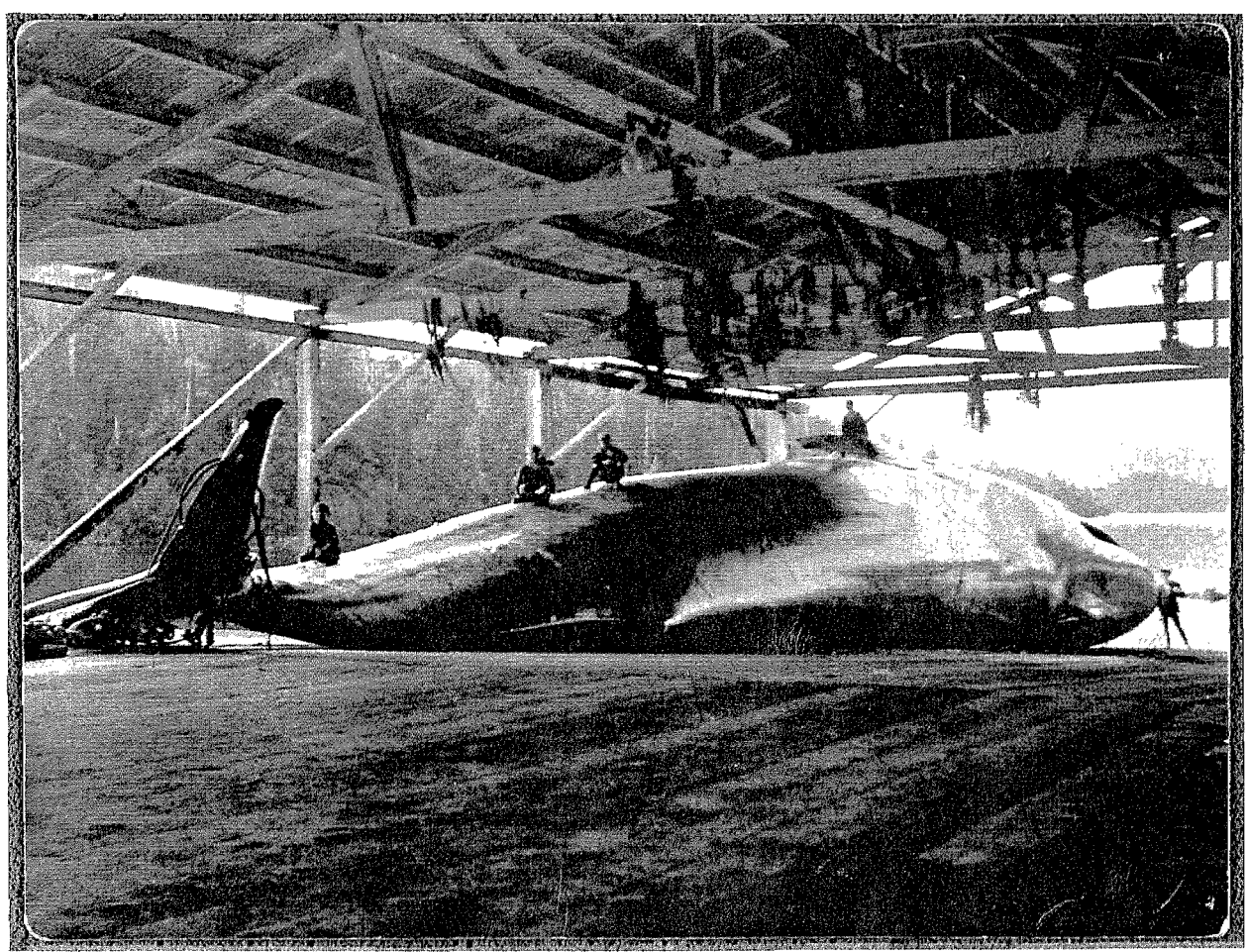


Golden Tord

THE HISTORICAL OCCURRENCE OF LARGE WHALES OFF THE QUEEN CHARLOTTE ISLANDS



Prepared for

South Moresby/Gwaii Haanas National Park Réserve,
Canadian Parks Service, P.O. Box 37,
Queen Charlotte City, B.C.
V0S 1S0

By

Linda Nichol
P.O. Box 98, Lantzville, B.C.
V0R 2H0

Kathy Heise
P.O. Box 1191, Nanaimo, B.C.
V9R 6E7

Vancouver Aquarium
P.O. Box 3232, Vancouver, B.C.
V6B 3X8

March 1992

Cover Photo: A blue whale on the slip at Rose Harbour. The whales were towed by heavy chain wrapped around their tails, and the tips of the flukes were removed to reduce "fish-tailing". The whale is ready for processing. Note the seaweed hanging to dry in the rafters of the shed.

Photograph courtesy of the British Columbia Provincial Archives.

TABLE OF CONTENTS

	List of Tables	i
	List of Figures	ii
	Acknowledgements	iv
1.0	Summary	1
2.0	Introduction	2
3.0	The Whales	3
3.1	Baleen Whales	3
3.2	Toothed Whales	7
3.3	Productivity and Whale Abundance	8
4.0	Historical Overview of Commercial Whaling in British Columbia	10
4.1	Whaling Regulations	21
5.0	Data Sources	23
6.0	Trends in the Commercial Catch	25
7.0	Whale Distribution and Natural History as Revealed Through Historical Records	33
7.1	Blue Whales	33
7.2	Fin Whales	40
7.3	Sei Whales	43
7.4	Humpback Whales	46
7.5	Sperm Whales	49
7.6	Right whales	53
7.7	Baird's Beaked Whales	55

TABLE OF CONTENTS Cont...

8.0	Present Status of Large Whales in the Queen Charlotte Islands	57
9.0	Conclusions	62
10.0	Literature Cited	63
11.0	Appendix 1: Description and Location of Data Sources	67

LIST OF TABLES

PAGE

- 29 Table 1. Annual catch of whales and whaling effort at Rose Harbour whaling station, Queen Charlotte Islands, 1910 to 1943.
- 30 Table 2. Annual catch of whales and whaling effort at Naden Harbour whaling station, Queen Charlotte Islands, 1911 to 1941.
- 31 Table 3. Annual catch of whales and whaling effort at Coal Harbour whaling station, Vancouver Island, 1948 to 1967.
- 35 Table 4. Mean body lengths of whales at Rose Harbour, 1924 to 1928. Only whales for which length and sex were recorded are included.
- 35 Table 5. Mean body lengths of whales at Naden Harbour, 1924 to 1927. Only whales for which length and sex were recorded are included.
- 36 Table 6. Mean body lengths of whales at Coal Harbour, 1948 to 1967. Only whales for which length and sex were recorded are included.
- 58 Table 7. Present and pre-exploitation estimates of large whale populations, worldwide and in the North Pacific. Percentages are the present day population estimates as a percentage of former abundance.

LIST OF FIGURES

PAGE

- 15 Figure 1. Map of the coast of British Columbia showing the location of all whaling stations and other geographical names mentioned in the text.
- 16 Figure 2. The gunner is in position, ready to fire the harpoon into a whale.
- 17 Figure 3. The Orion, first steam-powered chaser boat in British Columbia, and one of the first to work in the Queen Charlotte Islands.
- 18 Figure 4. The station at Rose Harbour.
- 19 Figure 5. The station at Naden Harbour.
- 20 Figure 6. The Rose harbour flensing crew posing in the jaws of a right whale.
- 24 Figure 7. Page from the 1926 Naden Harbour Weekly Catch Report.
- 27 Figure 8. Annual catch of fin whales, humpback whales and sperm whales at Rose Harbour whaling station, Queen Charlotte Islands, from 1910 to 1943.
- 28 Figure 9. Annual catch of fin whales, humpback whales and sperm whales at Naden Harbour whaling station, Queen Charlotte Islands, from 1911 to 1941.
- 32 Figure 10. Percentage of sexually immature versus sexually mature whales in the combined catch from Rose Harbour and Naden Harbour whaling stations, Queen Charlotte Islands, 1924 to 1928.
- 38 Figure 11. Locations of catches of 48 blue whales caught by Rose Harbour whalers, 1924-1928 (triangles), 25 caught by Naden Harbour whalers, 1924-1927 (squares) and 82 caught by Coal Harbour whalers, 1948-1967 (crosses).

LIST OF FIGURES, cont...

PAGE

- 39 Figure 12. Stomach contents of baleen whales processed at Coal Harbour whaling station, Vancouver Island between 1962 and 1967. Percentages are calculated using only whales whose stomachs contained prey.
- 42 Figure 13. Locations of catches of 330 fin whales caught by Rose Harbour whalers, 1924-1928, 153 caught by Naden Harbour whalers, 1924-1927, and 525 caught by Coal Harbour whalers, 1948-1967.
- 45 Figure 14. Locations of catches of 73 sei whales caught by Rose Harbour whalers, 1924-1928, 5 caught by Naden Harbour whalers, 1924-1927, and 291 caught by Coal Harbour whalers, 1948-1967.
- 48 Figure 15. Locations of catches of 76 humpback whales caught by Rose Harbour whalers, 1924-1928, 16 caught by Naden Harbour whalers, 1924-1927, and 117 caught by Coal Harbour whalers, 1948-1967.
- 51 Figure 16. Locations of catches of 244 sperm whales caught by Rose Harbour whalers, 1924-1928, 54 caught by Naden Harbour whalers, 1924-1927, and 359 caught by Coal Harbour whalers, 1948-1967.
- 52 Figure 17. Stomach contents of sperm whales processed at Coal Harbour whaling station, Vancouver Island between 1962 and 1967.
- 54 Figure 18. Locations of catches of 3 right whales caught by Naden Harbour whalers in 1924.
- 56 Figure 19. Locations of catches of 3 Baird's beaked whales caught by Rose Harbour whalers, 1924-1928, and 5 caught by Coal Harbour whalers, 1948-1967.

ACKNOWLEDGEMENTS

This report has brought together data from numerous unpublished sources and we would like to thank a number of people and organizations for their contributions and assistance. For access to historical whaling records, we would like to thank the following: ESL Environmental Sciences Ltd.; T. Smith and G. Ellis of the Pacific Biological Station; British Columbia Provincial Archives; Suzzallo Library Manuscripts Division at the University of Washington; the International Whaling Commission, and J. Eilerston of Coal Harbour, B.C..

For current whale sightings we thank: J. Ford and the observers who donated marine mammal sightings to the Vancouver Aquarium; the weather-observers at Cape St. James; and the crews of the *Darwin Sound* and *Island Roamer* for access to their logbooks. We would also like to thank the following institutions for permission to use and reproduce photographs of their collections: Suzzallo Library, Manuscripts Division; University of Washington; British Columbia Provincial Archives; Queen Charlotte Island Museum and the Vancouver Maritime Museum.

We also thank Lance Barrett-Lennard for his comments on this report, Peter Wainwright and Doug Ravenstein of LGL Environmental Research Associates for printing the maps and John Ford for his advice and support throughout this project.

1.0 SUMMARY

The history of commercial whaling in British Columbia is not widely known, despite the fact that six whaling stations operated on the coast between 1905 and 1967. Two of these stations were located in the Queen Charlotte Islands, one at Rose Harbour and the other at Naden Harbour. Whalers from a third whaling station located at Coal Harbour, on Vancouver Island, also hunted whales in the vicinity of the islands.

Based on the analysis of catch records, over 9,400 large whales were taken from the waters around the Queen Charlotte Islands. The catch included blue whales, fin whales, sei whales, humpback whales, sperm whales and right whales. In the early years of the century, primarily humpback whales were taken. In later years, fin whales and sperm whales dominated the catch. Sperm whales were most abundant off the southern end of the islands. Fin whales were found throughout the area. Data on the lengths of whales caught between 1924 and 1928 suggests that amongst the baleen whales, a high proportion of the animals captured were immature, and that large mature animals were hard to find.

Commercial whaling in British Columbia ended in 1967, with the closing of the Coal Harbour station. Current sighting information from the Queen Charlotte Islands indicates that large whales continue to utilize the area. Systematic surveys and a more comprehensive sighting network would be required to determine present-day abundance.

2.0 INTRODUCTION

The Queen Charlotte Islands are considered by many to be one of the last undisturbed wilderness areas in the world, yet the waters in the vicinity of the islands were the site of a shore-based commercial whaling industry for most of this century. Even in the 18th and 19th centuries, whalers would come to hunt whales in the eastern north Pacific. They exploited the whales which travelled north in summer months, attracted to the productive waters of the Queen Charlotte Islands to feed. Such intensive hunting has reduced the large whale populations in the area, and some species, such as the right whale, have never recovered.

It has long been recognized that whaling catch records are a valuable source of information about historic whale populations (Kellogg 1931; Townsend 1935; Pike and MacAskie 1969). Recently there has been renewed interest in extracting biological information from whaling records to describe past populations of whales worldwide (see International Whaling Commission 1983, Special Issue 5;) and to compare past and present distribution patterns (Reeves, Leatherwood, Karl and Yohe 1985).

In the Queen Charlotte Islands, little is known of the past and present occurrence of most whale species that were hunted commercially. Whaling catch records are the only sources of data which can describe these historic whale populations. Catch records from whaling operations that occurred in the vicinity of the Queen Charlotte Islands from 1910 to 1967 are analyzed to describe the occurrence and biology of the whale species that were hunted. These results are presented in this report, along with an historical account of the whaling industry in British Columbia and, in particular, in the Queen Charlotte Islands. There is also a discussion of the present status of each large whale species in the area.

The study area covered in this report comprises all areas where whale chaser boats from the Queen Charlotte Islands operated. Based on their movements, the study area extends south of Cape St. James to 50°45' N, which is near the northern tip of Vancouver Island. To the north, the area extends to the northern side of Dixon Entrance. Hecate Strait and the adjacent mainland waterways define the eastern limits, and the study area extends west to approximately 55 nm (100 km) offshore of the Queen Charlotte Islands.

3.0 THE WHALES

The seven species of whales which were harvested commercially in the waters of the Queen Charlottes include: the blue whale (*Balaenoptera musculus*); fin whale (*B. physalus*); sei whale (*B. borealis*); humpback whale (*Megaptera novaeangliae*); right whale (*Balaena glacialis*); sperm whale (*Physeter macrocephalus*) and Baird's beaked whale (*Berardius bairdii*). All are members of the order Cetacea. Although these are not the only species of whales that occur in the vicinity of the Queen Charlotte Islands, they represent the species which were harvested commercially from 1910-1967. By 1900, gray whales (*Eschrichtius robustus*) had already been hunted to near extinction (Rice, 1986a). Killer whales (*Orcinus orca*) were never harvested commercially. Minke whales, (*Balaenoptera acutorostrata*) which have been the target of intense whaling activity in areas such as the Antarctic and the western Pacific, were not hunted by shore-based whaling ships in British Columbia.

The following is a general account of the natural history of the whales which were found and harvested in the vicinity of the Queen Charlotte Islands. A brief discussion of biological productivity and its relationship to whale abundance concludes this section. For detailed information on the identification and biology of the large whales, the reader is referred to Hoyt (1984), Haley (1986), and Leatherwood and Reeves, (1983). Specific information gleaned from the whaling data will be discussed in section 6.0. Note that both imperial and metric measurements are used when discussing whale lengths as imperial measurements, although no longer standard, are the most compatible with the historical accounts.

3.1 BALEEN WHALES

Baleen whales are members of the suborder Mysticeti. The blue, fin, sei, and humpback whales are members of the family Balaenopteridae, commonly known as rorquals, and right whales are members of the Balaenidae. The mouths of mysticetes contain baleen, a material similar to human fingernails. This material is arranged in a series of plates, which are fringed along the inner edges. The fringes intertwine to form a coarse fibre-mat, and act as a strainer to trap prey items, such as copepods, euphausiids and small schooling fish.

Among the baleen whales, sexual size dimorphism exists, as mature females are larger than males. Their lengths are given here as background information for interpreting the changes in the catch over time which will be discussed in section 6.0.

Blue Whales

Blue whales are the largest mammals in the world. In the North Pacific population, physical maturity (maximum size) is attained between 79 and 85 ft (24.1-25.9 m) in length, although a 90 ft blue whale is reported in the catch from the Queen Charlotte Islands. In the Antarctic, blue whales have reportedly reached lengths of over 107 feet (32.6 m, in Small, 1971) although the largest documented length was 98 ft (29.9 m, in Leatherwood, Reeves, Perrin and Evans, 1982).

In all oceans, females are slightly larger than males. Sexual maturity is reached at 79 ft (24 m) in females and 74 ft (22.5 m) in males. Calves are born at 23 ft (7.0 m), after a gestation period of about 12 months, (Leatherwood and Reeves, 1983). They are nursed for 7 months, during which time the calves gain an average of 200 pounds (90 kg) per day (Small, 1971).

Blue whales are usually seen alone or in pairs, although aggregations of 50 to 60 animals have been recorded (Rice, 1986b). They appear to travel northward as far as the Gulf of Alaska and the Aleutians to feed in summer. In winter, blue whales travel south to breed and calve in tropical waters, however their movements do not appear to be consistent from year to year (Leatherwood et al., 1982)

Blue whales were too fast moving and powerful to be hunted by whalers in open boats in the nineteenth century. Even with the advent of modern whaling, blue whales were not always easy to capture. An old whaling log from the Akutan whaling station in Alaska described the harpooning of a blue whale which towed a steam-powered chaser boat at 4 mph, from 5 pm in the evening until 9 am the following morning. The ships engines ran in reverse at half speed throughout the entire time (in Henning, Loken, Olds and Morgan, 1978).

Fin Whales

Fin whales are the second largest species of whale, attaining maximum lengths of up to 79 ft (24.0 m) in the North Pacific (Leatherwood and Reeves, 1983). Females reach sexual maturity at 60 ft (18.3 m) and males at 58 ft (17.7 m). As with blue whales, calving and mating in fin whales occurs during winter months in low latitudes (Leatherwood and Reeves 1983; Pike 1956). The calves are born at 20 ft (6.1 m) after a gestation period of about 11 months. (Leatherwood and Reeves, 1983). Nursing lasts for approximately six months, and calves are

weaned at 36 to 40 ft (11.0-12.2 m, Leatherwood et al., 1982).

Even prior to commercial whaling activity in the 20th century, the fin whale may have been the most abundant baleen whale in the world's oceans (Evans, 1987). Fin whales typically travel alone, in small groups of two to three animals, and often in groups of 6 or 7 whales (Nemoto, 1959, Gaskin, 1982, Leatherwood et al., 1982). However, aggregations of up to 70 whales have been observed (Henning et al., 1978). Fin whales travel northward in summer to feed, as far as the Bering Sea, and travel south in the winter to breed, in tropical and sub-tropical waters.

Sei Whales

Sei whales attain maximum lengths of up to 61 ft (18.6 m) in the North Pacific, although sexual maturity occurs at 42-45 ft (12.7-13.7 m) for females and 39-43 ft (12.0-13.1 m) for males (Horwood, 1987; Leatherwood and Reeves, 1983). Male sei whales reach physical maturity at 56 ft (17.1 m) while females are larger, reaching full size at 61 ft (18.6 m).

Sei whales are most commonly found alone or in groups of 2-5 whales (Leatherwood et al., 1982) although larger aggregations of up to 30 animals are not uncommon on the feeding grounds (Mitchell, 1986). Sei whales are primarily pelagic and temperate in distribution, as they remain south of the Aleutians in summer, and north of 35 degrees in winter (Horwood, 1987). They are regarded as the fastest swimming of the great whales, able to attain burst speeds of over 20 knots (Leatherwood et al., 1982).

Calves are born at 14.8 ft (4.5 m) after a 12 month gestation period (Leatherwood and Reeves, 1983) and are weaned at seven to nine months, having attained lengths of about 30 ft (9 m, Horwood, 1987; Leatherwood et al., 1982).

Humpback Whales

Humpback whales are the most migratory of the whale species discussed in this report. They travel south to calving and breeding grounds in Mexico and Hawaii in winter, and north to feeding areas as far as the Aleutians in summer (Leatherwood et al., 1982). Group sizes average one to three animals, although they can be gregarious, and have been observed in aggregations of more than 20 animals.

Female humpback whales reach a maximum length of just over 52 ft (16 m) while males are full size at 49 ft (15 m, Leatherwood and Reeves, 1983). Sexual maturity occurs at 37-41 ft (11.4-12.4 m) in females and 36-39 ft (11-12 m) in males. Calves are born at 15 ft (4.5 m) after a gestation period of 12 months (Leatherwood and Reeves, 1983).

Humpback whales are unique amongst the baleen whales discussed here in that they vocalize extensively. The sounds, or "songs" as they are popularly called, are produced primarily on the breeding grounds, and appear to be important socially. It is the males which vocalize, and their singing may play a role in competition between males for access to females (Payne, 1991). When whales are on the feeding grounds in colder waters, they are relatively silent.

