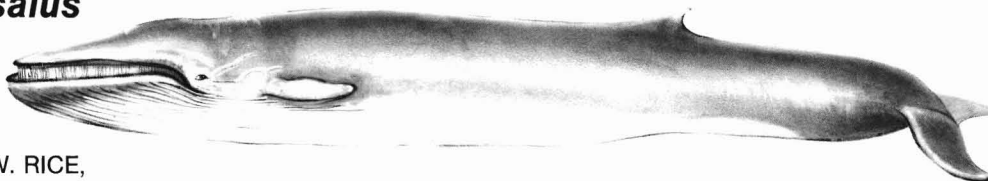


The Fin Whale, *Balaenoptera physalus*



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Introduction

The fin whale, *Balaenoptera physalus* (Linnaeus, 1758), is the second largest of the whales in the family Balaenopteridae, second only to the blue whale, *B. musculus*. Fin whales range in length up to 27 m (88 feet) (Mackintosh, 1942), and are generally gray above and white below. Like all balaenopterids, they have fringed baleen plates instead of teeth, and

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generally feed on swarms of small crustaceans or fish, which are captured in their baleen as water is filtered through. Fin whales do not exhibit as well defined a social or school structure as do toothed whales, and are usually found solitary or in small groups (Tomilin, 1957).

Distribution and Migration

The general migratory pattern of fin whales, like most balaenopterids, is a movement between poleward feeding areas in the summer months and lower latitudes in the winter months. Northern and Southern Hemisphere fin whale stocks are

thought to be reproductively isolated from one another, as their migration schedules are 6 months out of phase. A chart of the general distribution is given in Figure 1.

From observations made in the Antarctic feeding areas during the austral summer, it appears that there is a progression of arrivals by species, with fin whales arriving on the feeding grounds after the blue whales, but before the sei whales, *B. borealis*. Within the fin whale population, migration differs by sexual class, with pregnant females arriving early and leaving early (Mackintosh, 1965). There is some evidence that immature

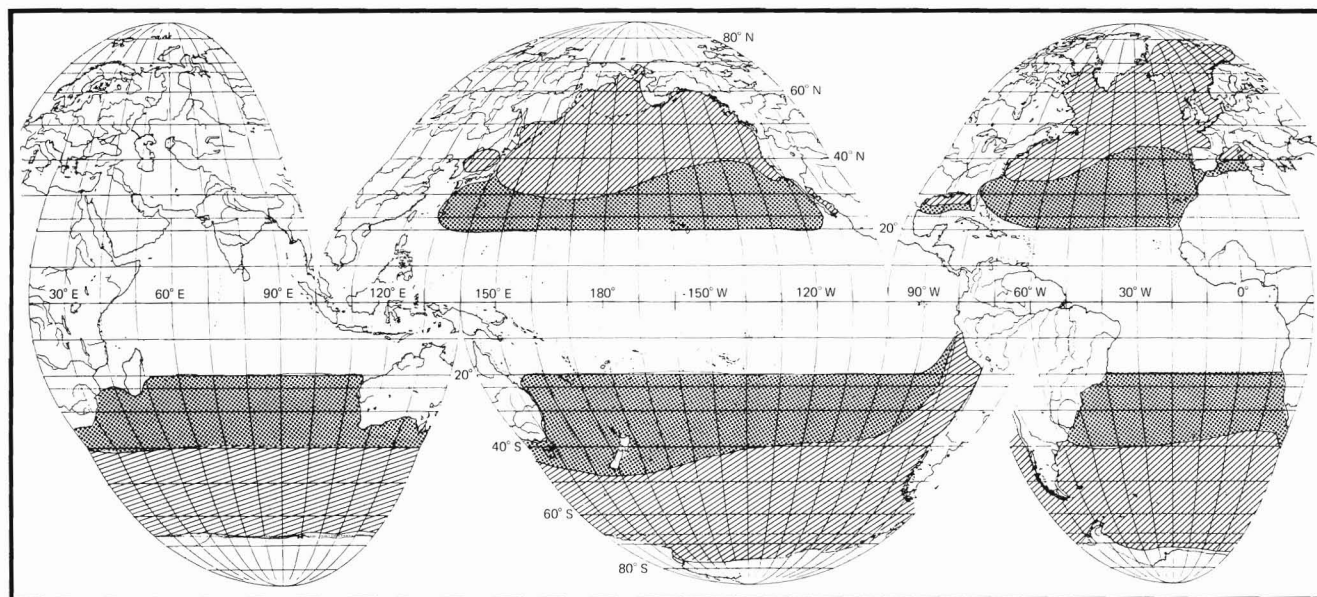


Figure 1. — Geographic distribution of the fin whale. Simple hatching indicates the summer feeding grounds. Stippling indicates distribution during autumn, winter, and spring; records are scarce during these seasons, and the distribution is to a large extent speculative.

whales do not migrate into as high a latitude as do the older whales (Mackintosh, 1965).

