Waring et al., 1998). In 1996, one anecdotal incident was reported from the southeastern United States of a whale being hit at sea by a container ship and carried into harbor on the ship's bow (Kreuger, 1996).

### *Noise Disturbance*

Studies have shown that fin whales respond to noise created by approaching vessel traffic in a variety of ways, depending on the behavior of the animals at the time of approach and the speed and direction of the approaching vessel. Fin whales involved in feeding react less rapidly and with less obvious avoidance maneuvers than those not involved in feeding (Richardson et al., 1995). In the St. Lawrence River estuary, summering fin whales encounter heavy recreational and commercial vessel traffic from several sources (i.e. industrial freight, whale watching). In the St. Lawrence River, the most marked reactions to these vessels occurred when boats made fast, erratic approaches or sudden changes in direction or speed (Edds and MacFarlane, 1987; MacFarlane[77]). In the waters off New England, an area in which there is a high level of whale watching and recreational boat activity, fin whales have been reported to reduce the duration of their surfacing and to reduce the number of blows per surfacing when whale-watching and other vessels are nearby (Stone et al., 1992; Young[84]). However, there is also evidence of habituation to increased vessel traffic by the fin whales in these waters (Watkins, 1986).

Noise disturbance from seismic exploration appears not to affect fin whales in detectable ways. Noise pulses from air guns off Oregon did not result in a change in fin whale vocalization rates when compared to periods prior to the onset of noise, suggesting they were undisturbed by the pulses (McDonald et al., 1993)

## Classification Status

The fin whale was listed as endangered under the ESA in 1973 and is protected under the MMPA. Endangered status is applied to all stocks in U.S. waters (Anonymous, 1994a). Internationally, the North Pacific, Nova Scotia, West Norway/Faeroe Islands, and Southern Hemisphere stocks are classified as "Protected Stocks" by the IWC. Under this designation, the IWC recognized that these whales are 10% or more below their maximum sustainable yield (MSY) levels, and therefore commercial whaling is prohibited (IWC, 1995b). The East Greenland/Iceland stock is classified as a "Sustained Management Stock" (SMS) by the IWC. This SMS designation indicates these whales are not more than 10% below and not more than 20% above their MSY levels. Whaling is permitted under this classification under advice of the Scientific Committee and in the absence of a moratorium on whaling (IWC, 1995b). The remaining stocks—West Greenland, Newfoundland/Labrador, British Isles/Spain and Portugal,

[83] Lockyer, C., and J. Sigurjónsson. 1992. Author's summary of SC/F91/F8: The Icelandic fin whale, (*Balaenoptera physalus*): biological parameters and their trends over time. Annex F. Rep. Int. Whal. Comm. 42:617-618.

[84] Young, N. M. 1989. Dive and ventilation patterns correlated to behavior of fin whales, *Balaenoptera physalus*, in Cape Cod and Massachusetts Bays (Abstr.). *In* Proceedings of the Eighth Biennial Conference on the Biology Marine Mammal, Dec. 1989, Pacific Grove, Calif.

**Table 14.—Factors possibly influencing the recovery of North Atlantic fin whale stocks under the ESA (1973) §4(a)(1), 1992 Amend. (Southern Hemisphere data are not available).**

| Factor | North Pacific | Western North Atlantic[1] | Eastern North Atlantic[2] |
|---|---|---|---|
| 1. Present or threatened destruction or modification of habitat | Offshore oil and gas development | Unknown | Unknown |
| 2. Overutilization for commercial, subsistence, recreational, scientific, or educational purposes | Unknown | Whale watching, scientific research, photography, and associated vessel traffic; West Greenland harvest | Icelandic harvest |
| 3. Disease or predation | Unknown | Giant nematode, *C. boopis*, infestations | Giant nematode, *C. boopis*, infestations |
| 4. Other natural or man-made factors | Vessel collisions | Vessel collisions; incidental take (e.g. gillnets, lobster pots, seines, fish weirs); human depletion of fish stocks | Unknown |

[1] Nova Scotia, Newfoundland/Labrador, West Greenland.
[2] East Greenland/Iceland, North Norway, British Isles/Spain and Portugal.

and North Norway—have no formal IWC classification; however, their catch limits will remain at zero as long as the current moratorium on commercial whaling is in place.

Since Braham's 1991 status review[3], there has been little additional information regarding fin whale abundance or stock identity. The factors possibly affecting the status of fin whales are summarized in Table 14. At this time, any reevaluation of fin whale status awaits the collection of more reliable information on stock structure, distribution and migration patterns, trends in abundance, causes of mortality, and factors influencing the recovery of fin whale stocks, as well as the development of objective delisting criteria. A joint Recovery Plan has been developed for both fin and sei whales (Anonymous[7]). This plan attempts to outline steps towards recovery of the fin whale through focused research priorities designed to increase our understanding of current threats, alleviate the possibility of future threats, and encourage international cooperation.