Right Whales

Right whales are slow swimming, and could be approached by men in row boats and killed with hand held harpoons. As a result, the species was harvested to commercial extinction in the North Pacific by the mid-1800s, and its population has never recovered. Townsend's (1935) map of right whale distribution based on logbook records from whaling ships indicates that right whales were found from the Gulf of Alaska to the north end of Vancouver Island.

There is a paucity of biological information on the right whale in the North Pacific. Much of the current knowledge about the species has come from studies of the southern right whale populations in Argentina. The southern right whales are regarded as a separate subspecies from the northern right whales (Gaskin, 1991), and their population appears to be recovering from the exploitation of previous decades.

Little is known of the reproductive biology of the northern right whale, but Leatherwood et al., (1982) suggest that right whales in the north Pacific may have congregated in protected areas for winter calving, and moved north to feed in the Gulf of Alaska in summer. Scarff (1986) however, comments that there is insufficient data to suggest that calving occurs in protected waters, and that the location of calving grounds remains a mystery.

Current estimates indicate that at full size, right whales may grow as large as 56 ft (17 m) in length, although a 62 ft right whale is recorded in the catch from the Queen Charlotte Islands. The girth of a right whale may be as much as 60 percent of its length (Leatherwood and Reeves 1983). Age and size at sexual maturity and gestation periods are not known, although calves are born at 15 to 20 ft (4.5-6.0 m) (Leatherwood et al., 1982).

3.2 TOOTHED WHALES

Toothed whales are members of the suborder Odontoceti. This includes the dolphins and porpoises, as well as killer whales, beaked whales and sperm whales.

Sperm Whales

Sperm whales are the largest of the toothed whales, and are members of the family Physeteridae. Unlike baleen whales, male sperm whales are much larger than females. The males reach physical maturity at 49 to 59 ft (15-18 m), while females are full size at 39 ft (12 m). Sexual maturity occurs at 33 to 39 ft (10-12 m) in males and at 27 to 30 ft (8.3-9.1 m) in females. Gestation lasts 14 to 15 months (Leatherwood et al., 1982). Calves are born at 11 ft (3.5 m) and are weaned when approximately 23 ft (7 m) in length (Leatherwood et al., 1982, Leatherwood and Reeves 1983).

Sperm whales are highly gregarious, and group sizes vary with the sex and age group of the whales. Large males tend to travel alone or in small groups. Females and juveniles travel in large schools of 15 to 30 individuals, but groups as large as 150 animals have been seen (Pike and MacAskie, 1969). During the breeding season, adult males join the schools of females, and travel with these large groups for up to several months (Rice, 1986c). Male and female sperm whales do not follow the same migratory patterns. Although both are found in temperate waters, the males tend to travel further north and into nearshore areas, while schools of females and immatures tend to remain offshore.

Sperm whales appear to have a highly developed system of echolocation, producing low frequency "clicks" which may propagate for miles (Rice, 1986c). These sounds are produced while the animals are foraging. They also use a repetitive sequence of clicks, termed "codas", which are thought to be used in intra-specific communication (Weilgart and Whitehead, 1991). For example, one whale might produce a coda consisting of eight regularly spaced clicks, followed by a pause, during which a second whale might respond with a seven click coda. The significance of these interchanges is unknown.

The head of a sperm whale is huge, comprising 25%-33% of its total body length. In male sperm whales, this proportion can be even greater (Leatherwood and Reeves, 1983). Housed in this large head is the spermaceti organ, a large reservoir filled with oil like wax. The function

of the fluid and the spermaceti organ remains unclear; although it is thought to be involved in sound production (Rice, 1986c).

Whalers hunted the sperm whale both for its spermaceti oil and for its ambergris --a substance occasionally found in their intestines. Ambergris was used as a base for perfumes, but its use has now largely been replaced by synthetics.

Baird's Beaked Whales

In British Columbia, Baird's beaked whales were also called bottlenose whales by the whalers. They are the largest of the species in the family Ziphiidae and have been found only in the North Pacific (Leatherwood et al., 1982). Beaked whales are characterized by having a well-defined beak, in which the lower jaw extends beyond the upper jaw, and have functional teeth in the lower jaw only. Although beaked whales are an interesting family of whales, there is relatively little known about them.

Baird's beaked whales grow to nearly 43 ft (13 m) in length, although females are sexually mature at 36 ft (11 m), and males at 33 ft (10 m) (Leatherwood and Reeves, 1983). They tend to remain seaward of the continental shelf, and were not a target species of the shore-based whalers.

3.3 PRODUCTIVITY AND WHALE ABUNDANCE

Between 1910 and 1967, over 9,400 whales were taken from the waters of the Queen Charlotte Islands. Although many of these whales may have been travelling to feeding grounds in or near the Gulf of Alaska, historical records tell us that whales were present and feeding in the area throughout all of the summer months. The waters in the vicinity of the islands are very productive biologically, and support large populations of seabirds, and other marine mammals, in addition to large whales. The physical characteristics of the region create productive areas, and ultimately help to explain the abundance of whales found there.

Along the western shore of the Queen Charlotte Islands, the continental shelf is narrow, rarely exceeding 2.8 nm (5 km) in width, and water depths change dramatically from 200 m to over 2500 m (Thomson, 1989). The unevenness of the ocean floor creates areas of upwelling, where colder subsurface water is moved upwards to the surface. This has profound effects on physical conditions such as current, weather, and nutrient content of the nearsurface water. These

act indirectly on the abundance of planktonic organisms and fish. Upwelling is likely an important factor influencing the abundance of whales in the waters surrounding the Queen Charlotte Islands.

Upwelling acts as a "biological bump" (Thomson, 1981) by bringing cold, deep, nutrient-rich water up to the surface. These nutrients combine with sunlight to provide food for phytoplankton (single-celled photosynthetic micro-organisms) which grow in dense concentrations, or oceanic "crops" as Thomson refers to them. Phytoplankton in turn is consumed by zooplankton, which are small microscopic marine animals. Small crustaceans, such as the euphausiids and copepods that form a principal component of the diet of baleen whales, feed directly on plankton, as do many species of small schooling fish. Northcote et al., (1989) note that the narrow continental shelf along the western shore of the Queen Charlotte Islands supports a large number of fish species, which they attribute to the dramatic increase in depth over such a relatively short distance. It is not surprising then that whales are also attracted to these diverse and productive areas to feed.

4.0 HISTORICAL OVERVIEW OF COMMERCIAL WHALING IN BC

The historical account presented here is derived from Webb's 1988 book *On the Northwest*, unless otherwise stated. The location of various place names mentioned here are shown in Figure 1.

Whaling in the Pacific began in the 1800's, as men travelling in sailing ships followed the seasonal movements of sperm whales. These ships were based out of California and Honolulu and did not travel into the temperate waters of the Pacific regularly until the 1840's, when whale stocks in the south were becoming too low to sustain commercial whaling. Between 1840 and 1850, there was an intense fishery for both sperm and right whales in the waters that became known as the "Kodiak grounds". This area ran from Vancouver Island northwest to the Aleutians and from the coast west to 150 degrees W. (Scammon, 1874).

The 1840's marked a period of intense hunting for right whales in the Kodiak grounds. Although right whales were generally caught further offshore than sperm whales, in latitudes 56°N, 145-146°W, both species were hunted. The number of whaling ships increased from 108 in 1843, to a peak of 292 in 1846, but by 1849, right whales had been hunted to commercial extinction. Less than 25 vessels remained to whale in the Kodiak grounds, and the whalers moved north, to hunt bowheads in the Arctic. Both right whales and bowheads were hunted for their oil and for their baleen. The baleen, or whalebone as it was commonly called then, was used as a stiffener for corsets and umbrella ribbing, and other products such as horse whips.

Although there are few records of locations where whales were caught during the 1840's, on July 29, 1841, the whaling ship *Orozimbo* harpooned 5 sperm whales within 60 miles of Cape St. James. Generally less than 50% of the whales struck with harpoons were recovered. Upon sighting a whale, open whaleboats were launched, and rowed so as to almost collide with the whale. A hand-held harpoon was then hurled from the bow of the boat. Provided it had been well-struck, the whale towed the whaleboat until either it was exhausted, or the men in the boat could kill it with a lance.

Whaling activity in the eastern north Pacific generally subsided until 1905, due to the lucrative profits available in the fur seal harvest, and the lack of technology available to hunt the faster-moving fin and humpback whales which were still abundant at that time. Attempts were made at harvesting humpback whales in the Strait of Georgia from 1866 to 1873, but relatively

blue?

few animals were caught (Merilees, 1985). By the 1900's however, the situation began to change, as there were indications that the fur seal population could no longer sustain intense harvesting. Fur seal stocks had been reduced from an estimated high of 2.5 million in the 1780's, to 200,000-300,000 in 1909. Attention was redrawn to commercial whaling.

In 1905, whaling activity on the coast of British Columbia resumed with newfound intensity, as modern equipment developed by Norwegian whalers became available, allowing more efficient killing techniques. Sailing ships were replaced with steam powered chaser boats, which travelled fast enough to keep up with the previously unattainable fin and blue whales. The harpooning system was modernized. Fired from a cannon, the harpoon was now equipped with multiple barbs which spread open on impact, and the tip contained an exploding grenade (see Figure 2). Retrieving carcasses which sank had been a problem that had plagued whalers in the previous century, but was now overcome with the development of steam-powered winches for raising carcasses.

During this time the Minister of the Marine and Fisheries Department established restrictions on the whaling industry in British Columbia. This was done in an attempt to avoid the disastrous results of the unregulated whaling fishery in Newfoundland, where humpback whales and other rorquals were hunted to near extinction within an 8-year period. A brief history of the whaling regulations is provided in section 4.1.

The first whalers to initiate new whaling activity on the west coast were actually former sealing captains. Perhaps anticipating the end of the sealing harvest, Captain Sprott Balcom and Captain William Grant formed the Pacific Whaling Company. They based themselves at the docks of the Victoria Sealing Company, which was also owned by Captain Grant.

The Pacific Whaling Company opened their first whaling station at Sechart, in Barkley Sound, in 1905. A chaser boat, the *Orion* (Figure 3) was bought from the Norwegians, and brought over for the first whaling season in 1906. Balcom and Grant bought a second steam chaser from the Norwegians, the *St. Lawrence*, and opened a second station in Kyuquot in 1907.

A third station was opened in the fall of 1907, at Page's Lagoon in Nanaimo. With the intention of providing winter employment for the west coast whalers and shore-crews, it was built to exploit humpback whales in Georgia Strait. Although 97 humpback whales were processed at the station during the first few months of operation, it closed permanently on January 25, 1908

(Merilees, 1985).

In 1908, the Pacific Whaling Company acquired permission to build on sites at Rose Harbour and on Dundas Island. Although the Dundas Island station was never built, in 1910 a station at Rose Harbour on Kunghit Island was completed and operational. In 1911, the company opened a fifth station in Naden Harbour, in Virago Sound, and owned a total of 10 chaser boats. The Pacific Whaling Company changed its name to the Canadian North Pacific Fisheries Ltd.

The whaling station at Rose Harbour on Kunghit Island provided easy access to both the east and west coasts of the Queen Charlottes. A photograph of the station and a brief description is included in Figure 4. From Rose Harbour, the chasers could travel west through Houston Stewart Channel, beyond the Gordon Islands and Anthony Island, and out into the open Pacific. Whaling was generally most successful along the western side of the Queen Charlotte Islands. Yet when rough weather conditions precluded travel in the exposed waters of the open Pacific, the chasers could also travel east, to hunt for whales in Hecate Strait.

The station at Naden Harbour, on the north end of Graham Island, opened in 1911. Photographs of this station are shown in Figure 5. The layout was very similar to the station at Rose Harbour, and both stations were similar to others constructed in the north Pacific during this era. The Naden Harbour site was also in a location well protected from the open Pacific, and whalers could hunt in Dixon Entrance, or when weather permitted, along the west side of Graham Island. Both the Rose Harbour and the Naden Harbour stations were managed by Caucasians, and staffed by Asians, particularly the Japanese and Chinese. An interesting photograph of a flensing crew, and a description of some of the station crew's duties, is provided in Figure 6.

Typically the whaling season began in late April or early May and continued until October, although in many years the season ended earlier (see Tables 1 and 2). The 1911 season was the longest, spanning almost 7 months at both stations, and during which a record 734 whales were killed. The number of chasers operating varied annually, but on average three boats were sent out from each station.

After a very intense harvesting period, a serious slump in the industry occurred, due to the depletion of whale stocks and the outbreak of the First World War. This forced Canadian North Pacific Fisheries into receivership. In 1915 it was bought up by an American, William P. Schupp, who by 1918 had closed the Sechart station and sold two of the chasers. He also

combined his American whaling operations with the Canadian ones to form one company: Consolidated Whaling Corporations Ltd.

Schupp was successful for several years, despite declining whale stocks, as he was able to develop new markets for whale oil. Part of his success was due to the development of a new hydrogenation technique, which removed the fishy odour from the oil. It was then a suitable product for use in the cosmetic manufacturing industry.

The First World War also increased demand for other whale products. Although sperm whale oil was traditionally used as an illuminant, as it burned very cleanly, during the war it was also highly sought after for use in the production of nitroglycerine for explosives. There was also an increased demand for whale meat, as most beef was being sent overseas to feed the troops. However, this demand for "sea-beef" quickly declined at the end of the war. Other uses of whale by-products included bone meal fertilizers for the domestic farm market, glue, margarine, animal fodder, lipsticks, perfumes, crayons, and stringing for tennis racquets. In later years it would also be used in the production of vitamins and insulin.

In 1919 and 1920, there was a total of three shore-based whaling stations operating (Rose Harbour, Naden Harbour and Kyuquot). A recession, combined with a glut of whale oil from the Antarctic, led to the closing of all three stations in 1921. Naden Harbour re-opened in 1922, and Rose Harbour was re-opened in 1923. Although Kyuquot also re-opened in 1922, it was closed permanently a few years later, in 1925.

In 1925, the invention of the stern slipway changed the nature of whaling forever (Morgan, 1978). The slipway enabled whalers to haul entire carcasses aboard, and factory ships could now hunt on the high seas. These pelagic whaling ships no longer had to follow the regulations of any national government, and in the North Pacific, the shore-based whaling stations would wage a constant battle to compete economically with the intense harvesting of the pelagic whalers.

The economic difficulties of the early 1920's continued to beset the operations of the shore-based stations. The depression forced the temporary closure of both stations in 1931 and 1932, and Naden Harbour was also closed in 1933. When the stations reopened, wages were cut by fifty percent, and efforts to maintain and repair equipment were minimal. Profits declined and in the following years frequently one or both of the stations were closed.

The Second World War presented further problems to the industry. Wartime regulations prohibited undisguised transmissions on marine radios of subjects such as weather information or the location of boats. Without this communication network, the functioning and success of the whalers were certainly impeded. Even more serious were the effects of the wartime internment of people of Japanese origin. The Consolidated Whaling Company lost the majority of its skilled flensing crews, and these men could not be replaced. In 1941 the Naden Harbour Station closed permanently. Rose Harbour closed shortly thereafter, in 1943. The chaser boats, which had all been built between 1906 and 1911, were in severe disrepair. When they were later sold at auction, four of the five boats went to the scrap metal heap.

With the closing of the two British Columbia whaling stations by 1943, there was a brief reprieve for the whales. However, in 1948, the Western Whaling Company was formed, and a shore-based processing station was opened at Coal Harbour, on Vancouver Island. A new set of regulations was imposed by the International Whaling Commission (IWC), in order to protect whale stocks. These regulations required the recording of biological information on all whales captured and processed by the whalers.

The Canadian Department of Fisheries and Oceans hired Gordon C. Pike in 1948 as a junior biologist, and assigned him the task of collecting and submitting biological data from the Coal Harbour whaling station to the IWC. Based at the Pacific Biological Station in Nanaimo, Pike conducted research on a variety of subjects including: methods to determine age and size at sexual maturity of fin whales, humpback whales and sperm whales; seasonal changes in blubber thickness; diet studies through stomach content analysis; and the schooling and migration behaviours of sperm whales (Pike, 1953; Pike 1956; Pike 1958; Pike 1965a; Pike 1965b). This consistent, but often unpublished, recording of catch information from Coal Harbour has provided most of the data on large whales in British Columbia.

Coal Harbour whaling operations were far more intense than the earlier operations in the province. Whalers used bigger boats and more of them, better equipment, and even aerial reconnaissance to assist them in their search for whales. Their season was on average longer than that of the Queen Charlotte Island whalers, and they travelled as far as 200 nm offshore, although they did not venture into Dixon Entrance. The Coal Harbour station operated from 1948 to 1967, except when it closed briefly, in 1960 and 1961, due to poor market conditions. When the station was closed permanently in 1967, it marked the end of whaling on the west coast of Canada. Soon thereafter, in 1972, Canada officially agreed to stop all commercial whaling activity altogether.

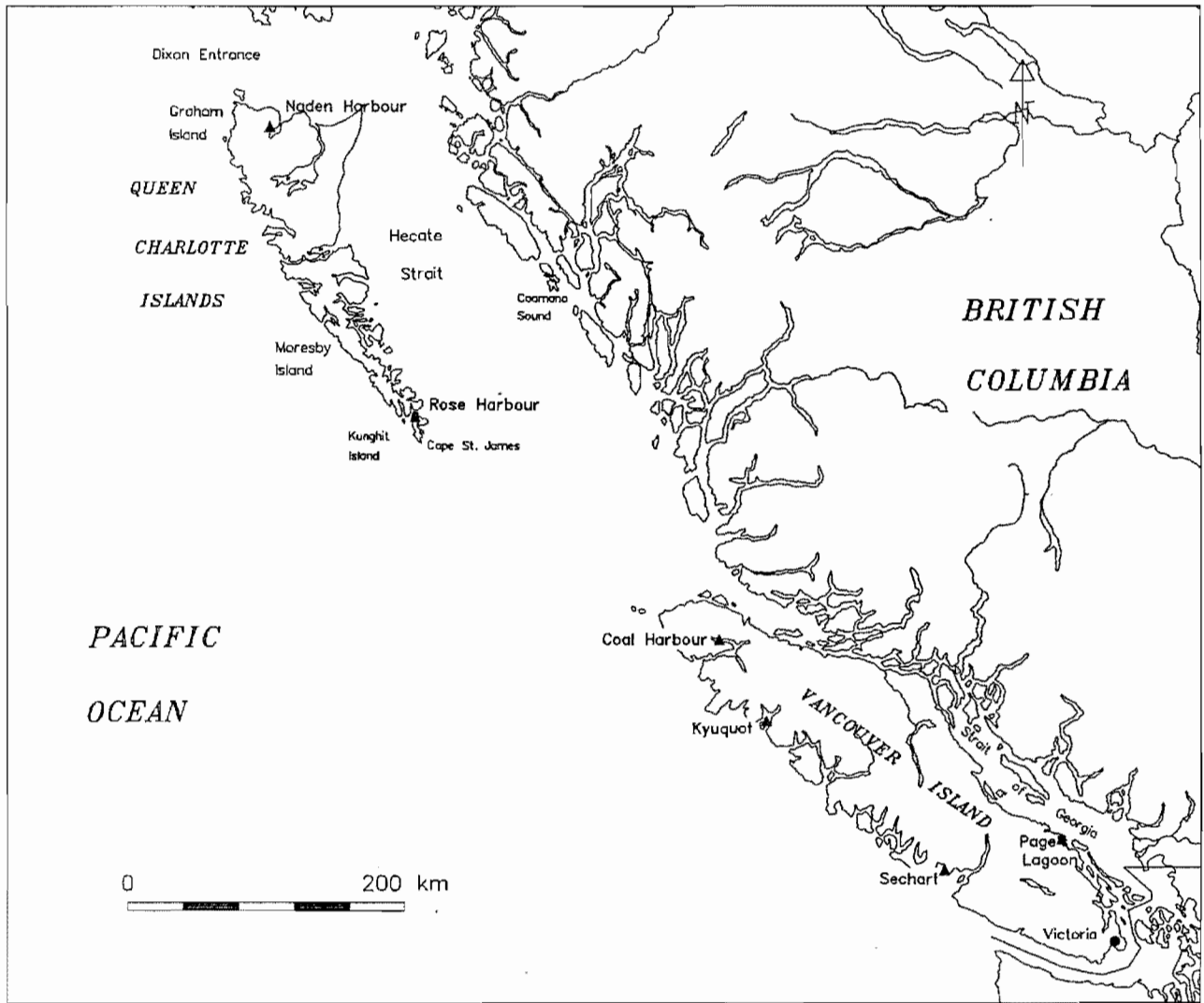


Figure 1. Map of the coast of British Columbia showing the location of all whaling stations (▲) and other geographical names mentioned in the text.