Catch statistics indicate that in the Antarctic, and presumably in the Northern Hemisphere as well (Cetacean and Turtle Assessment Program¹), fin whales are distributed over a wider range of latitudes than either the blue or sei whales. Fin whales can be found from the ice edge in Arctic and Antarctic waters to lower latitudes of around 20° N and S (Jonsgård, 1966a; Mackintosh, 1966; Leatherwood et al., 1982).

Because their migrations are conducted in the open ocean rather than along coastlines, it is difficult to track fin whales from summer feeding areas back to their winter grounds. Consequently, we have scant knowledge of the location of winter breeding grounds.

Stock Identity

Because hunting occurs in feeding rather than breeding areas, the stocks described herein refer to feeding aggregations rather than breeding groups. There is a chance that whales that summer on different feeding grounds intermingle on the same breeding grounds. However, given the history of exploitation in the North Atlantic (e.g., where the industry moved from area to area after successively overharvesting what appeared to be localized populations), there are indications that there is some separation between the stocks found on different feeding grounds (Mackintosh, 1965; Jonsgård, 1966b; Mitchell, 1974; Gaskin, 1982; Tønnessen and Johnsen, 1982).

North Pacific

Although the International Whaling Commission (IWC) considers the North Pacific as one management

¹Cetacean and Turtle Assessment Program. 1982. A characterization of marine mammals and turtles in the middle and North Atlantic areas of the U.S. outer continental shelf. Unpubl. manuscript, 450 p. plus appendices. Graduate School of Oceanography, Univ. R.I., Kingston, RI 02881. (Prep. for U.S. Dep. Inter. Bur. Land Manage. under Contract AA551-CT8-48.)

unit, Fujino (1960) describes several fin whale subpopulations in this region. According to histological and marking experiments, he has found an eastern and western group that may intermingle around the Aleutian Islands, as well as an isolated stock in the East China Sea. Fujino also surmises, based on marking studies, that the stock off British Columbia may be isolated as well. Mark recoveries indicate, however, that the animals that winter off southern California range from central California to the Gulf of Alaska in summer, and an isolated population may be resident in the Gulf of California. There may well be other subgroups, but there has been little research directed to this question.

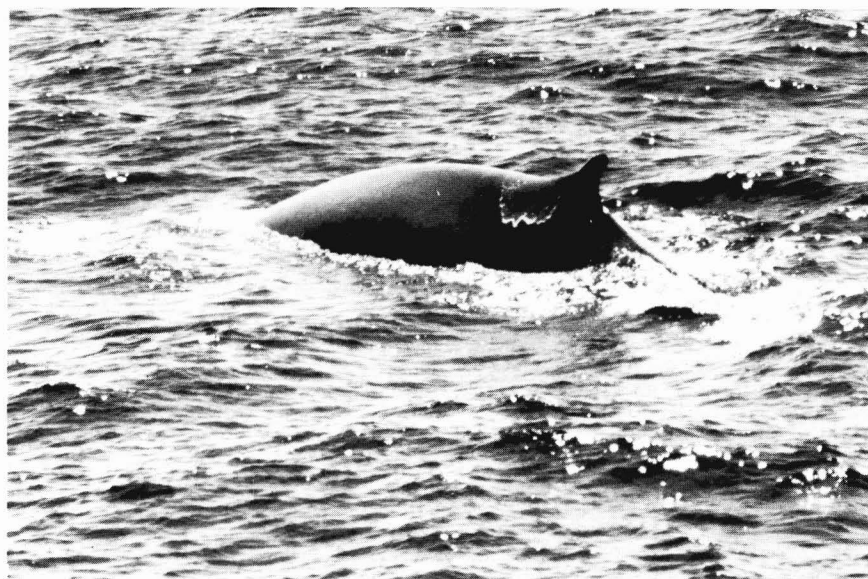
North Atlantic

The International Whaling Commission recognizes the following stocks in the North Atlantic: North Norway, West Norway and Faroe Islands, Spain—Portugal—British Isles, East Greenland—Iceland, West Greenland, Newfoundland—Labrador, and Nova Scotia. There is no evidence that indicates mixing among