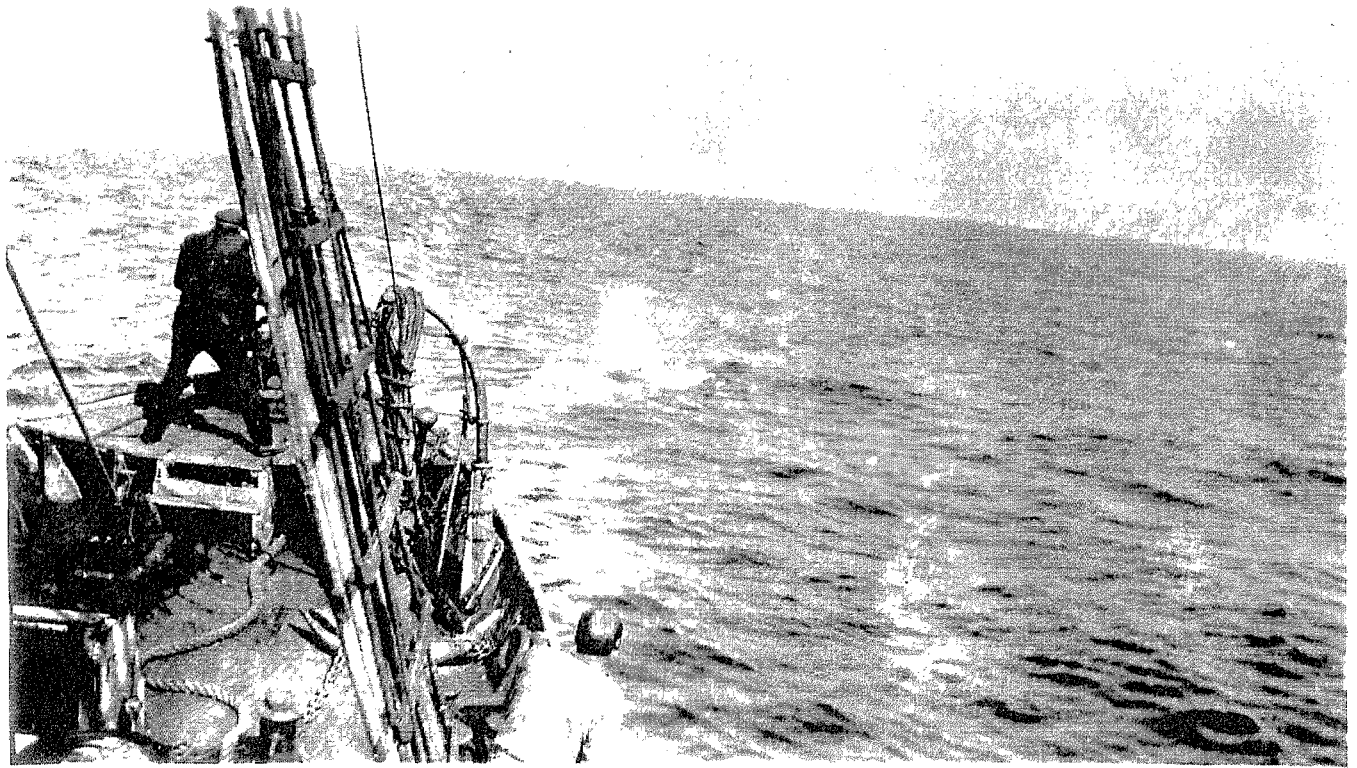


Figure 2. The gunner is in position, ready to fire the harpoon into a whale. The morale of the ship's crews depended heavily on the gunner, as it was his skill which determined the success or failure of the hunt. Typically these gunners were Norwegian in origin, and the skill was passed from father to son over generations. Harpooning a large whale was a dangerous business and mishaps like the following were not uncommon.

"On Friday the *SS White* shot a sperm (whale) which charged under his counter and hit the rudder with it's tail and drove it against the propeller blades. The rudder jammed and the rope wound round the propeller shaft. They could neither work the engines or steer, so called the *SS Grant* who towed them to near Anthony Island where they were able to fix the rudder and come into the station themselves." (Anon. 1941).

Photograph courtesy of the British Columbia Provincial Archives.

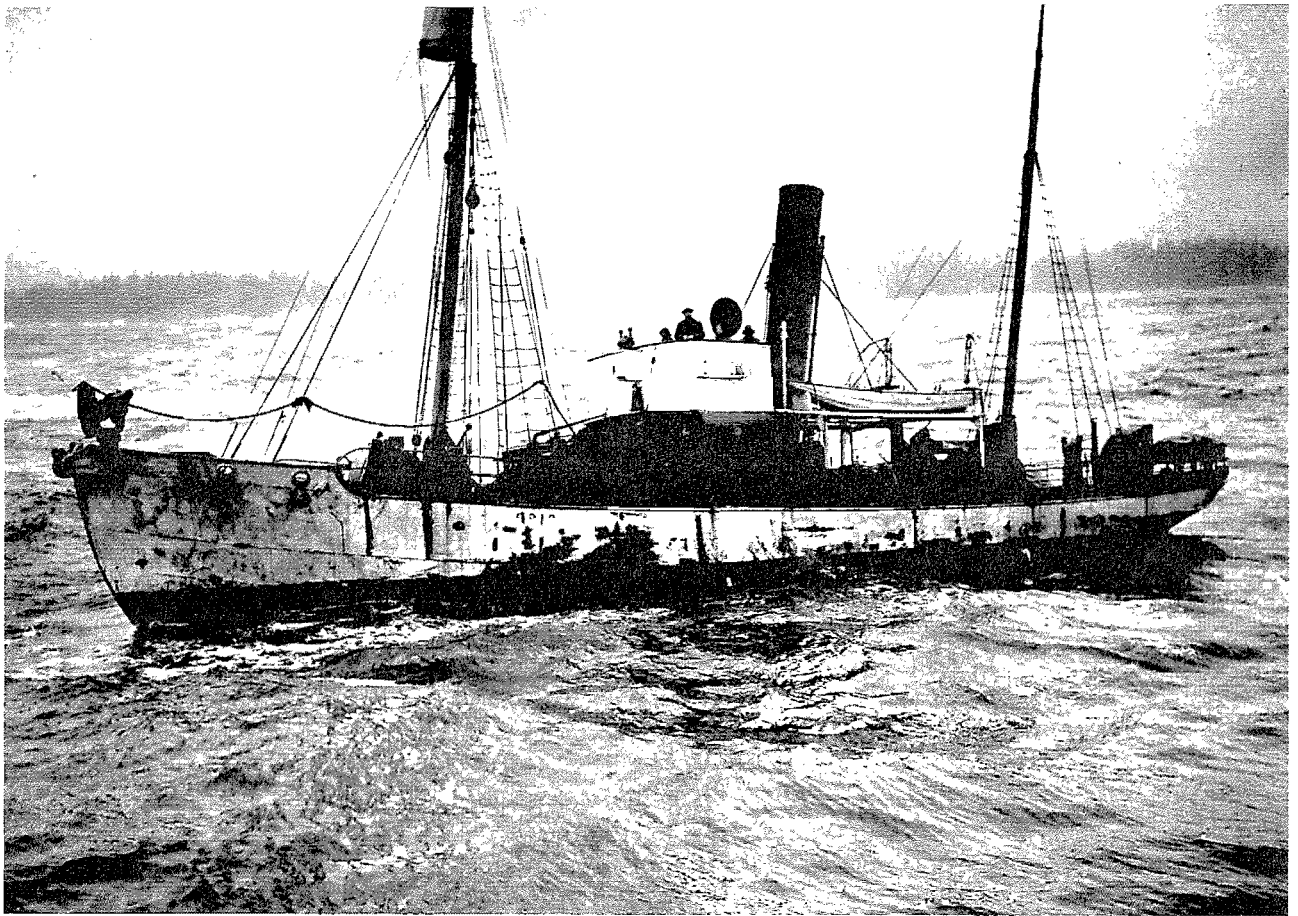


Figure 3. The *Orion*, the first steam-powered chaser boat in British Columbia, and one of the first to work in the Queen Charlotte Islands. It was purchased in Norway in 1904, and was typical of those used worldwide at the time. The *Orion* was 94 ft in length. The layout of the chasers are best described by Webb (1988):

" The salient features of these vessels were their high, trawler-style bows which warded off heavy seas; a round bottom to aid in manoeuvring; low bulwarks, especially aft, where water could come aboard but just as easily leave; and a tall forward mast supporting the lookout barrel, which was reached by means of ratlines and a short ladder. Scotch marine boilers provided steam, and the whales would be played out and reeled in with a steam-winch located forward of the wheel house... Another characteristic of these steamers was their scanty accommodations. A small forecabin housed firemen and deckhands; at midships a tiny mess and a galley were provided; aft were two bunks for the second engineer and mate and cramped cabins for the chief engineer and the captain".

Sailor's memories of life aboard these chasers were mixed. The design of their hulls made them prone to pitching and rolling. One sailor wrote "Even the best sailors lose their 'sea legs' on one of these round bottomed vessels. The *Orion* twisted and writhed about like a wild thing."

Photograph courtesy of the Vancouver Maritime Museum

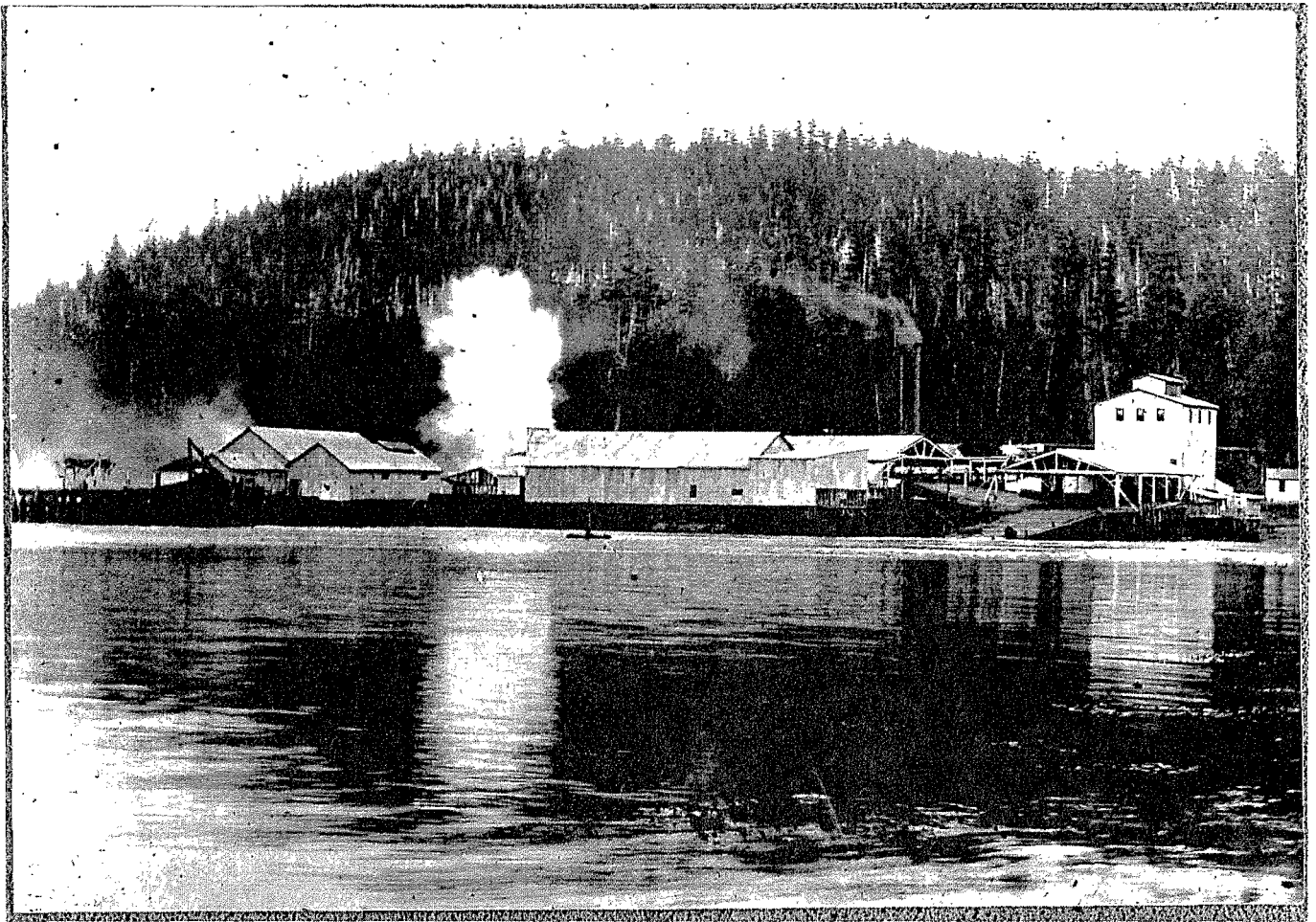


Figure 4. The station at Rose Harbour. Whale carcasses were brought up the haul-up slip, shown in the right of the photograph, where flensing crews would immediately remove the blubber. The blubber was then rendered in the tall building also seen in the right of the photograph, and stored in the large building to the left of the slip. The baleen was removed and stored, and the flensed carcass was then winched onto the carcass slip, where bones, meat and the viscera were removed and processed. There were separate bunkhouses for the white, Japanese and Chinese men who crewed the station, but they are outside of this photograph (on the right-hand side). The manager kept a separate residence, which is not shown here (modified from Webb, 1988)

Photograph courtesy of the British Columbia Provincial Archives

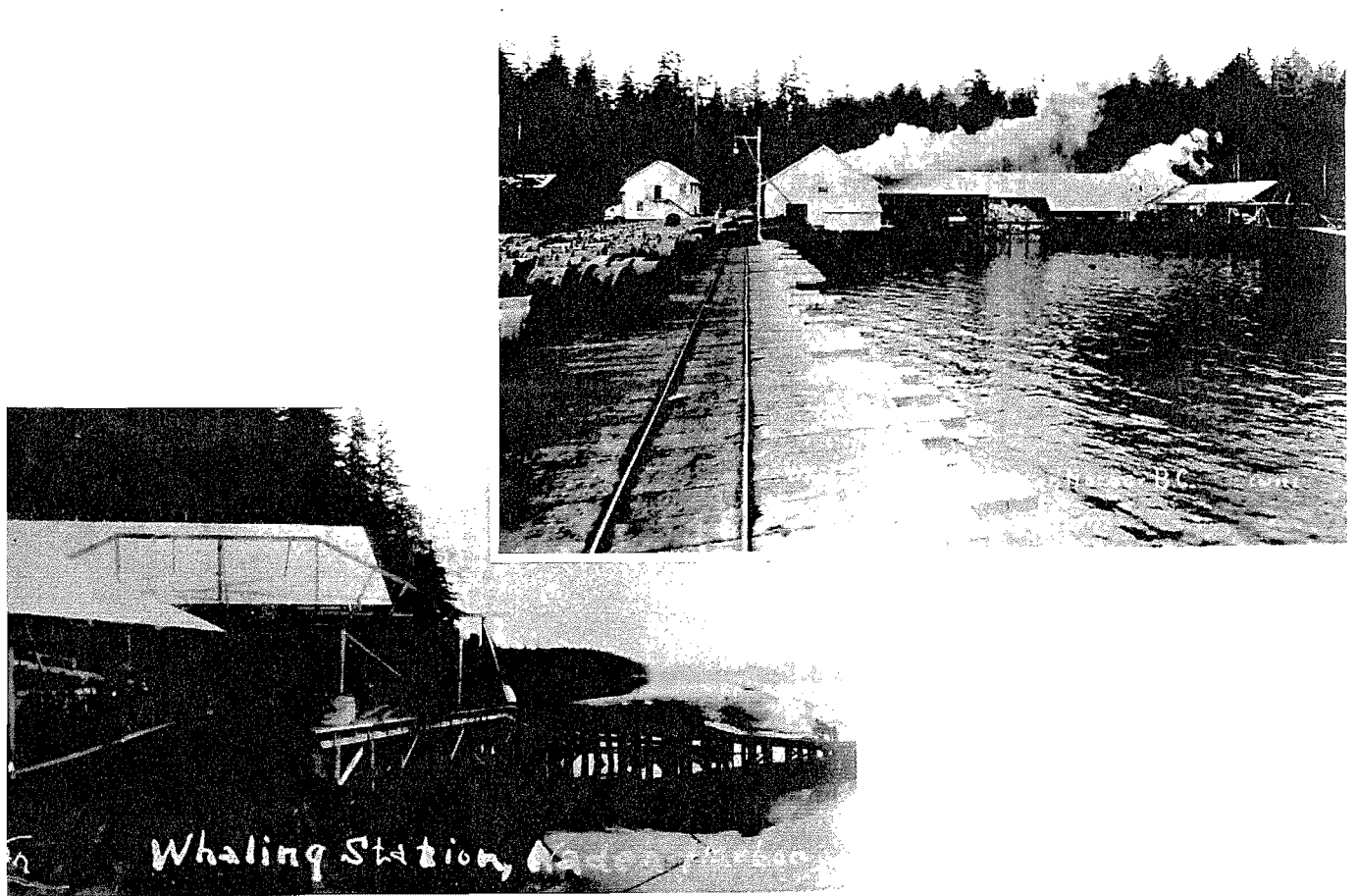


Figure 5. Naden Harbour resembled the Rose Harbour station in its layout. It was described by Alfred Hustwick in a 1914 article for B.C. Magazine.

"Imagine a long wharf with a coal bunker at each end, a tramway running its full length, and its entire surface almost hidden by thousands of drums and barrels of oil awaiting shipment. To the right of the wharf, picture half a dozen factory buildings, rectangular studies in unpainted wood and corrugated iron and at the farther end a wide slipway running from a half-roofed shed down to the water. To the left of the wharf, five or six bunkhouses, storehouses and office buildings with the manager's private residence showing between the trunks of great trees and through dense foliage about their roots. The background in virgin forest, sloping steeply up from the water, which is coffee-coloured by a score of polluting drains.

The sky is grey and rainy and the air is filled with steam, smoke and a combination of abominable odours that no words can do justice to. Such was Naden Harbour Whaling Station as the engineer and I beheld it on the morning following the whale hunt....Hardly had the whale cleared the roller at the head of the slip than a trio of nimble Japanese had climbed on the body and commenced removal of the blubber."

Photographs courtesy of the Queen Charlotte Islands Museum.

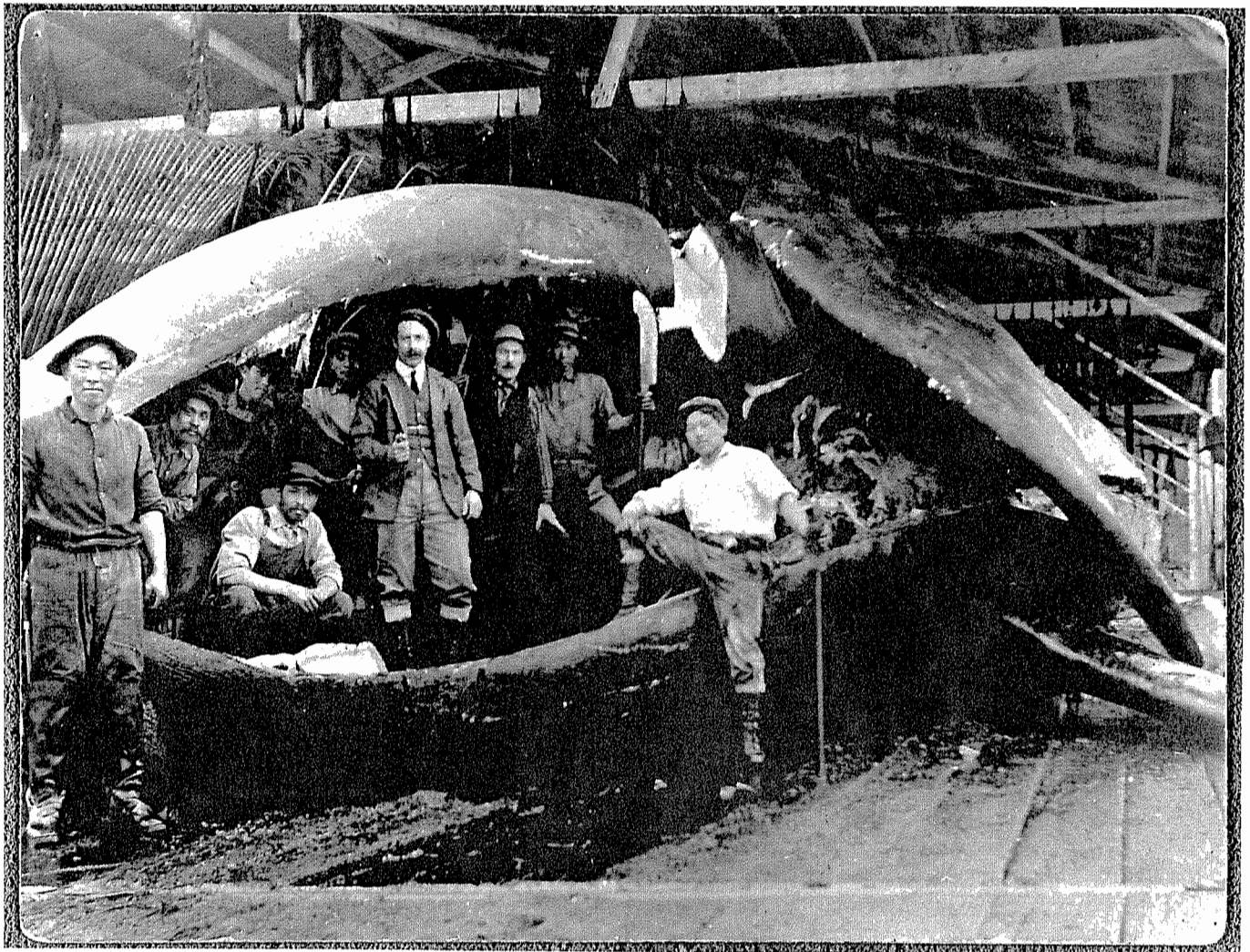


Figure 6. The Rose Harbour flensing crew is shown here posing in the jaw of a right whale. The station manager stands in the center of the photograph, surrounded by Japanese crew. In British Columbia, the stations were generally managed by Caucasians, and crewed by Asians, particularly the Japanese and Chinese (Webb, 1988). Flensing was considered highly skilled work, and was traditionally given to the Japanese. The less glorified jobs of mincing, feeding the dryers and the rendering vats, and the packaging of final product were delegated to the Chinese work crews.