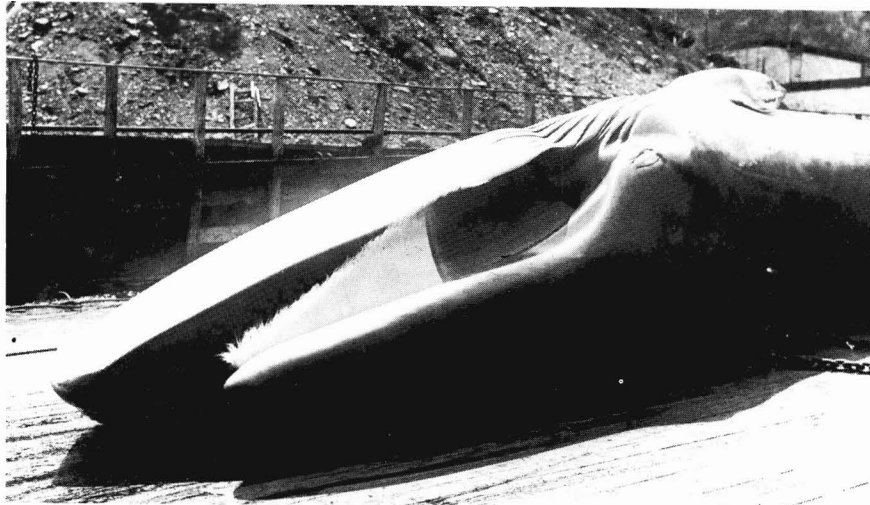
these stocks. For example, no whales marked off north Norway have been captured off Iceland (IWC, 1983). However, no electrophoretic (or other) studies have yet been presented that would indicate whether these stocks show genetic differences (Arnason, 1981). In addition, Schmidly (1981) speculates that there may be an isolated stock in the northern Gulf of Mexico.

Southern Hemisphere

The Antarctic has been divided by the IWC into six (formerly five) statistical areas. They are based (to some degree) on humpback whale, *Megaptera novaeangliae*, breeding and feeding concentrations (Mackintosh, 1942; 1966), but these areas also apply somewhat to fin whale populations (Brown, 1962). Since the Antarctic harvests (and hence most research) occurred on feeding grounds rather than breeding grounds, catch and mark-recapture data (Brown, 1962) tell us only of dispersal while feeding. Evidence indicates that fin (and blue) whales disperse more than humpback whales while feeding; consequently, different breeding groups are likely to overlap in the various



A fin whale, surfacing in the North Atlantic off Spain, reveals its prominent dorsal fin which gives the species its name. Photo by S. Mizroch.



Head of a fin whale (lower jaw uppermost). The characteristic white plates on the front half of the right baleen plate row are clearly visible. Source: Historical Photography Collection, University of Washington Libraries.

areas (Mackintosh, 1942, 1966; Brown, 1962). Breeding areas have not yet been identified, so it is not clear how closely the statistical areas relate to breeding groups. For management purposes, however, the IWC considers each statistical area to represent one stock unit.

Life History and Ecology

Feeding

During the summer, most fin whales inhabit high latitudes and the cold eastern boundary currents where food production is high. They range mostly offshore and tend to be nomadic. They feed primarily on species of euphausiids, or krill, that congregate in dense shoals near the surface—notably *Euphausia superba* in the Antarctic; *E. pacifica*, *Thysanoessa inermis*, *T. longipes*, *T. spinifera* in the North Pacific; and *Meganyctiphanes norvegica* and *T. inermis* in the North Atlantic (Nemoto, 1959). In the Northern Hemisphere, fin whales often supplement their diet with small schooling fishes such as capelin, *Mallotus villosus*; anchovies, *Engraulis mordax*; and herring, *Clupea harengus*, and may even feed exclusively on fish in some areas (Jonsgård, 1966b; Mitchell, 1975;

Kawamura, 1982).

In the autumn, fin whales migrate several thousand miles toward equatorial waters. They fast almost completely for several months during the winter, living off their fat stores.

Reproduction

The reproductive strategy of fin whales is closely integrated and synchronized with their annual feeding cycle. Their basic reproductive cycle is biennial, consisting of mating during the winter, birth of the large single precocial calf about a year later on the winter grounds, and weaning of the calf before the end of the following summer on the feeding grounds (Mackintosh and Wheeler, 1929; Laws, 1961).