Photograph courtesy of the British Columbia Provincial Archives.

4.1 WHALING REGULATIONS

In the North Pacific, both right whales and gray whales were already commercially extinct by 1900. Early in the 20th century, the Canadian government applied restrictions to the construction and operation of shore-based whaling stations in British Columbia, in an attempt to avoid the commercial extinction of whales which had occurred in Newfoundland in the 1890's. Internationally, there were no regulations to protect whale stocks until several decades later.

Canadian regulations initially imposed minimum distances between shore-based stations, restricted the number of chaser boats which could operate from each station, and required that all whales be processed within 24 hours of capture. In 1931, regulations were broadened following an international meeting of the League of Nations in Geneva. The *International Convention for the Regulation of Whaling* was drawn up, and it protected right whales, immature whales, and females with calves. However, the convention was not ratified until 1935, due to a general lack of political will (Small, 1971).

In 1937, the *International Agreement for the Regulation of Whaling* was drawn up, and it broadened the regulations to protect gray whales in addition to right whales. Amongst other changes, the agreement imposed minimum size limits on blue, fin, humpback and sperm whales. By encouraging the selection of the larger individuals of each species, the harvesting of sexually immature animals was avoided. In 1946, the International Whaling Commission (IWC) was established, with the signing of the *International Convention for the Regulation of Whaling*, which incorporated the regulations of the 1937 agreement and expanded upon them (Anon., 1950). The Commission has provided the framework for all international whaling regulations from 1946 to the present, although it did not hold its first formal meeting until 1949.

The 1946 convention contained specific regulations applicable to whaling operations, such as imposing minimum-length requirements for all whale species, as well as declaring opening and closing dates for the whaling season, defining certain areas as closed to commercial harvesting, and setting quotas (in the Antarctic). Punishment for any infractions of the whaling regulations became the responsibility of each member-nation in the Commission to enforce.

Each country was now also responsible for collecting biological data from the catches, which were to be submitted to the Bureau of Whaling Statistics in Norway. In 1948 Gordon Pike, of the Pacific Biological Station in Nanaimo, was assigned responsibility for recording biological

information on every whale processed in British Columbia. Information including the size, sex, species, stomach contents, sexual maturity and location of each whale captured was collected (Webb, 1988). As a result, the database from the Coal Harbour station is much more extensive than that from the Queen Charlotte Island processing stations.

The historical records regarding regulations are unclear as to whether or not the terms of the International Whaling Convention and Agreements of 1935, and 1937, were enforced in Canada prior to 1946. Prior to 1934, ship's crews were paid bonuses according to the number of whales they caught. In 1934, this bonus system changed significantly. Bonuses were now based on the size of whale caught, rather than on the number of whales caught, with larger bonuses paid for larger whales (Webb 1988). The introduction of this system prior to 1946 suggests that catches were being monitored, in order to protect stocks.

Certainly at the Akutan whaling station in Alaska, also owned by Consolidated Whaling Ltd., there was official monitoring of the catch, as specific references to the presence of an inspector taking length measurements of whales (Reeves et al., 1983). Another indication that some form of monitoring system was in place is a reference by Robbins, Oldham and Geiling (1937), who visited the Rose Harbour whaling station in 1936 and 1937. They refer to the routine collection of stomach content data as "one of the legal requirements in connection with modern whaling operations". As there are no surviving records that we have been able to locate, we are unable to confirm this reference.

In an effort to preserve stocks, the IWC prohibited the harvesting of humpback whales in 1966. Blue whales also received full protection. Pike continued to submit details of the catch to the Bureau of Statistics until 1967, when the Coal Harbour station closed permanently. Although pelagic whaling in the North Pacific continued, all nearshore operations ceased in British Columbia.

5.0 DATA SOURCES

The biological data presented in this report are derived from unpublished catch records from whaling stations at Rose Harbour, Naden Harbour and Coal Harbour. The catch records analyzed are from the period 1910 to 1967. The amount of detail in the records varies annually, from a minimum account of the total annual catch for each whaling station, to specific biological data collected for each animal processed.

For the period 1910 to 1943, detailed records concerning the species, sex, length, and location of capture of each whale caught are not complete. Precise details were only recorded from 1924 through 1928 at Rose Harbour and in records from 1924 through 1927 at Naden Harbour. However, descriptive accounts of where whales were caught, such as "25 miles SW of Anthony Island", can be found in the pilot log books of the chasers boats from Rose Harbour and Naden Harbour in the years 1928 to 1943. There are no records for the years 1944 through 1947, as all whaling in the province ceased temporarily during that time.

The majority of existing records are from the period 1948 to 1967, when the Coal Harbour station operated, and include the date, species, sex, length, and location where each whale was captured. The stomach contents of many whales were also examined and recorded in detail between 1962 and 1967. During the 1960's, Coal Harbour whalers were required to document not only where whales were caught, but also to record all whale sightings, including approximate group sizes. As a result, Coal Harbour catch records have been included wherever possible as they are more extensive than the Rose Harbour and Naden Harbour records. Combining the records from all three whaling stations provides a comprehensive picture of the historical population of whales which once occurred off the Queen Charlotte Islands.

A detailed list describing the historical data sources used and their present location is provided in Appendix 1. A sample page from the Naden Harbour Catch Report is shown in Figure 7.

CONSOLIDATED WHALING CORPORATION LIMITED

WHALE CATCH REPORT

SEASON 1926 - S.S. *Albatross* S.S. *Albatross* STATION

NO. 3

WHALE SERIAL NO.	DATE	KILLED	LENGTH AND SEX	TOTAL	S.S. <i>Albatross</i>		S.S. <i>Albatross</i>	
					RECEIVED	WHALE	CHASER	WHALE
27	28	10	46	1	1	1	1	
28	10	10	50	1	1	1	1	
31	11	11	63	1	1	1	1	
32	12	13	60	1	1	1	1	
33	14	14	53	1	1	1	1	
34	15	16	58	1	1	1	1	
35	16	15	58	1	1	1	1	
36	17	16	44	1	1	1	1	
37	18	17	44	1	1	1	1	
38	19	19	55	1	1	1	1	
39	20	20	48	1	1	1	1	
40	21	21	48	1	1	1	1	
41	22	22	48	1	1	1	1	
42	23	23	48	1	1	1	1	
43	24	24	47	1	1	1	1	
44	25	25	47	1	1	1	1	
45	26	26	47	1	1	1	1	
46	27	27	47	1	1	1	1	
47	28	28	50	1	1	1	1	
48	29	29	50	1	1	1	1	
49	30	30	50	1	1	1	1	
50				1	1	1	1	
				13	13	13	13	

100. 575 40N Long 133. 30 W.
 1/2 way off Cape Horn 30 miles
 In Sound
 20 miles half Cape Horn
 In Sound
 10 miles half Cape Horn
 In Sound
 SW 1/4 30 Miles French Island
 1/2 miles N of 1/2 way
 24 17 N 134 20 W
 In Sound
 34 23. 132 47
 34 17 133 20 W
 34 25 134 09
 In Sound

Figure 7. Page from a 1926 Naden Harbour Weekly Catch Report, showing the length and sex of each whale, the location of its capture, and which chaser boat caught it.

Photograph courtesy of the Manuscripts Division, Suzzallo Library, University of Washington.

6.0 TRENDS IN THE WHALE CATCH

The focus of whaling activity in British Columbia shifted from one species to another in response to depletion. A target species was selected on the basis of its abundance and profitability and harvested intensely. Once its population had declined, whalers redirected their efforts towards other species. The catch of humpback, fin and sperm whales follow this pattern of exploitation (Figures 8 and 9). Details of these trends are provided below.

Humpback whales were the first species to be hunted heavily in British Columbia. In the early years of the century, humpback whales were abundant on the coast (Pike and MacAskie, 1969) and made up 70%, 89% and 90% of the total annual catch in 1908, 1909 and 1910. In the first years of whaling operations at Rose Harbour and Naden Harbour (1910 and 1911), 79 humpbacks (54% of the total catch) and 178 humpbacks (42% of the total catch) were taken at each station respectively (Tables 1 and 2). By 1914 the number of humpbacks in the catches had dropped to 19 (19% of catch) and 27 (24% of catch) and by 1941 only 5 (5.5% of catch) and 2 (2.3% of catch) humpback whales were taken at Rose Harbour and Naden Harbour respectively. Humpback whales were no longer a profitable target once their numbers had declined, forcing the whalers to hunt other species.

Fin whales were the second species to be heavily hunted in British Columbia. Although they are much faster swimmers than humpback whales and hence more difficult to catch, they were more profitable because of their large size. At the Rose Harbour whaling station, the number of fin whales in the catch rose sharply after the first season, and though their numbers fluctuated in the catch, from 1911 until 1920, an average of 68 fin whales were taken annually (Figure 8). From 1923 to 1930, an average of 77 fin whales were taken each year. In 1933 the fin whale catch dropped sharply, and from 1933 until 1943 an average of only 32.5 fin whales were taken annually. At Naden Harbour the number of fin whales caught fluctuated annually but declined throughout the years of operation after an initial peak in the first season of operation (Figure 9).

Sperm whales were the third species to be hunted intensively. As the annual catch of fin whales declined, the sperm whale catch increased at both stations. In 1910 none were caught at Rose Harbour while one sperm whale was caught in 1911 at Naden Harbour. By 1936 the sperm whale catch had risen to 198 at Rose Harbour and 113 at Naden Harbour.

At both stations, the number of blue whales in the catch also declined annually (Tables 1 and 2). The catch peaked in 1911 with 95 blue whales caught. Over the following 30 years, the blue whale catch fluctuated but declined overall, and in 1941 only one blue whale was caught. No blue whales were caught in 1943, the last year whaling operations were based on the Queen Charlotte Islands.

As can be seen in Figure 8, as the number of fin and humpback whales declined, there was a marked increase in the number of sperm whales caught. Although the change was attributed to possible shifts in prey distribution or water temperature (Robbins et al., 1937), over hunting may also have been a factor. Based on current estimates of length at sexual maturity (Leatherwood and Reeves, 1983; Pike and MacAskie, 1969), over half the fin whales and 35% of the humpback whales caught during the seasons 1924 through 1928, were sexually immature (Figure 10).

Two sources provided significantly different estimates on the lengths of blue whales at sexual maturity. Based on Leatherwood and Reeves' (1983) estimates, over 60% of the blue whales caught were immature, but using the estimates in Pike and MacAskie (1969), less than 20% of the blue whales caught were immature. Regardless of whichever source is correct, the high proportion of small and sexually immature animals in the catch suggests that large baleen whales were difficult to find.

Whaling activity resumed in 1948 at Coal Harbour, and sperm whales and fin whales continued to make up the majority of the catch until 1954. Between 1949 and 1953, 50 percent of the fin whales caught were immature (Pike 1956). In 1954, the catch of sei whales jumped to 143 animals from a mere three animals caught in 1948 (Table 3). When sei whales dominated the catch, whalers took this as a sign that an area had been commercially exhausted (Webb, 1988). Sei whales are smaller than fin whales and yielded only 20 barrels of oil compared with 40 barrels from the average fin whale (Kellogg, 1931). For this reason they were less profitable for an industry that primarily marketed whale oil. In 1964 however, a record 613 sei whales were caught, mainly off Vancouver Island, and were sold as meat for human and animal consumption (Pike and MacAskie, 1969).

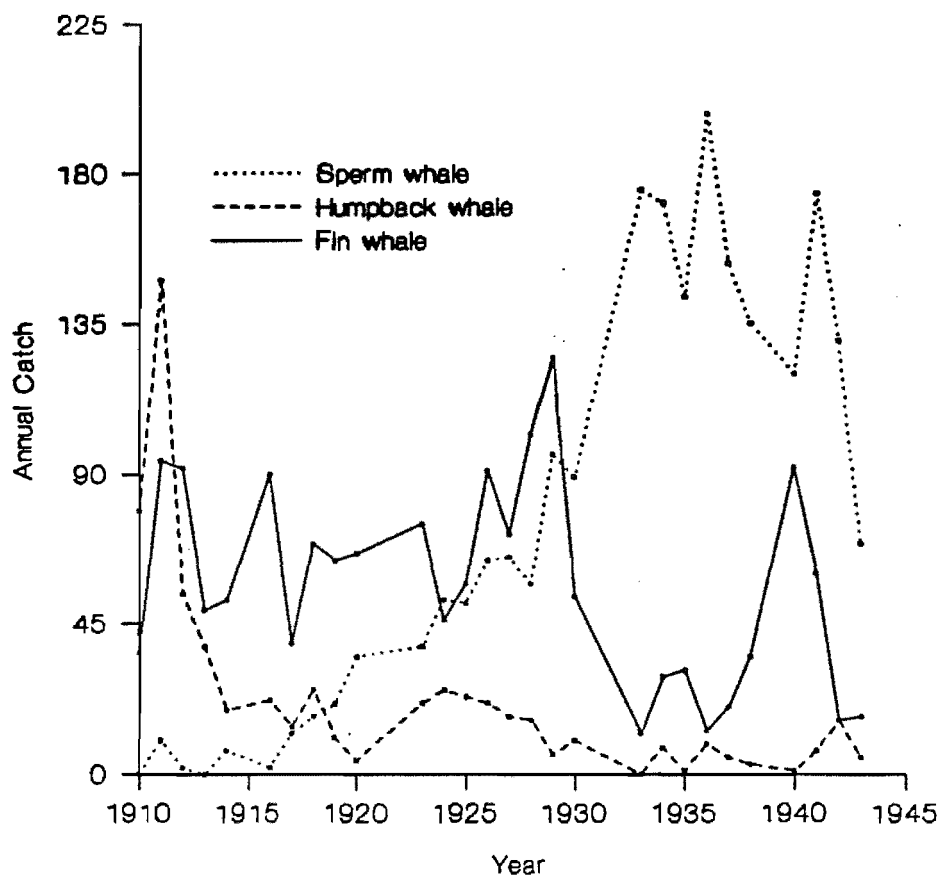


Figure 8. Annual catch of fin whales, humpback whales and sperm whales at Rose Harbour whaling station, Queen Charlotte Islands, from 1910 to 1943.

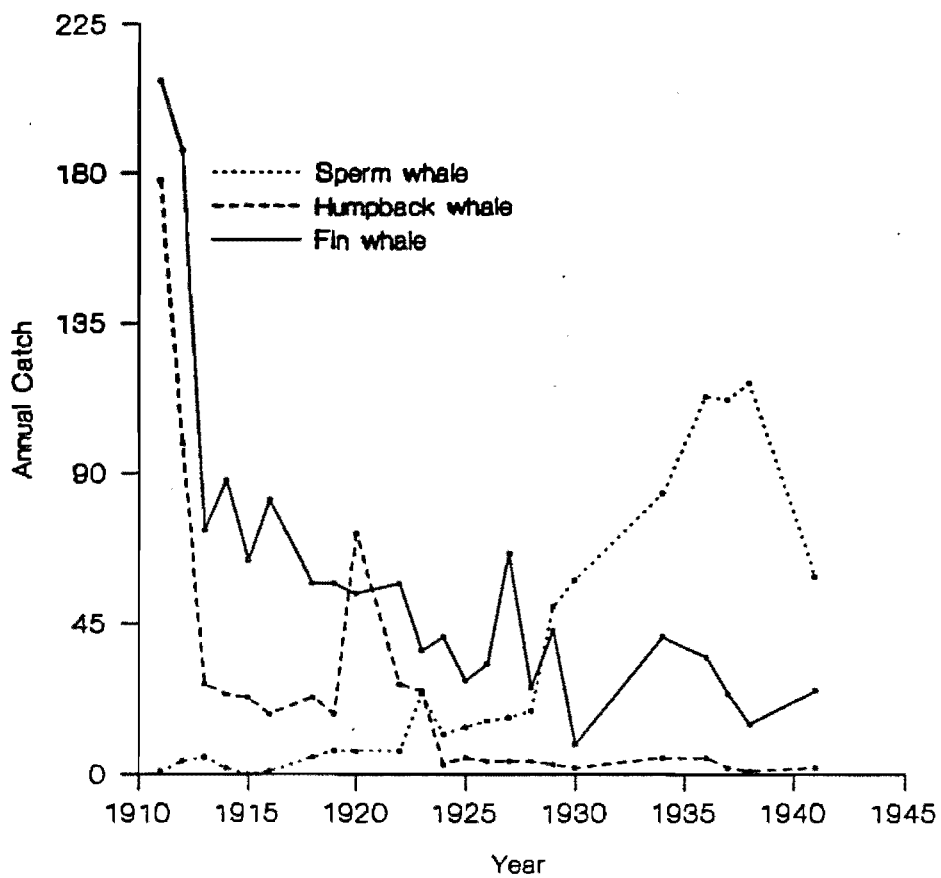


Figure 9. Annual catch of fin whales, humpback whales and sperm whales at Naden Harbour whaling station, Queen Charlotte Islands, from 1911 to 1941.

Table 1. Annual catch of whales and whaling effort at Rose Harbour whaling station, Queen Charlotte Islands, 1910 to 1943.

YEAR	SEASON	NUMBER OF CHASERS	NUMBER OF WHALES							TOTAL	
			BLUE	FIN	SEI	HUMPBACK	SPERM	RIGHT	BAIRD'S		
1910	July 23- Nov. 30	?	31	36	0	79	0	0	0	146	
1911	Mar. 15- Oct. 9	?	58	94	0	148	10	0	0	310	
1912	Mar. 26- Oct. 16	?	40	92	0	54	2	0	0	188	
1913	Apr. 13- Sept. 30	2- 4	20	49	0	38	0	0	0	107	
1914	May 21- Oct. 3	1- 3	22	52	0	19	7	0	0	100	
1915				station closed							
1916	June 9- Oct. 17	3	7	90	0	22	2	0	0	121	
1917	May 1- Oct. 12	3	14	39	27	14	12	0	0	106	
1918	Apr. 1- Aug. 31	3	12	69	15	25	17	1	1	140	
1919	Apr. 30- Oct. 25	3	8	64	51	11	21	0	0	155	
1920	Apr. 23- Oct. 25	?	12	66	41	4	35	0	1	159	
1921				station closed							
1922				station closed							
1923	May 6- Nov. 3	?	26	75	37	21	38	0	0	197	
1924	May 30- Oct. 2	3	26	46	50	25	52	1	1	201	
1925	May 19- Oct. 2	4	13	57	30	23	51	0	2	176	
1926	May 23- Oct. 6	5	11	91	24	21	64	0	0	211	
1927	May 16- Sept. 30	4	3	72	7	17	65	0	0	164	
1928	May 22- Oct. 1	4	14	102	10	16	57	0	1	200	
1929	May 13- Sept. 28	?	8	125	58	6	96	1	0	294	
1930	May 14- Aug. 22	2	0	53	80	10	89	0	0	232	
1931				station closed							
1932				station closed							
1933	June 5- Aug. 14	4	2	12	1	0	175	0	0	190	
1934	Apr. 25- Aug. 31	4	0	29	0	8	171	0	0	208	
1935	May 8- Sept. 21	4	8	31	0	1	143	0	0	183	
1936	Apr. 22- Sept. 19	3	1	13	0	9	198	0*	0	221	
1937	Apr. 26- Sept. 13	3	0	20	0	5	153	0	0	178	
1938	Apr. 12- Aug. 18	3	0	35	0	3	135	0	0	173	
1939				station closed							
1940	May 13- Aug. 31	3	1	92	0	1	120	0	0	214	
1941	May 16- Oct. 18	3	0	60	0	7	174	0	0	241	
1942	May 25- Sept. 21	3	1	16	0	16	130	0	0	163	
1943	July 22- Oct. 7	2	0	17	0	5	69	0	0	91	
TOTAL CATCH BY SPECIES			338	1597	431	608	2086	3	6		
GRAND TOTAL									5069		

* The terms of the International Whaling Convention prohibits the hunting of right whales after 1935.

Table 2. Annual catch of whales and whaling effort at Naden Harbour whaling station, Queen Charlotte Islands, 1911 to 1941.

YEAR	SEASON	NUMBER OF CHASERS	NUMBER OF WHALES						TOTAL
			BLUE	FIN	SEI	HUMPBACK	SPERM	RIGHT	
1911	Apr. 11- Nov. 7	?	37	208	0	178	1	0	424
1912	Mar. 28- Oct. 19	?	50	187	0	99	4	0	340
1913	Apr. 13- Sept. 19	2- 3	7	73	0	27	5	0	112
1914	Apr. 17- Oct. 11	2	29	88	0	24	2	1	144
1915	July 7- Sept. 24	3	5	64	0	23	0	0	92
1916	Apr. 30- Sept. 30	2- 3	6	82	0	18	1	0	107
1917				station closed					
1918	Apr. 26- Oct. 4	2	15	57	0	23	5	0	100
1919	May 7- Oct. 24	2	24	57	5	18	7	0	111
1920	Apr. 25- Oct. 26	3	13	54	42	72	7	0	188
1921				station closed					
1922	June 5- Oct. 23	3	4	57	0	27	7	0	95
1923	May 8- Oct. 20	2	31	37	3	25	24	0	120
1924	May 29- Oct. 1	2	13	41	2	3	12	2	73
1925	May 24- Oct. 2	2	4	28	3	5	14	1	55
1926	May 31- Oct. 6	2	3	33	1	4	16	1	58
1927	June 14- Oct. 9	3	7	66	0	4	17	0	94
1928	June 10- Oct. 3	?	27	26	2	4	19	0	78
1929	May 27- Oct. 8	1+	9	43	10	3	50	0	115
1930	June 7- Aug. 21	2	10	9	8	2	58	0	87
1931				station closed					
1932				station closed					
1933				station closed					
1934	May 20- Sept. 4	3	0	41	0	5	84	0	130
1935				station closed					
1936	May 3- Sept. 19	3	2	35	0	5	113	0*	155
1937	May 20- Sept. 14	3	1	24	0	2	112	0	139
1938	Apr. 19- Sept. 12	3	4	15	0	1	117	0	137
1939				station closed					
1940				station closed					
1941	May 24- Sept. 13	3	1	25	0	2	59	0	87
TOTAL BY SPECIES			302	1350	76	574	734	5	
GRAND TOTAL									3041

* The terms of the International Whaling Convention prohibits the hunting of right whales after 1935.

Table 3. Annual catch of whales and whaling effort at Coal Harbour whaling station, Vancouver Island, 1948 to 1967.

YEAR	SEASON	NUMBER OF CHASERS	NUMBER OF WHALES									
			BLUE	FIN	SEI	HUMPBACK	SPERM	RIGHT	BAIRD'S	GRAY	TOTAL	
1948	May 30- Sept. 24	4	0	41	3	126	28	0*	0	0	198	
1949	May 16- Sept. 25	3	2	105	3	76	69	0	0	0	255	
1950	May 28- Sept. 15	3	4	150	24	95	40	0	1	0	314	
1951	Apr. 16- Sept. 23	5	9	216	5	51	153	1	1	0	436	
1952	May 19- Sept. 10	6	16	240	22	61	126	0	0	0	465	
1953	Apr. 17- Sept. 16	6	8	181	14	47	275	0	4	11**	540	
1954	Apr. 9- Sept. 12	6	11	150	134	106	226	0	3	0	630	
1955	Apr. 14- Sept. 12	6	11	120	139	37	320	0	3	0	630	
1956	May 22- Sept. 17	6	15	167	37	28	127	0	1	0	375	
1957	Apr. 11- Sept. 22	6	15	284	93	49	190	0	4	0	635	
1958	Apr. 12- Sept. 17	6	8	573	39	40	112	0	2	0	774	
1959	Apr. 13- Sept. 12	6	28	372	185	28	256	0	0	0	869	
1960				station closed								
1961				station closed								
1962	Apr. 20- Sept. 25	6	27	157	340	16	172	0	1	0	713	
1963	May 11- Sept. 23	5	30	220	154	24	147	0	3	0	578	
1964	Apr. 9- Sept. 23	5	12	140	613	10	105	0	0	0	880	
1965	Apr. 10- Sept. 22	5	9	83	603	18	151	0	0	0	864	
1966	Apr. 9- Sept. 23	5	0#	134	355	0##	229	0	2	0	720	
1967	Apr. 7- Aug. 28	5	0	102	89	0	303	0	0	0	494	
TOTAL CATCH BY SPECIES			205	3435	2852	812	3029	1	25	11		
GRAND TOTAL										10370		

* The terms of the International Whaling Convention prohibits the hunting of right whales after 1935.

** Ten whales were taken on a scientific research permit, the eleventh was caught in error. The terms of the International Agreement for the Regulation of Whaling prohibit the hunting of gray whales for commercial purposes after 1937.

International Whaling Commission prohibits the hunting of blue whales after 1965.

International Whaling Commission prohibits the hunting of humpback whales after 1965.

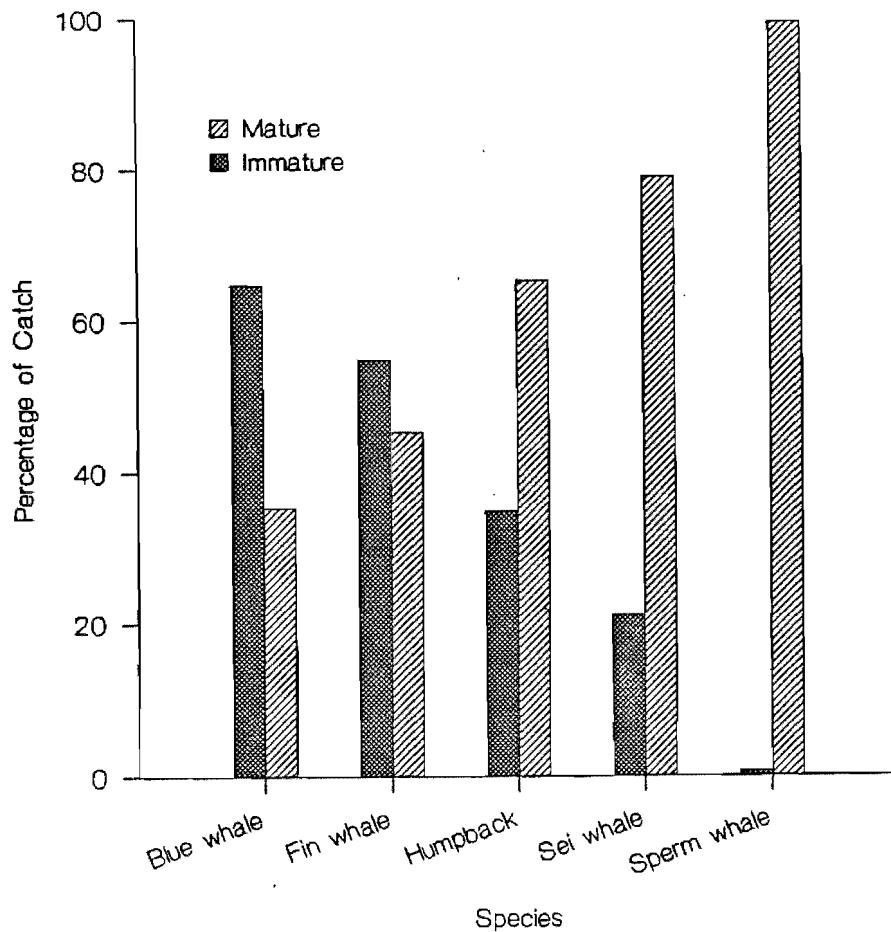


Figure 10. Percentage of sexually immature versus sexually mature whales in the combined catch from Rose Harbour and Naden Harbour whaling stations, Queen Charlotte Islands, 1924 to 1928. Blue whales $n=99$, fin whales $n=500$, humpback whales $n=115$, sei whales $n=128$, sperm whales $n=327$. Estimates of length at sexual maturity: blue whales, females 79ft, and males 74ft; fin whales, females 60ft, males 58ft; sei whales, females 42ft, males 39ft; humpback whales, females 37ft, males 36ft; and sperm whales, females 27ft, males, 33ft (Leatherwood and Reeves 1983).

7.0 WHALE DISTRIBUTION AND NATURAL HISTORY AS REVEALED THROUGH HISTORICAL RECORDS

Whaling catch records from the Queen Charlotte Islands provide invaluable information about the historical occurrence of whales in the area, but like all whaling records, they are biased in a number of ways. Sherman (1983) and Reeves (1983) discuss the difficulties associated with interpreting logbook and catch data, but there are two important biases that should be mentioned here.

Firstly, logbook entries and company records indicating where whales were caught may give a biased account of the historical distribution of the whales. Locations where whales were caught indicate that the boats operated in certain areas and found whales, but this does not necessarily mean that whales were not abundant in other areas. Perhaps the whalers found enough whales where they operated and did not need to travel further afield.

Secondly, variations in the catch of each species by month are not necessarily an indicator of seasonal changes in abundance. Other factors also affected the catch. Weather and sea conditions are usually best during the summer and poorer during the spring and early fall. Obviously these conditions affected the ability of the whalers to hunt. Monthly changes in the abundance of each species could also have been masked by whaler selectivity. It is likely that when possible, the whalers selected the more lucrative species, and ignored whales which were less profitable.

7.1 BLUE WHALES

Blue whales were a prize catch for the whalers because of their large size and high oil yield. Consequently, they were taken whenever possible. Yet blue whales were never a large part of the catch in the Queen Charlotte Islands, which suggests they were not as abundant as were other species in the area (Tables 1 and 2). Until 1965, when the IWC gave blue whales full protection from whaling, the number caught declined annually. Rose Harbour and Naden Harbour whalers took a total of 640 animals between 1910 and 1943. This number is in sharp contrast to a mere 82 blue whales caught between 1948 and 1965 by Coal Harbour whalers hunting within the study area.

Based on length estimates of calves at weaning (Leatherwood and Reeves 1983), blue whales of all sizes were taken, including very young and recently weaned calves. Tables 4 and 5 present mean lengths by year of blue whales processed at the Rose Harbour and Naden Harbour whaling stations. As expected with the baleen whales, females were larger than males. The largest blue whale recorded in the North Pacific was caught within the study area. It was 90 ft in length, and was processed at Naden Harbour, but its sex was not recorded.

The IWC regulations of 1946 set a minimum length limit of 65 ft for blue whales caught in shore-based operations and young animals could no longer be taken. In spite of this, six blue whales below the minimum length limit were caught between 1948 and 1967. The shortest of these was 54 ft. Table 6 presents mean lengths by year of all blue whales processed at Coal Harbour.

The sex ratio in the catch from the years for which data are available (1924-28, 1948-65) indicate that 95 of 171 (55.5%) of the blue whales caught were females. Among these females, 13 foetuses were reported (four from Rose Harbour, two from Naden Harbour and seven from Coal Harbour). The number of pregnant females in the combined catch was only 13.7 percent. This is likely an under-estimate as foetuses may not have been routinely reported at Rose Harbour and Naden Harbour. In comparison, the proportion of pregnant females in the catch from two whaling stations that operated in Alaska during the 1920's and 1930's was much higher (26%, in Brueggeman, Newby and Grotefendt, 1985).

The 13 recorded foetuses ranged in length from 11 inches to 15 ft (0.3-4.5 m) with the smallest reported in April and the largest in September. At birth a blue whale calf measures 23 ft (7 m) and calves are born during winter months (Leatherwood and Reeves, 1983). Based on foetal lengths from the whale catch in Alaska (1912 to 1939) Reeves et al., (1985) estimate that some calving probably occurred in October.

Blue whales were encountered in the open water of the Pacific, and were rarely found in Hecate Strait. Rose Harbour and Naden Harbour whalers ventured as far as 54 nm (100 km) offshore of Kunghit, Moresby and Graham Islands to find blue whales. Interestingly, the data shown in Figure 11 indicate that blue whales rarely ventured closer than 5.5 nm (10km) to shore. The catch was highest in July, August and September, although blue whales were caught

Table 4. Mean body lengths by year, species and sex, of whales caught at Rose Harbour whaling station, 1924 to 1928. All measurements are in feet. Only whales for which length and sex were recorded are included.

YEAR	BLUE		FIN		SEI		HUMP		SPERM		BAIRD'S		RIGHT	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
1924	n	18	27	4	45	19	6	19	-	47	-	1	-	1
	Range	66-84	52-77	42-66	38-65	45-49	26-56	27-44	30-48	-	43-60	-	-	-
	Mean	74.25	68.88	58.11	56.44	47	42.78	37.67	39.26	-	52.32	-	-	42
1925	n	7	6	22	35	15	15	13	10	51	-	2	-	-
	Range	64-79	67-78	42-69	44-65	39-51	41-49	29-56	25-45	-	41-59	-	-	-
	Mean	72.14	73.88	56.68	56.23	43.80	44.07	41.38	37.60	-	50	-	-	-
1926	n	6	5	48	41	12	13	10	10	64	-	-	-	-
	Range	49-80	64-79	50-74	40-65	35-50	35-50	30-50	30-50	-	45-57	-	-	-
	Mean	66.33	72	60.69	53.83	44.08	41.38	41.30	40.40	-	51.52	-	-	-
1927	n	1	2	36	36	2	5	8	9	65	-	-	-	-
	Range	-	70-71	44-68	47-65	-	40-44	29-48	27-47	-	43-55	-	-	-
	Mean	84	70.50	56.92	54.61	46	41.60	38	35.56	-	50.25	-	-	-
1928	n	13	8	59	53	4	7	9	7	55	-	1	-	-
	Range	61-84	49-78	30-69	35-65	40-52	38-47	30-45	28-43	-	25-36	-	-	-
	Mean	74.92	70.25	56.51	56.81	45	42.14	38	36.14	-	31.22	-	-	-
SD	6.87	10.36	7.70	6.44	6	3.34	5.32	4.88	3.35	4.25	-	-	-	

Table 5. Mean body lengths by year, species and sex, of whales caught at Naden Harbour whaling station, 1924 to 1927. All measurements are in feet. Only whales for which length and sex were recorded are included.

YEAR	BLUE		FIN		SEI		HUMP		SPERM		RIGHT	
	F	M	F	M	F	M	F	M	F	M	F	M
1924	n	6	7	22	19	19	46	64	1	1	11	1
	Range	71-82	70-77	46-71	58-64	42	45	33-47	-	-	50-64	-
	Mean	77.83	73.29	58.54	57.0	47	45	41.67	-	-	56.18	-
1925	n	2	2	16	10	2	2	4	1	14	-	-
	Range	77-84	67-77	48-68	40-64	48-49	40	25-39	-	-	48-58	-
	Mean	80.5	72	55.44	52.3	48.5	40	33.75	30	-	53.71	-
1926	n	2	1	11	15	1	1	2	2	16	-	-
	Range	71-75	-	47-69	47-70	-	-	43-48	-	-	41-58	-
	Mean	73.0	55	59.20	54.73	45	45	45.50	37.50	-	51.0	-
1927	n	2	3	14	17	-	-	1	1	14	-	-
	Range	79	67-73	43-64	45-63	-	-	32	33	-	50-57	-
	Mean	79.0	71.0	54.21	54.41	-	-	53.71	4.27	-	53.71	-
SD	0	3.46	5.60	5.78	-	-	2.27	-	-	2.27	-	

Table 6. Mean body lengths by year, species and sex, of whales caught at Coal Harbour whaling station, 1948 to 1967. All measurements are in feet. Only whales for which length and sex were recorded are included.

YEAR	BLUE		FIN		SEI		HUMP		SPERM		BAIRD'S		RIGHT	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
1948	n	-	24	17	1	2	71	55	-	-	28	-	-	-
	Range	-	47-64	52-64	-	46	33-54	30-47	-	-	40-56	-	-	-
	Mean	-	58.33	57.88	47	46	40.87	38.67	-	-	45.28	-	-	-
1949	n	-	5.01	3.37	-	0	4.39	3.27	-	-	3.61	-	-	-
	Range	2	49	56	50-65	2	36	40	36-52	69	-	-	-	
	Mean	77.78	60.75	58.69	48	38	40.39	39.17	42.35	42.35	3.91	-	-	
1950	n	4	81	69	37-65	14	34	61	40	40	1	-	-	
	Range	56-79	47-70	37-65	36-50	41-46	30-49	31-47	38-50	38-50	-	-	-	
	Mean	72.5	58.87	56.04	45.36	44.1	40.12	39.23	44.17	44.17	3.15	33	-	
1951	n	6	117	99	5.16	3.77	4.99	3.88	-	-	3.15	-	-	
	Range	65-78	46-70	41-64	-	38-56	32-46	29-45	32-39	32-56	1	-	1	
	Mean	74.66	58.87	57.10	-	45.4	39.06	38.97	35.23	41.87	29	-	42	
1952	n	9	119	121	4.58	4.94	4.98	3.78	4	1.92	4.30	-	-	
	Range	61-82	48-70	48-65	43-48	40-48	31	30	33-37	35-53	-	-	-	
	Mean	73.22	58.40	56.91	46.2	44.53	40.90	39.9	35	42.86	-	-	-	
1953	n	2	91	90	4.71	4.10	3.78	3.25	8	1.63	4.12	-	-	
	Range	75-79	43-69	45-65	36-50	45	32-47	32-45	31-37	32-53	-	-	-	
	Mean	77	60.49	56.63	46.5	45	39.16	39.35	34.25	43.22	-	-	-	
1954	n	6	61	89	4.71	4.71	3.99	3.61	2.05	2.05	1.89	-	-	
	Range	63-79	50-68	40-66	60	74	44	62	11	215	3	-	-	
	Mean	74	59.34	55.71	44.13	43.61	40.27	39.26	34.82	43.01	18.34	-	-	
1955	n	8	70	50	5.20	5.20	3.95	4.32	16	2.32	9.24	-	-	
	Range	65-85	49-71	44-63	40-51	35-48	34-47	32-44	33-39	31-55	3	-	-	
	Mean	73.62	59.7	55.04	45.02	43.19	40.06	38.333	35.63	42.85	33.33	-	-	
1956	n	12	89	78	4.58	4.58	2.43	3.84	1.75	1.75	0.58	-	-	
	Range	53-84	45-70	45-66	38-51	34-49	34-47	33-49	28-37	33-53	1	-	-	
	Mean	74.25	58.12	56.67	44.92	42.58	41.13	38.92	34.35	42.91	37	-	-	
1957	n	12	154	129	4.55	4.55	4.05	4.31	1.98	1.98	4.65	-	-	
	Range	65-83	46-70	43-67	37-51	35-48	33-45	33-45	31-38	28-53	4	-	-	
	Mean	75.5	60.55	57.40	45.40	43	41	40.52	35.18	42.62	35.5	-	-	
1958	n	5	258	315	4.77	4.77	3.58	3.42	1.67	1.67	4.41	-	-	
	Range	74-80	44-72	45-68	36-52	32-47	35-50	33-45	30-46	35-52	35	-	-	
	Mean	76.8	64.33	60.48	45.42	43	42.67	39.32	35.35	41.85	35	-	-	
1959	n	17	175	197	4.79	4.79	3.68	4.19	2.35	2.35	4.10	-	-	
	Range	59-80	44-70	36-69	37-52	33-49	34-47	28-51	30-38	31-53	0	-	-	
	Mean	71.65	59.54	56.64	45.04	43.28	40.73	40	35.2	41.36	-	-		
1962	n	16	90	66	5.08	5.08	3.11	2.97	1.41	1.41	4.71	-	-	
	Range	62-82	46-68	46-65	35-51	35-50	36-48	34-47	30-38	31-51	-	-	-	
	Mean	74.62	57.83	55.57	45.47	44.04	40.78	40.71	34.74	41.42	-	-	-	
	SD	5.75	5.19	4.54	3.63	2.55	4.47	5.02	1.71	4.70	-	-	-	

Table 6. Continued...