Conception occurs over a 5-month period during the winter. Females are usually monestrous, but if they fail to conceive, they may, in rare cases, ovulate two or three times during one estrous cycle. A postpartum estrus is very rare. Mean length at birth is about 6 m (20 feet). Calves are weaned at an age of 7-11 months (Mackintosh and Wheeler, 1929; Best, 1966) when they have attained a mean body length of about 12 m (40 feet). Both male and female fin whales attain sexual maturity between 5 and 15 years

of age (Lockyer, 1972). Mature females bear a calf every 2 or 3 years.

Natural Mortality

Important natural mortality factors are unknown. The fin whale is relatively free of ectoparasites. Except for kidney worms, *Crassicauda* sp., the few endoparasitic helminths that infest the fin whale usually appear to be nonpathogenic. Predation on adult fin whales by killer whales, *Orcinus orca*, is rare but may occur more often in younger animals.

Natural mortality rates are difficult to estimate, but appear to be about 4 percent/year in adults and perhaps somewhat greater in immature animals (Allen, 1980).

Exploitation and Population Size

History of Exploitation

Since fin whales, like most other balaenopterids, are fast swimmers and sink when killed, they were difficult for most whalers to catch, until modern whaling techniques using the explosive harpoon and the steam powered catcher boat were introduced in Norway in 1864. However, the Japanese perfected a technique in the mid-17th century in which whales were netted, attached to a float, and then hauled to shore for processing. With this method they were able to catch a number of fin and sei whales, but on a much smaller scale than possible with modern techniques (Tønnessen and Johnsen, 1982).

North Pacific

Although small numbers of fin whales were taken by the Japanese from around the middle of the 17th century, large numbers were taken only after modern whaling was introduced to Japan at the start of the 20th century. Catches of fin whales off Japan peaked at 1,040 in 1914, and then continued at levels ranging from 300 to 400/year until World War II. After World War II, catches began to decline, and ended entirely in 1975 when the IWC prohibited the capture of fin whales in that area.

Annual catches in the North Pacific

Ocean and Bering Sea ranged from 1,000 to 1,500 from the mid-1950's to the mid-1960's, after which they declined sharply and ended entirely in 1976, when catches were prohibited.

Catches of fin whales off the west coast of North America occurred mostly around California, British Columbia, and Alaska. Until 1955, most whaling occurred off British Columbia, after which catches off California began to increase. All fin whale catches off the west coast of North America had stopped by 1972.

North Atlantic

Modern whaling began off northern Norway in the late 1860's and spread to Iceland, the Faroe Islands, Newfoundland, Svalbard (Spitsbergen), and islands off the British coasts. In the three northernmost areas and the Hebrides, the initial target species was the blue whale, but as blue whale stocks were locally depleted, fin whale catches began to increase. In the other areas, fin whales dominated from the start. Annual fin whale catches fluctuated from around 300 to 1,300 from 1910 to 1970. By then, most catches came from Iceland, Newfoundland, and Labrador. In 1921, fin and sperm, *Physeter macrocephalus*, whaling began off the coast of Spain and Portugal. However, early catches were excessive in this region, and by 1927 local stocks had been depleted to a point of commercial extinction. In the 1950's, fin whaling resumed off northwestern Spain. By 1973, catches off the Canadian coasts had stopped, and currently fin whales are taken only off east and west Greenland, Iceland, and Spain.

Southern Hemisphere

Modern whaling in the Southern Hemisphere began in 1904, targeting initially on the humpback whale. By 1913, however, catches of blue and fin whales had overtaken humpback whale catches. Annual catches of fin whales ranged from around 2,000 to 5,000 from 1911 through 1924, but increased substantially after 1925 due to the introduction of the floating fac-

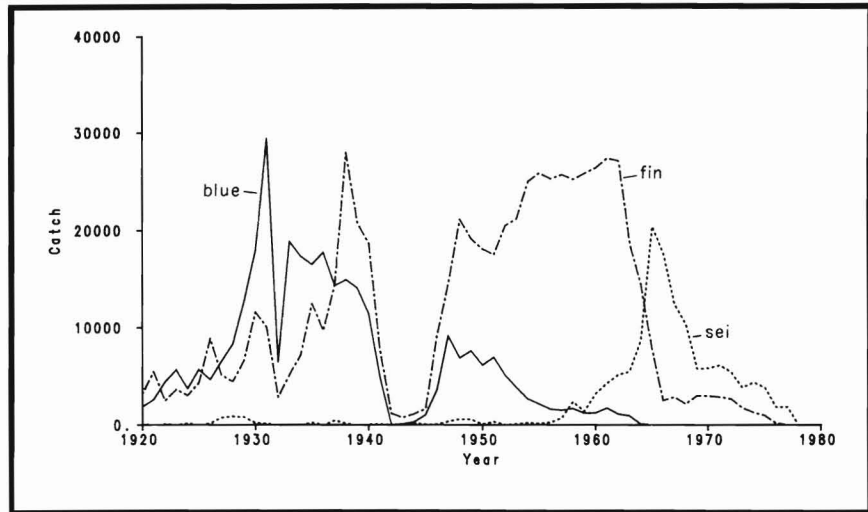


Figure 2.—Catch of fin, sei, and blue whales in the Antarctic, 1920-75 (from the Bureau of International Whaling Statistics).

tory ship. While blue whale catches declined in the late 1930's, fin whale catches rose to over 28,000 in 1937 (Fig. 2). As the whaling industry developed again after World War II, fin whale catches rose and averaged around 25,000/year from 1953 to 1961. By 1962, catches began to decline and the industry began concentrating on the sei whale. By 1974, less than 1,000 fin whales were caught, and by 1976 the IWC had prohibited the capture of fin whales in the Southern Hemisphere.

Current and Pre-exploitation Stock Sizes

North Pacific

The North Pacific fin whale population is estimated to have ranged from 42,000-45,000 before whaling began to 14,620-18,630 currently (Ohsumi and Wada, 1974).

North Atlantic

Rorvik and Jonsgård (1981) presented rough estimates of pre-exploitation and current population sizes of fin whales in the northeast Atlantic (Table 1). Mitchell (1974) presents some estimates of current stock sizes in the northwest Atlantic, ranging from around 3,590 to 6,300.

Southern Hemisphere

Estimates of current and pre-exploitation population sizes of fin whales by IWC statistical area in the Antarctic (Table 2) are from Chapman (1976) and the Report of the IWC Scientific Committee (IWC, 1979).

Table 1.—Pre-exploitation and current population sizes of fin whales in the northeast Atlantic.

Area	Population estimate	
	Pre-exploitation	Current
North Norway	Several thousand	?
Western Norway and Faroe Islands	> 2,700	Low hundreds
Spain, Portugal, and Scottish Islands	≥ 5,000	?
Denmark Strait	?	1,791-11,584

Table 2.—Estimates of pre-exploitation and current fin whale population sizes by IWC statistical area in the Antarctic.

Area	Population estimate	
	Pre-exploitation	Current
I (60°-119°W)	12,000	3,100
II (0°-59°W)	124,000	19,400
III (0°-69°E)	152,000	38,800
IV (70°-129°E)	60,000	8,400
V (130°E-170°W)	28,000	3,100
VI (120°-169°W)	24,000	12,400
Total	400,000	85,200

Management

Fin whales are currently taken only in the North Atlantic. A small aboriginal take is allowed in east Greenland, and the IWC has also set a quota for the west Greenland and Spain-Portugal-British Isles stocks. Research on stock estimation and biological parameters has continued on these and other North Atlantic stocks such as the Canadian east coast stock, which supported a fishery from 1965 to 1972.

Stocks of fin whales in the Southern Hemisphere and the North Pacific were classified as protected stocks in the mid-1970's. Additional information on these stocks has come mainly from sightings.

In the Southern Hemisphere and North Pacific, fin whale stocks were well below estimated pre-exploitation levels at the time fin whaling ceased. Recovery data for these stocks has been scarce since whaling ceased in the mid-1970's. What little sighting information is available has been difficult to interpret. These stocks probably remain at much less than half their pre-exploitation levels.

In the North Atlantic, pre-exploitation levels of fin whale stocks are poorly known. Most of the stocks experienced episodic catch histories, and only during the last 20 years have the catch histories been well documented and the biological and catch-effort data necessary for stock size estimation collected. Current stock size estimates are available for most of these stocks, although few of them are very reliable. Current research has concentrated on stock estimation and biology of the Cana-

dian east coast stocks, the Icelandic stock, the west Greenland stock, and Spain-Portugal-British Isles stock. A major problem, addressed by several researchers, is the degree of intermingling between the various North Atlantic stocks. Indeed, the question is open as to whether or not there is just one biological stock which occurs as a patchy continuum.

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