YEAR	BLUE		FIN		SEI		HUMP		SPERM		BAIRD'S		RIGHT	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
1963	n	13	120	100	51	103	11	13	51	96	-	-	-	-
	Range	57 -86	47 -71	45 -67	34 -51	37 -48	32 -48	32 -43	28 -39	32 -52	-	-	-	-
	Mean	73.41	59.52	56.44	45.71	43.57	40	38.84	35.06	42.44	-	-	-	-
	SD	6.63	4.96	5.61	3.80	2.60	5.02	3.56	1.99	5.26	-	-	-	-
1964	n	8	86	54	262	351	7	3	45	60	-	-	-	-
	Range	54 -81	44 -70	47 -68	35 -54	33 -51	37 -45	31 -34	28 -38	31 -53	-	-	-	-
	Mean	63.88	64.25	58.12	44.52	43.63	40	32.33	34.24	40.97	-	-	-	-
	SD	9.52	12.34	5.84	5.54	3.29	3.27	1.53	2.37	6.40	-	-	-	-
1965	n	6	49	34	263	340	11	7	81	70	-	-	-	-
	Range	60 -81	46 -67	45 -63	32 -52	31 -51	34 -46	31 -45	26 -49	33 -53	-	-	-	-
	Mean	70.17	56.71	54.53	43.29	42.29	40.27	39.71	35.28	40.44	-	-	-	-
	SD	9.15	4.73	6.22	4.82	4.41	4.56	5.34	2.59	5.12	-	-	-	-
1966	n	-	72	62	182	173	-	-	97	132	-	-	-	-
	Range	-	44 -71	46 -82	31 -52	32 -49	-	-	32 -40	29 -53	-	-	-	-
	Mean	-	58.96	57.77	42.68	41.43	-	-	35.61	41.29	-	-	-	-
	SD	-	6.679	5.707	4.821	4.032	-	-	1.469	6.108	-	-	-	-
1967	n	-	50	52	55	34	-	-	164	140	-	-	-	-
	Range	-	47 -70	40 -65	32 -52	32 -48	-	-	20 -39	27 -55	-	-	-	-
	Mean	-	60.78	57.04	43.98	42.79	-	-	34.98	39.74	-	-	-	-
	SD	-	6.40	6.0	4.33	3.49	-	-	2.48	5.53	-	-	-	-

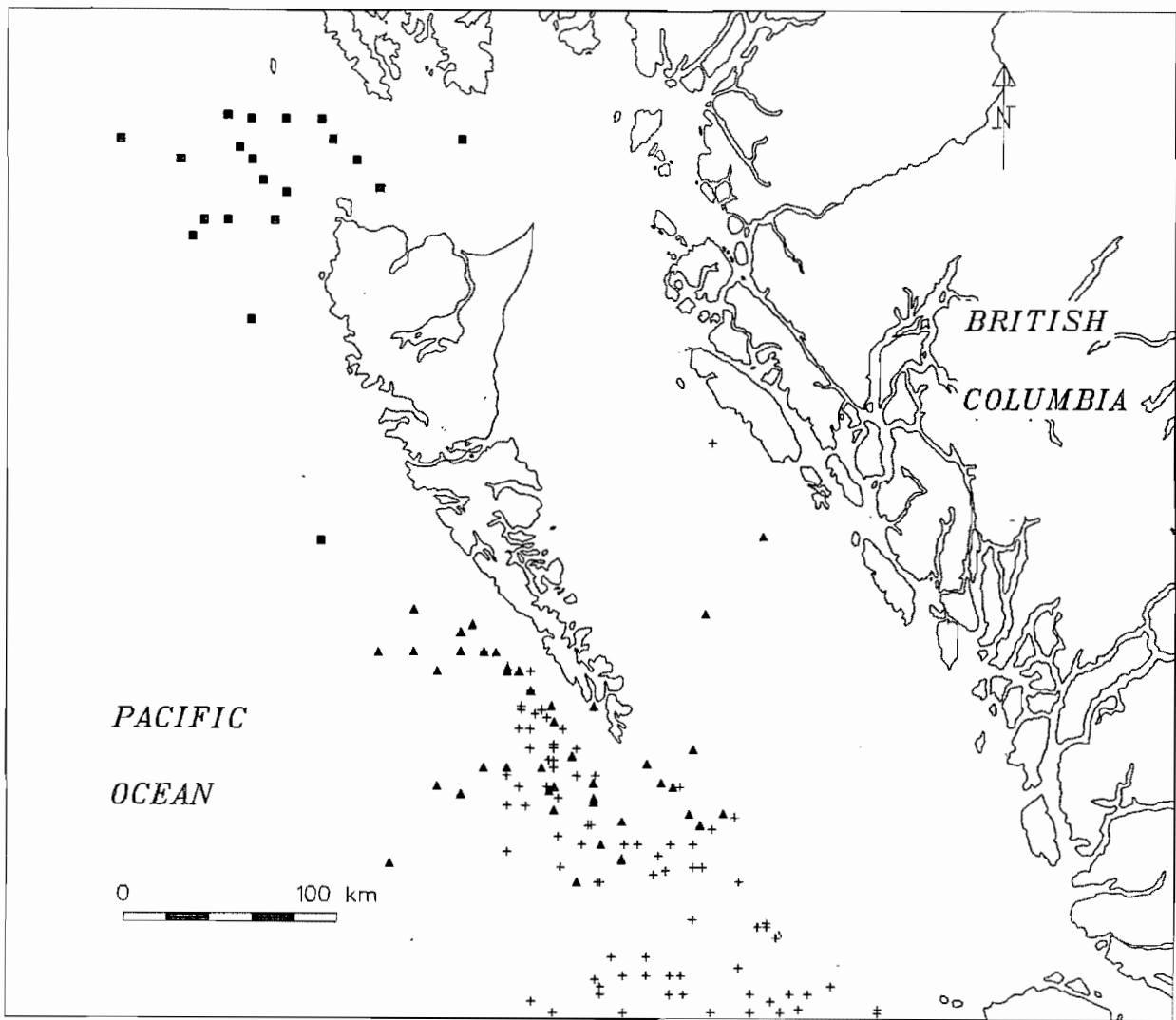


Figure 11. Locations of catches of 48 blue whales caught by Rose Harbour whalers, 1924-1928 (▲), 25 caught by Naden Harbour whalers, 1924-1927 (■) and 82 caught by Coal Harbour whalers, 1948-1967 (+). Only Coal Harbour blue whales caught within the study area have been included.

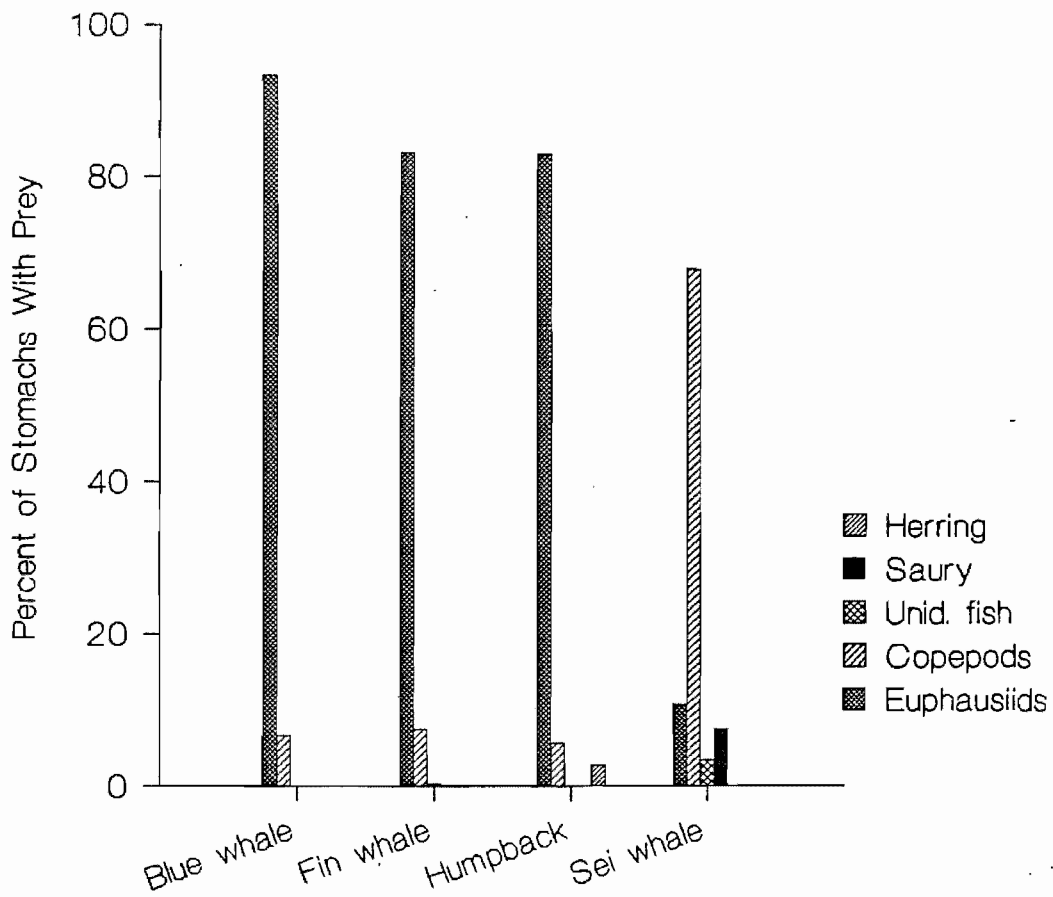


Figure 12. Stomach contents of baleen whales processed at Coal Harbour whaling station, Vancouver Island, between 1962 and 1967. Percentages are calculated using only whales whose stomachs contained prey. Blue whales $n=30$ of 52, fin whales $n=307$ of 647, humpback whales $n=35$ of 54, sei whales $n=543$ of 1586.

throughout the whaling season. In Alaska during the same period, the majority of blue whales were caught in June, July and August. The effects of weather on whaling activity in the Queen Charlotte Islands may also have been a factor affecting the monthly catch results.

Blue whales were most frequently encountered travelling singly or in pairs. Of 87 sightings by Coal Harbour whalers between 1963 and 1967, single animals and pairs of animals were encountered 81 times, while groups larger than 4 animals were reported only twice. These larger groups may have been feeding aggregations, since blue whales are rather solitary but will congregate in prime feeding areas (Leatherwood and Reeves, 1983).

At the south end of the Queen Charlotte Islands and off the west coast of Vancouver Island, blue whales fed almost exclusively on euphausiids (Figure 12). Two species of euphausiids were identified in the stomachs of Coal Harbour whales, *Thysanoessa spinifera* and *Euphausia pacifica*. These two species predominate as food of baleen whales in the eastern North Pacific (Nemoto, 1959). Although there are no data on the stomach contents of whales caught off the north end of the Queen Charlotte Islands, diet studies from Japanese pelagic whaling operations in the North Pacific confirm that blue whales feed almost exclusively on euphausiids throughout the North Pacific (Nemoto and Kawamura, 1977).

7.2 FIN WHALES

From the catch statistics, it is clear that fin whales were considerably more abundant off the coast of British Columbia than were blue whales. Between 1910 and 1943, 2,947 fin whales were caught around the Queen Charlotte Islands (Tables 1 and 2). An additional 525 fin whales were caught within the study area by Coal Harbour whalers between 1948 and 1967.

As with blue whales, length measurements indicate that very young animals were taken during the years 1924 to 1928 (see mean lengths in Tables 4 and 5). On 20 occasions, fin whales less than 46 ft were taken. The smallest was a 30 ft calf. As is characteristic of all baleen whales, male fin whales were smaller than females.

The IWC regulations in 1946 set a minimum length limit of 50 ft for fin whales taken by shore-based whaling operations. However, calves and young animals were still taken 37 times between 1948 and 1967. The smallest fin whale taken was 36 ft. The lengths of fin whales

caught during these later years were similar to those caught earlier by the Rose Harbour and Naden Harbour whalers. See Table 6 for mean lengths by year of all Coal Harbour fin whales. Pike (1956) found that 50 percent of the fin whales he examined between 1949 and 1953 were immature.

Records of the sex of 1,062 fin whales (caught between 1924-1928, and 1948-1967) indicate that 503 (47%) were females. Foetuses were reported in 18 of the females processed at Rose Harbour and Naden Harbour, and in 36 of the fin whales processed at Coal Harbour. Pregnant females ranged in length from 54 ft to 74 ft (16 m-22.5 m) although seven were less than 60 ft (18 m), which is the estimated length at sexual maturity according to Leatherwood and Reeves (1983).

There was considerable variation in the size of foetuses found throughout the whaling season, suggesting that calves were not born synchronously. In the months of April, May, and June, foetuses ranged in length from 6 inches to 6 ft 6 inches (0.15-2.0 m) and in August and September, lengths still varied widely between 3 ft and 18 ft (0.9-5.5 m). Calves average 20 ft in length at birth (Leatherwood and Reeves, 1983) and based on historical data from Alaskan whaling operations, Reeves et al.(1985) suggest that some calving occurs in September and October. Pike (1956) concludes that calving peaks between November and January in British Columbia.

In the southern Queen Charlotte Islands, fin whales were found off the west coast of Kunghit and Moresby Islands, up to 55 nm (100 km) offshore, and between Cape St. James and the northern tip of Vancouver Island. They were also caught frequently in Hecate Strait. During the Coal Harbour era, large numbers of fin whales were also taken in Caamano Sound, between Banks Island and Aristazabal Island, and in other mainland channels and inlets. Off the north end of the Queen Charlotte Islands, fin whales were encountered throughout Dixon Entrance and up to 70 nm (125 km) off the west coast of Graham Island (Figure 13). Fin whales were caught throughout the whaling season, but the catch was highest during the months of July and August. This is consistent with the monthly catch distribution at the Alaskan whaling stations (Reeves et al., 1985). Pike and MacAskie (1969), suggest that there was a summer resident population

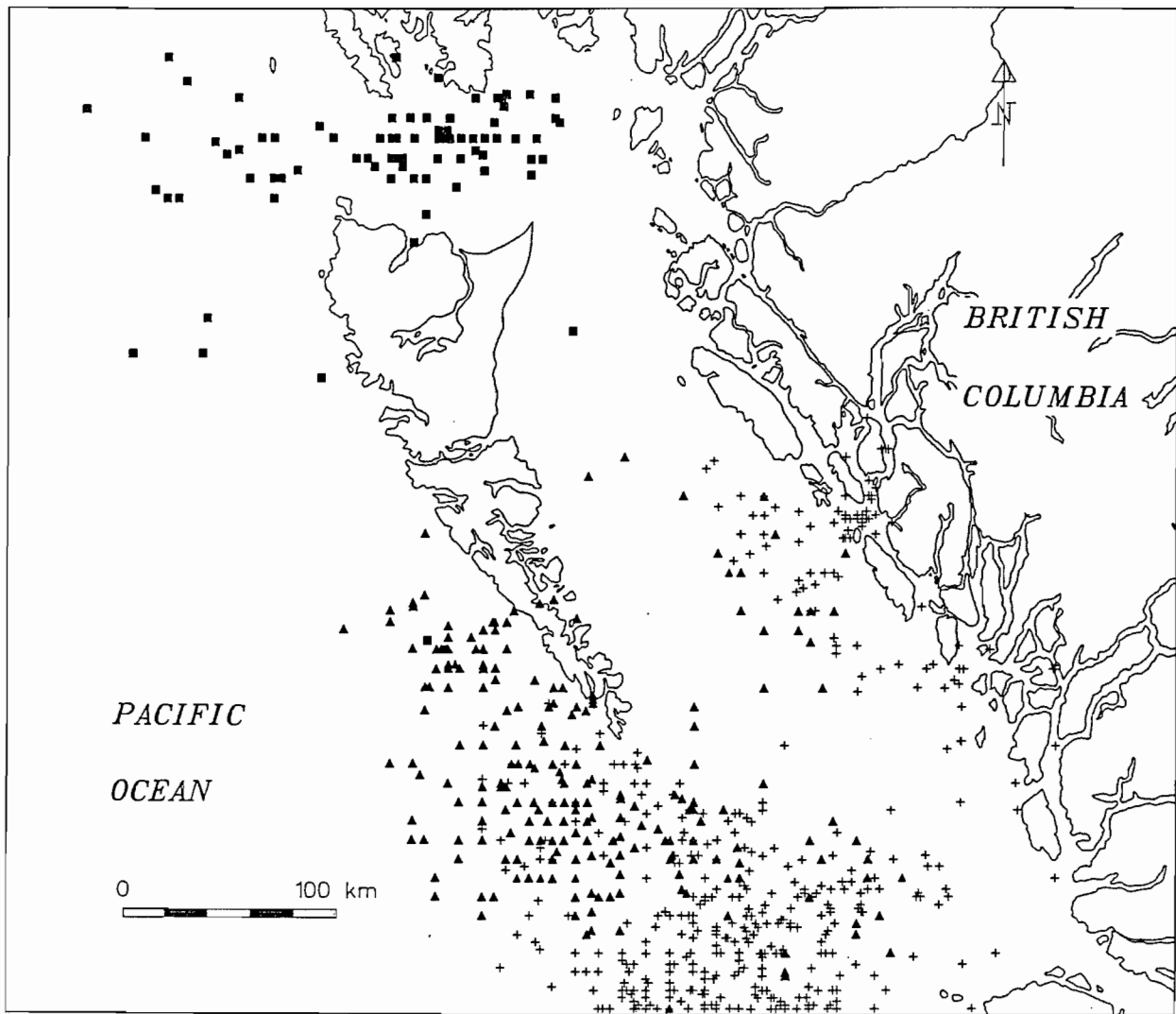


Figure 13. Locations of catches of 330 fin whales caught by Rose Harbour whalers, 1924-1928 (▲), 153 caught by Naden Harbour whalers, 1924-1927 (■) and 525 caught by Coal Harbour whalers, 1948-1967 (+). Only Coal Harbour fin whales caught within the study area have been included.

of immature animals that fed off the coast of British Columbia.

Of 649 fin whale sightings collected between 1963 and 1967, 516 were of whales travelling in groups of one to three individuals. Within the study area, groups of 10 to 15 animals were sighted on 12 occasions and groups of 20 animals were sighted twice.

Like blue whales, fin whales caught near the south end of the Queen Charlotte Islands and off the west coast of Vancouver Island fed almost exclusively on euphausiids. The balance of their diet was made up of copepods and fish (Figure 12). Only one species of copepod, *Calanus cristatus* was identified from the stomach contents. There are no data on the stomach contents of fin whales caught off the north end of the Queen Charlotte Islands, but elsewhere in the north Pacific, fin whales have also been found feeding mainly on euphausiids and to a lesser extent on copepods and fish. The proportion of copepods and fish in their diet can be as much as 30% (Nemoto and Kawamura, 1977).

7.3 SEI WHALES

Sei whales did not comprise as large a portion of the catch at Rose Harbour and Naden Harbour as fin whales did. Only 507 whales were taken during the 30 years the stations operated (Tables 1 and 2). In comparison, 2,857 sei whales were caught by Coal Harbour whalers during 16 years of operations, but only 291 of these were taken in the study area. This suggests that sei whales were not abundant around the Queen Charlotte Islands.

Only one sei whale calf measuring 26 ft was taken between 1924 and 1928. Aside from this, the rest of the catch appears to have been comprised of mature animals. Tables 4 and 5 show mean lengths of sei whales processed at Rose Harbour and Naden Harbour, from 1924 through 1928.

The whaling regulations imposed in 1946 set a minimum length limit of 35 ft for sei whales. Twelve sei whales below this limit were taken in the study area between 1948 and 1967. Average lengths of females and males taken between 1948 and 1967 were similar to those taken between 1924 and 1928. Table 6 presents mean lengths of all Coal Harbour sei whales.

Of the 419 sei whales for which sex was recorded, 164 (39%) were females. Foetuses were reported in 16 of the Coal Harbour sei whales and in nine of the Rose Harbour sei whales.

Only one of the pregnant females was less than 41.6 ft (12.7 m) in length, which is the lower limit to the estimated length range at sexual maturity (Leatherwood and Reeves, 1983). Foetuses in whales caught in April, May and June ranged in length from 1 ft 6 in to 5 ft (0.4-1.5 m, n= 19). By September, foetuses ranged from 10 ft to 12 ft (3-3.6 m, n= 4). At birth sei whale calves measure between 15 ft to 16 ft (4.5-4.8 m) in length (Leatherwood and Reeves, 1983) which suggests that the females carrying large foetuses in September were nearing parturition.

Sei whales were encountered up to 40 nm (72 km) off the west coast of the Queen Charlotte Islands (Figure 14). Based on Japanese whaling records, Nemoto (1959) concludes that sei whales are largely an oceanic species. Unlike fin whales, sei whales were rarely found in Hecate Strait. They were caught throughout the season, with most whales caught in June, July and August, which is similar to the catch of fin whales and blue whales.

Between 1963 and 1967, there were 1,446 sightings of sei whales recorded by Coal Harbour whalers. In both the study area and off the coast of Vancouver Island, 88% of the sightings were of individuals or of groups numbering no more than five individuals. These group size reports are consistent with those from other areas (Leatherwood and Reeves, 1983). Within the study area there was only one sighting of a group larger than 10 individuals.

Off the southern end of the Queen Charlotte Islands, and off the coast of Vancouver Island, sei whales fed largely on copepods. Euphausiids and saury made up the rest of their diet (Figure 12). Saury (*Cololabis saira*) are a small slender schooling fish about 14 inches (0.3 m) in length (Hart, 1973) which also feed on copepods (Nemoto, 1959). Copepods are smaller than euphausiids and probably make up a large part of the sei whale diet because the baleen fringe of sei whales is very fine and allows them to sieve these tiny prey more efficiently than other rorquals (Rice 1977). Although there is no information on diet from the north coast of the Queen Charlotte Islands, data from Japanese pelagic whaling operations in the North Pacific present similar results (Nemoto and Kawamura, 1977).

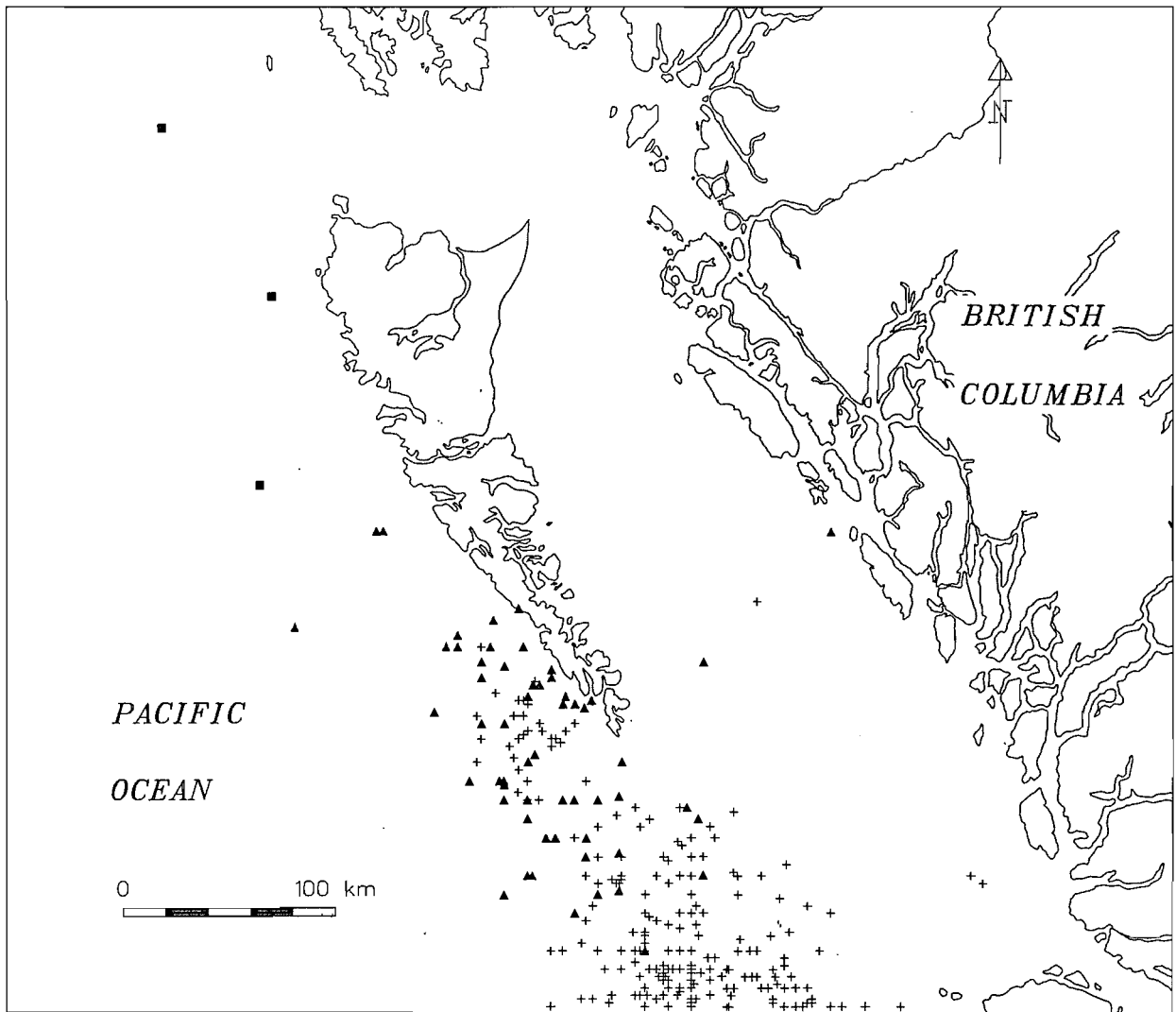


Figure 14. Locations of catches of 73 sei whales caught by Rose Harbour whalers, 1924-1928 (▲), 5 caught by Naden Harbour whalers, 1924-1927 (■) and 291 caught by Coal Harbour whalers, 1948-1967 (+). Only Coal Harbour sei whales caught within the study area have been included.

7.4 HUMPBACK WHALES

Humpback whales often congregate near coastal areas and around oceanic islands (Nemoto, 1959) so that despite their small size, they were the prime target of coastal whalers from California to Alaska in the early years of this century. In 1929, humpback whales still made up about half of the coast wide catch from California to Alaska (Kellogg, 1931). In the waters surrounding the Queen Charlotte Islands, 1,182 humpback whales were caught between 1910 and 1943 (Tables 1 and 2) but only 117 were caught between 1948 and 1967 (Figure 15).

Length measurements indicate humpback whales of all sizes including calves were taken in the whaling operations during 1924 through 1928. The smallest animal taken was 25 ft, and as consistent with the other baleen whales, females were larger than males (Tables 4 and 5).

Whaling regulations imposed in 1946 set a minimum length limit for humpback whales at 35 ft (11 m), but 7 humpbacks shorter than this were still taken within the study area between 1948 and 1967. Lengths of humpback whales caught during this period were similar to those caught between 1924 and 1928. Table 6 presents mean lengths of all Coal Harbour humpback whales.

Of 233 humpback whales for which sex was recorded, 110 (47%) were females. No foetuses were reported among 53 females caught between 1924 and 1928 but among 57 females caught between 1948 and 1965, 16 foetuses were reported. The 16 cows were greater than 36 ft (11 m), which concurs with Leatherwood and Reeves (1983) estimated lengths at sexual maturity.

The size range among humpback whale foetuses was smaller than for the other rorquals, with the exception of one foetus which measured 15 ft 5 in, from a female caught in June. Lengths ranged from 7 inches to 5 ft (0.2-1.5 m) and in general, foetus length increased over the course of the summer. The largest was a 5 ft (1.5 m) foetus found in a female caught in September. The smallest foetus was from a female caught in May. Data from the Alaskan whaling operations show that foetuses measured up to 9 ft by September and 12.5 ft by October (Reeves et al., 1985). At birth, humpback whale calves measure 15 ft to 16 ft (4.5-4.8 m, in Leatherwood and Reeves, 1983).

In the southern Queen Charlotte Islands, humpback whales were encountered up to 55 nm (100 km) off the west coast of Kunghit and Moresby Islands. They were also caught between

Cape St. James and the northern tip of Vancouver Island. Humpback whales also ventured into Hecate Strait and into channels and inlets along the adjacent mainland. Off the north end of the Queen Charlotte Islands, humpbacks were encountered throughout Dixon Entrance and at least as far as 45 nm (81 km) west of Graham Island (Figure 15).

Between 1963 and 1967, humpback whales were most commonly encountered singly or in pairs (68 of 71 reported sightings). This is consistent with observations from other areas although feeding aggregations of 12 to 15 animals are also seen (Leatherwood and Reeves, 1983). Humpback whales were caught primarily during July, August and September. In Alaska, the catches peaked in June, July and August (Reeves et al., 1985).

Off the southern end of the Queen Charlotte Islands and off Vancouver Island, humpback whales fed primarily on euphausiids. Copepods, herring and other unidentified fish made up the balance of their diet (Figure 12). There are no stomach content data pertaining to the northern portion of the Queen Charlottes, however data from humpback whales caught during Japanese pelagic whaling operations in the North Pacific show a similar diet (Nemoto and Kawamura, 1977).

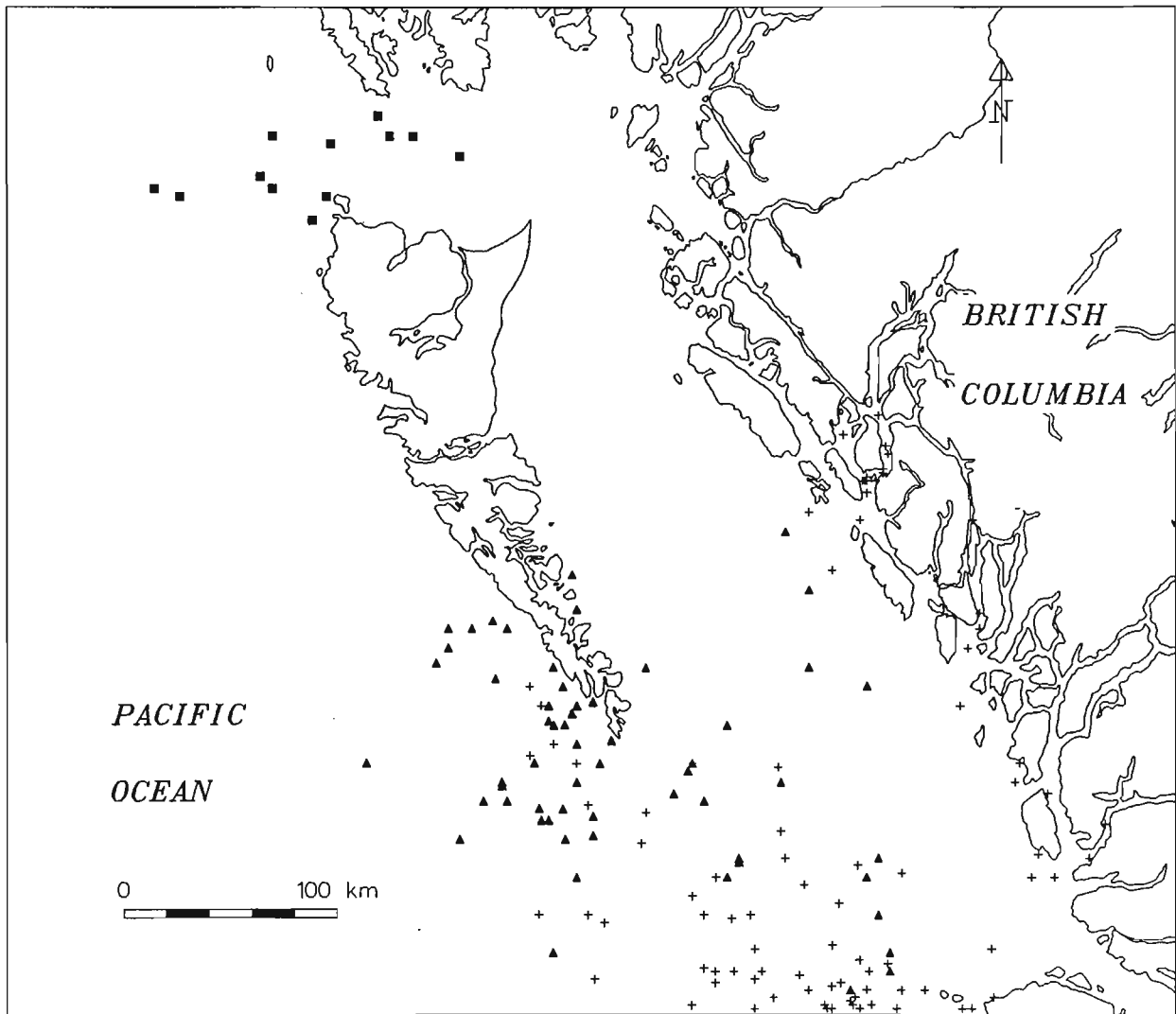


Figure 15. Locations of catches of 76 humpback whales caught by Rose Harbour whalers, 1924-1928 (▲), 16 caught by Naden Harbour whalers, 1924-1927 (■) and 117 caught by Coal Harbour whalers, 1948-1967 (+). Only Coal Harbour humpback whales caught within the study area have been included.

7.5 SPERM WHALES

Sperm whales made up a significant part of the catch in the Queen Charlotte Islands. During the years that Rose Harbour and Naden Harbour whaling stations operated, 2,820 sperm whales were caught. They seem to have been particularly abundant off the southern end of the Queen Charlotte Islands, where 74% of the whales were caught (2,086 sperm whales) (Tables 1 and 2). An additional 359 sperm whales were caught within the study area by Coal Harbour whalers, between 1948 and 1967.

Length measurements of sperm whales caught between 1924 and 1928 indicate that both adult and immature animals were taken. As is typical for the species, males were larger than females. Table 4 and 5 present mean lengths by year of whales processed at Rose Harbour and Naden Harbour, between 1924 and 1928.

The IWC regulations of 1946 set a minimum length limit for sperm whales at 35 ft (10.6 m). Despite this, young sperm whales as small as 20 ft were still taken occasionally. Mean lengths of all Coal Harbour sperm whales are listed in Table 6.

Both the sex ratio of the catches and the group sizes reported from sightings are consistent with current knowledge of the social organization and migratory habits of sperm whales. The sex ratio of the catch reflects the fact that females do not migrate as far north as males (Pike 1965a). Of 706 sperm whales caught in the study area, only 45 (6.3%) were females. A school of about 20 females and calves were encountered in 1934 off the west coast of Kunghit Island, and the incident was so unusual that it was reported in a letter to the office of Consolidated Whaling in Victoria (Anon, 1934). Sightings of schools of females were obviously quite rare near the islands.

In April, May, and June, 15 females carrying foetuses were caught, and the foetuses ranged in length from 7 ft to 12 ft (2-3.6 m). At birth, sperm whale calves measure 11 ft to 15 ft (3.5-4.5 m) (Leatherwood and Reeves, 1983). Pike (1965a) estimates that calving peaks in August. This timing appears consistent with the foetus lengths reported in the whaling records.

Sightings of sperm whales by Coal Harbour whalers between 1963 and 1967 show that within the study area, most groups numbered no more than five individuals. These would likely have been adult males, since large males tend to be solitary, or to travel in small groups (Pike 1965a).

There were two instances of groups of 12 to 15 animals and 5 occurrences of groups of 20 to 40 individuals sighted by whalers within the study area. Large groups were encountered near the northern tip of Vancouver Island, in April, May, and June. This is consistent with the seasonal occurrence of large schools of females and juveniles, which may or may not be accompanied by a few bulls.

Large groups were more common in areas offshore of Vancouver Island. A total of 55 sightings of groups of 20 to 50 whales were made by Coal Harbour whalers. The majority occurred during the months of April, May and June. These sightings are not surprising given that females travel in large groups and do not migrate as far north as males.

Sperm whales were caught up to 55 nm (100 km) off the west coast of Kunghit and Moresby Islands and southward to the northern tip of Vancouver Island (Figure 16). Interestingly, a few sperm whales were caught during the 1950's in coastal waterways on the adjacent mainland. This is unusual since sperm whales are a deep-water species (Leatherwood and Reeves, 1983). They were found throughout the season, but most were caught in May, June and July. This is consistent with the monthly catch distribution at two Alaskan whaling stations (Reeves et al., 1985).

Sperm whales are deep divers and have been found at depths of more than 1000 m (Leatherwood and Reeves, 1983). Stomach content data from Coal Harbour show that sperm whales fed primarily on squid, especially *Moroteuthis robusta* and *Gonatus* sp.. They also fed on various species of fish including ragfish, rockfish, dogfish, skate and lamprey (Figure 17).

Prey species such as ragfish (*Ikosteus aenigmaticus*), which occur at depths of 732 m (Hart, 1973) and giant squid, which are found at depths of 200 to 600 m (Fiscus, Rice and Wolman, 1989) indicate that sperm whales off the Queen Charlotte Islands were indeed feeding at great depths. Ragfish are large, reaching lengths of 2 m or more (Hart, 1973). The mantles of giant squid taken from the stomachs of sperm whales in the North Pacific have been up to 1.3 m in length (Fiscus et al., 1989). There is only one report on the stomach contents of a sperm

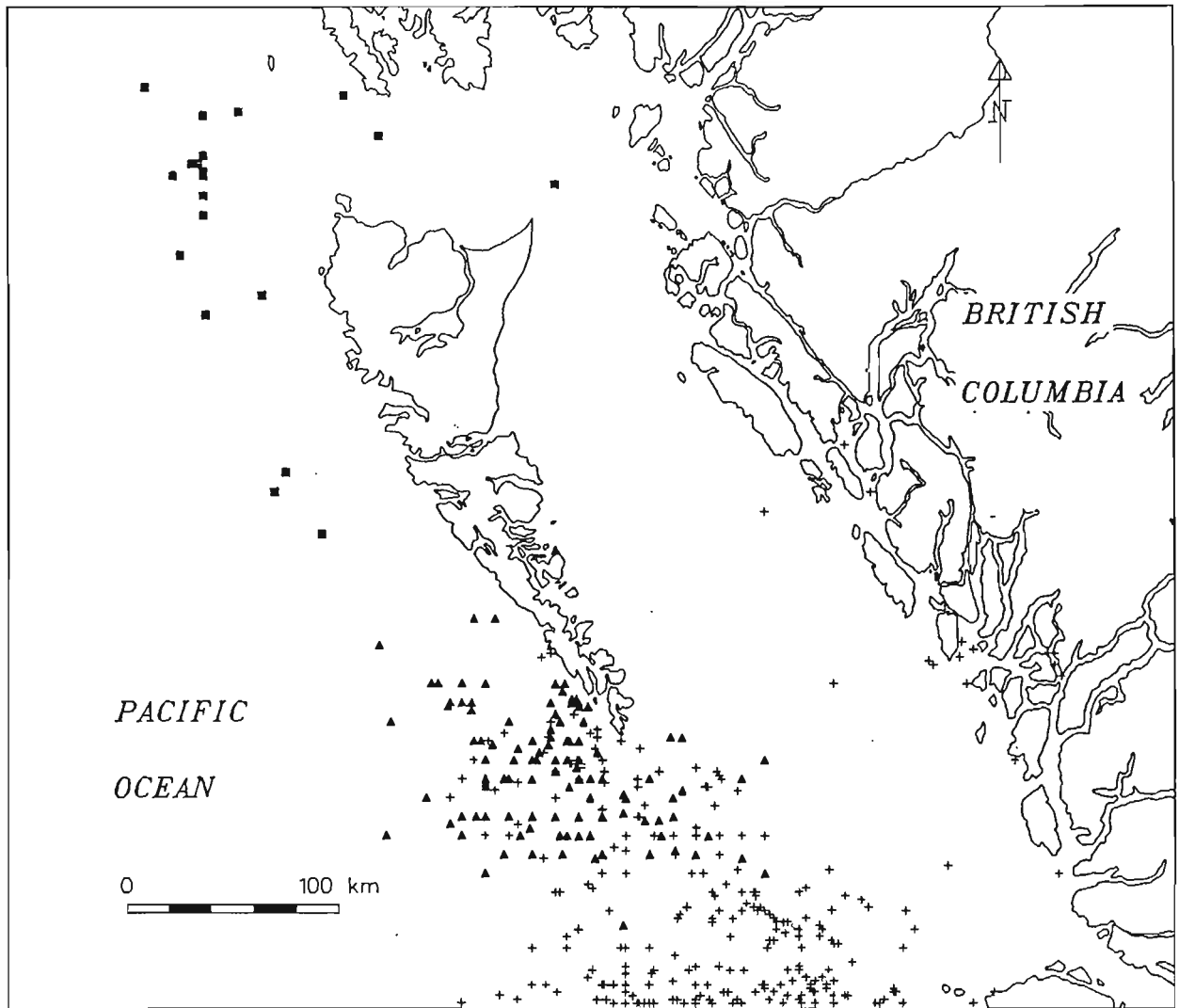


Figure 16. Locations of catches of 244 sperm whales caught by Rose Harbour whalers, 1924-1928 (▲), 54 caught by Naden Harbour whalers, 1924-1927 (■) and 359 caught by Coal Harbour whalers, 1948-1967 (+). Only Coal Harbour sperm whales caught within the study area have been included.

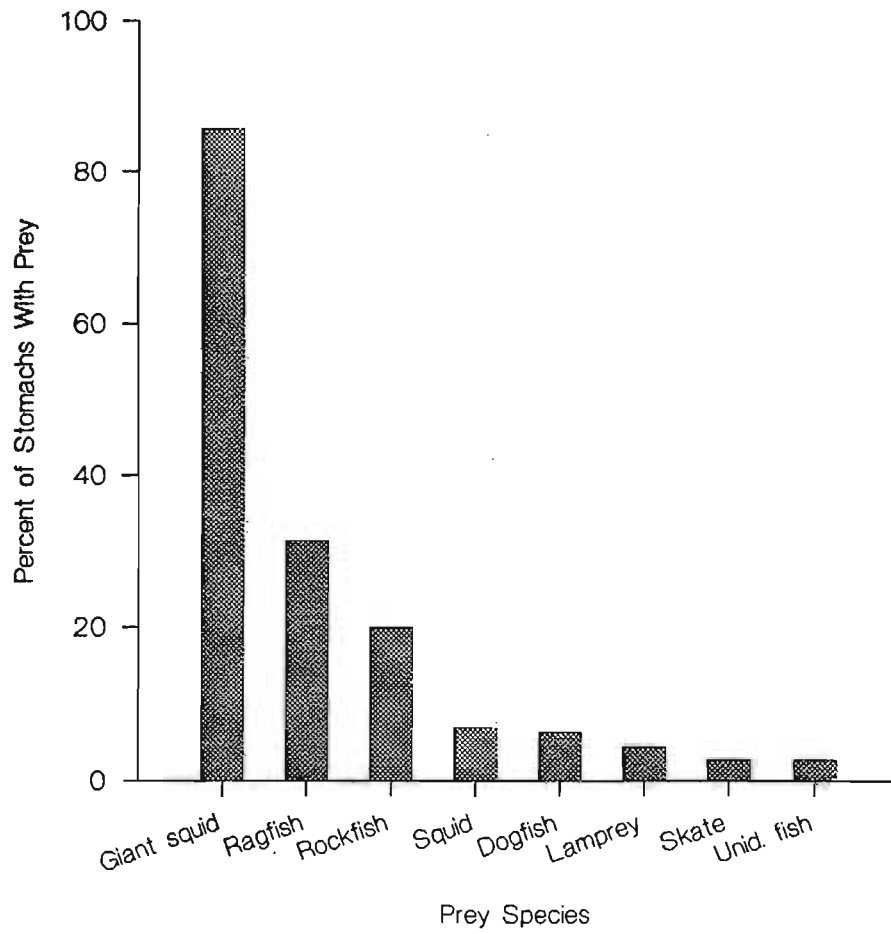


Figure 17. Stomach contents of sperm whales processed at Coal Harbour whaling station, Vancouver Island, between 1962 and 1967. Percentages are calculated using only whales whose stomachs contained prey, (n=501 of a total of 792 whales caught).

whale from the Rose Harbour records, but it is similar to the Coal Harbour data in that squid, ragfish, and lamprey were mentioned (Robbins et al., 1937). There are no data on diet of sperm whales from the north end of the Queen Charlotte Islands. In a general review of sperm whale diet, Kawakami (1980) cites all of the above mentioned prey.

7.6 RIGHT WHALES

Right whales were extremely rare along the coast of British Columbia, and remain so today. Only eight were caught between 1910 and 1934, prior to whaling regulations that prohibited hunting of right whales. A ninth right whale was taken accidentally off Vancouver Island in July of 1951.

Eight of the nine right whales were caught off the Queen Charlotte Islands. Of these eight, records of the sex, length and location of capture survive for only four animals, all of which were caught in 1924. Three of the four whales were caught in June. Two were females, measuring 62 ft (19 m) and 45 ft (14 m) in length and one was a male, measuring 57 ft (17 m). The male and the smaller female were caught in the western portion of Dixon Entrance, while the larger female was caught off the northwest side of Graham Island (Figure 18) The fourth right whale, a male measuring 42 ft (13 m), was caught in May off the southern end of the Queen Charlotte Islands. Most right whales in the north Pacific were caught in May, June and July during the era of sailing ships (Townsend, 1935).

There are no stomach content data available for the right whales caught in British Columbia. Right whales feed on copepods and euphausiids, with a preference for copepods (Leatherwood and Reeves 1983). Data on the stomach contents of nine right whales taken in Japanese pelagic whaling operations in the North Pacific indicate that copepods are eaten almost exclusively (Nemoto and Kawamura, 1977).

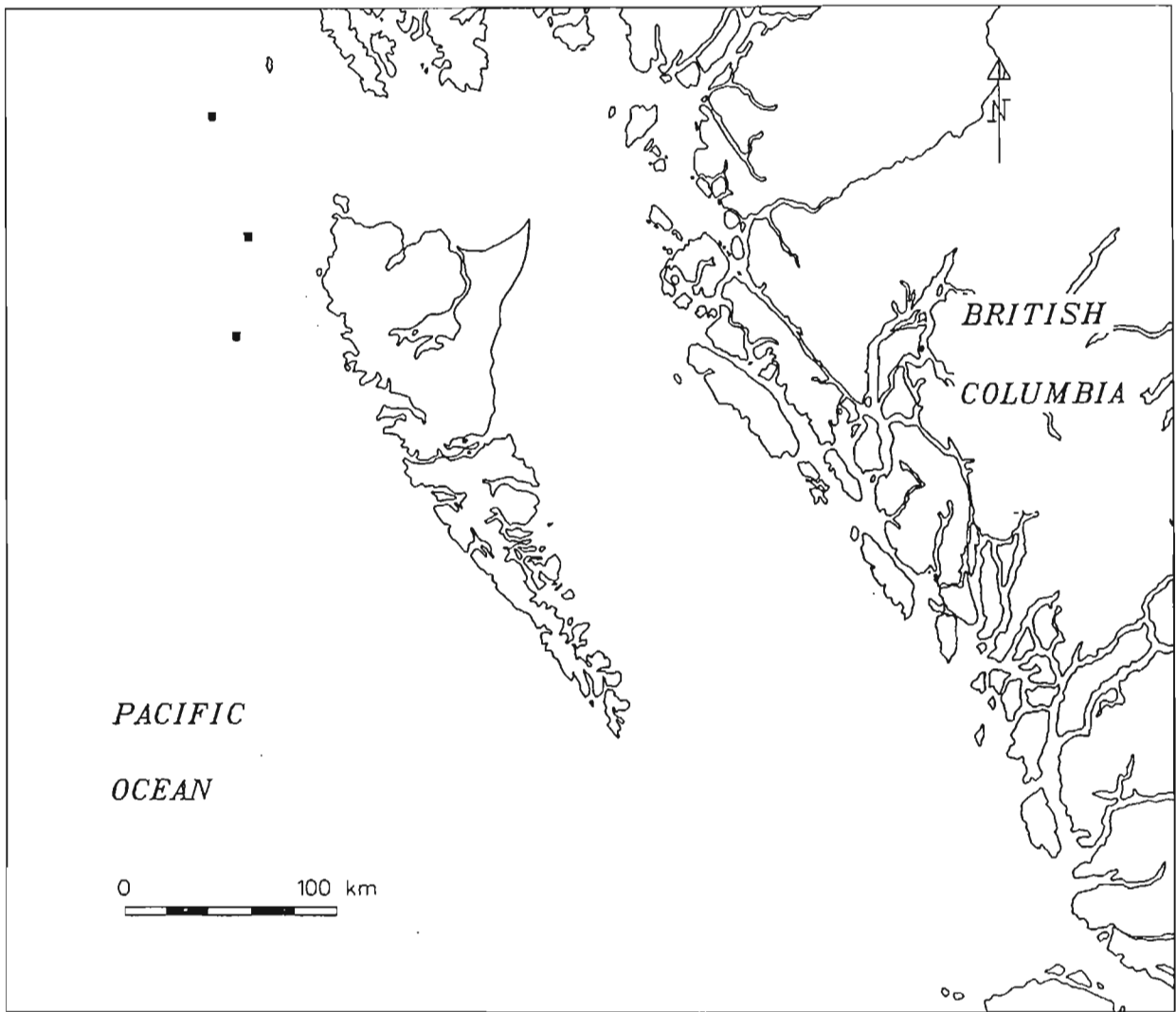


Figure 18. Locations of catches of three right whales caught by Naden Harbour whalers in 1924.

7.7 BAIRD'S BEAKED WHALES

A total of 10 Baird's beaked whales were caught off the Queen Charlotte Islands. Five animals were caught between 1910 and 1943 (Tables 1 and 2). Of 25 whales caught between 1948 and 1967, five were taken in the study area, the remaining 20 were caught off Vancouver Island.

Of the ten Baird's beaked whales caught off the Queen Charlotte Islands, all were caught off the south end of the Islands (Figure 19). Data exist for only eight of these animals. One was a female caught in July measuring 37 ft (11 m) and carrying a 6 ft (1.8 m) foetus. The other seven animals were males, caught in June, August and October. Two males measured 25 ft (7.6 m), the remaining five ranged in lengths from 32ft to 37 ft (10 m to 11 m).

Most Baird's beaked whales caught off the British Columbia coast and elsewhere in the North Pacific have been males (Pike and MacAskie 1969; Leatherwood and Reeves 1983). This suggests that the population is sexually segregated for at least part of the year (Leatherwood and Reeves 1983). Off the British Columbia coast Baird's beaked whales were typically encountered travelling in groups of 10 to 20 individuals (Pike and MacAskie 1969).

Baird's beaked whales are usually found in water deeper than 1000 m, and they feed on deep sea fish, octopus, squid, rockfish, crustaceans and sea cucumbers (Leatherwood and Reeves, 1983).

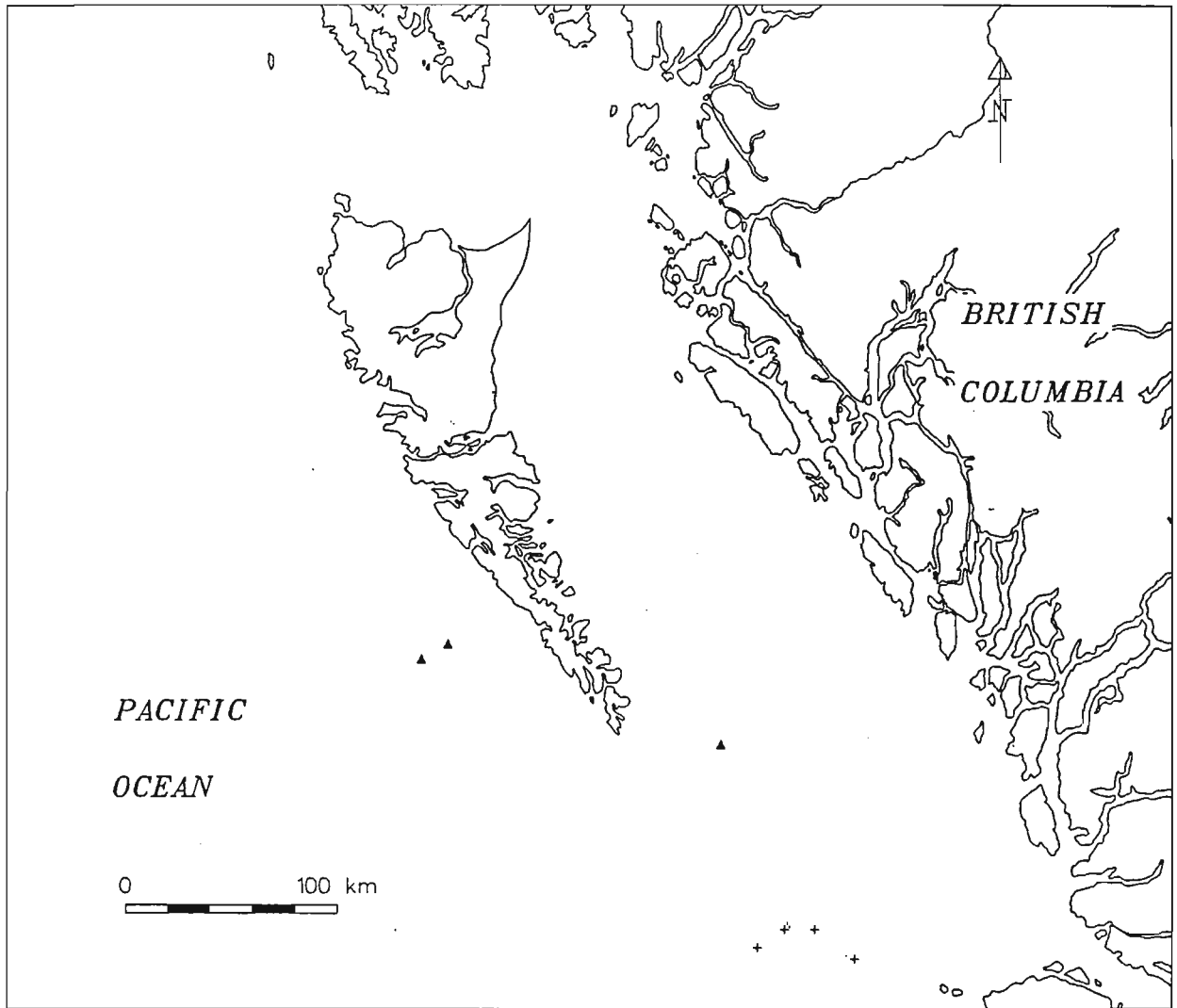


Figure 19. Locations of catches of 3 Baird's beaked whales caught by Rose Harbour whalers, 1924-1928 (▲) and 5 caught by Coal Harbour whalers, 1948-1967 (+). Only Coal Harbour Baird's beaked whales caught within the study area have been included.

8.0 PRESENT STATUS OF LARGE WHALES IN THE QUEEN CHARLOTTE ISLANDS

Historically, the Queen Charlotte Islands supported abundant whale populations. Recent sightings of large whales in the area are relatively uncommon, but this may be partly a consequence of the lack of systematic surveys. Considering current sightings in the light of both pre and post-exploitation population estimates is of interest in developing an understanding of the present distribution of whales in the area.

The following discussion is based on a compilation of recent sighting reports from several sources collected by the Vancouver Aquarium. The weather-observers at Cape St. James regularly recorded whale sightings for the Dept. of Fisheries, and these were made available for the period 1976-1989. In 1990 and 1991, the Vancouver Aquarium distributed Marine Mammal Sighting Record logs to interested mariners in the Queen Charlotte Islands. As well, the Marine Mammal Research Group in Victoria also contributed sightings from their "Whale Hotline" network. Aquarium research teams contributed sightings during the course of two seasons of killer whale surveys along the northern and eastern shores of the islands. Patrol vessels for the Dept. of Fisheries and Oceans have contributed sightings from 1988-1991, as have several of the sailing-charter boats working in the area, such as the *Darwin Sound* and the *Island Roamer*.

The use of sighting network data in determining population distribution and abundance should be interpreted cautiously. Some species, such as the fin and sei whale, are difficult to distinguish without extensive identification experience, and the possibility of species mis-identification must be considered when interpreting the reports. The use of photographs to document sightings and individually identify whales helps to reduce this potential source of error. This technique, known as photo-identification is becoming one of the most popular research techniques in population assessments (see IWC 1990, Special Issue 12).

Table 7 is a compilation of past and present population estimates for the large whales. Compiled from several sources, the majority of population counts are estimates, rather than the results of censuses, and are presented for comparison purposes only. This is useful to demonstrate relative changes in abundance both locally and globally, over time. It is clear that certain species of whales were harvested more intensely than others. Gray whales are included in the table even though they were not hunted commercially during the period covered by this report, because they are now one of the more commonly sighted species occurring around the Queen Charlottes. Baird's beaked whales are not included, as there is little current information on them.

Table 7. Present and pre-exploitation estimates of large whale populations, worldwide and in the North Pacific. Percentages are the present day population estimates as a percentage of former abundance.

SPECIES	WORLDWIDE POPULATIONS			NORTH PACIFIC POPULATIONS		
	HISTORIC	PRESENT	%	HISTORIC	PRESENT	%
Blue	228,000	14,000	6	5,000	1,500	30
Fin	548,000	120,000	22	?	17,000	?
Sei	256,000	54,000	21	63,000	14,000	22
Humpback	120,000	10,000	8	15,000	1,200	8
Right	?>100,000	4,000	4	?	100-500	?
Sperm	2,400,000	1,950,000	81	1,250,000	1,000,000	80
Gray	15,000	18,500	123	15,000	18,500	123

Sources: Leatherwood et al., 1982; Evans, 1987; Mitchell, 1986; Scarff, 1986; Rice, 1986b.; Wolman, 1986.

One might expect that the sighting frequency for different large whale species is directly related to their overall population levels, i.e., based on Table 7, that gray whales are seen relatively often and right whales are seen rarely. In general this is true, especially if the behaviour of the different species is taken into account. For example, gray whales might be seen feeding in shallow water, often less than 30 m in depth, but sperm whales are rarely found in waters of less than 200 m.

Gray Whales

Gray whales are the only species shown whose population numbers in the North Pacific have returned to historic levels. Their recovery from previous exploitation has been quite remarkable, especially when one considers that in 1875 there were only an estimated 4,400 whales left in the north Pacific, and by the 1900's they were commercially extinct (Henning et al, 1978; Rice, 1986a). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC), in a review of the potential species which may be in jeopardy in Canada, did not assign any risk status to gray whales (Campbell, 1991).

Gray whales are commonly reported feeding along the eastern shores of Graham and Moresby Islands, and in Skidegate Inlet in the spring (14 of 19 boat sightings). They are also frequently reported by the observers at Cape St James, with peak sightings occurring during December and early January. Many of the whales seen during these months were travelling south, on their return migration to breeding grounds in Mexico.

Right Whales

Right whales have been protected for even longer than gray whales, yet their population has never recovered from exploitation. In the 1840s, pelagic whalers on the Kodiak Grounds found one or more right whales, three days of every seven. Japanese scouting boats operating just over 100 years later in approximately the same area, found only one right whale for every 11,072 miles of cruising. In 1980, COSEWIC assigned the right whale to the endangered species list, and renewed this designation in 1990 (Campbell, 1991).

Present day sightings of right whales are rare, which is not surprising given the overall population estimate for the North Pacific. The only area in the world in which right whales appear to be recovering from intense exploitation is off the southern coast of South America, where the population is thought to number approximately 500 animals, and is growing at a rapid rate of 7% per year (Scarff, 1986).

Scarff (1983) discusses several potential factors which singly or in combination may have prevented or reduced the recovery rate of this species, such as pollution, mortality through net entanglement and ship collisions, and competition with sei whales for food. However, even if the population did return to historic levels, it is unlikely that many whales would be seen in close

proximity to shore. Although southern right whales congregate in near shore areas for calving and breeding, there is no evidence to suggest that the northern right whales did, even prior to exploitation.

Sperm Whales

Sperm whales were the target of commercial whaling for almost as long as right whales, yet as shown in Table 7, they are the most abundant large cetacean in the world's oceans. They have been hunted since 1712, and in some areas, they are still the target of aboriginal whaling. A COSEWIC report on their status is being prepared, but it is unlikely that their population will be designated any status.

Despite their overall abundance, there are relatively few recent sightings of sperm whales in the study area (4 sightings), although this may be biased as a reflection of the areas in which observers are travelling. Three of the four sightings were along the southwestern shore of the Queen Charlotte Islands in May. The fourth was in central Queen Charlotte Sound. Both of these areas are very exposed to the open Pacific, and are not commonly travelled by small boats. Figure 18 shows that these were areas in which historically sperm whales were found in abundance.

Humpback Whales

Of all the large whales considered here, the humpback is now the second rarest. It was protected from commercial harvesting in 1966. It received "threatened" status by COSEWIC in 1982 (Campbell, 1991), and there is a great deal of concern for its population worldwide (Wolman, 1986). Interestingly though, humpback whales were sighted more frequently by observers in boats than were any other species of whale (42 sightings). This may be a reflection of an the whales tendency to travel and congregate in nearshore waters, or perhaps it suggests that humpback whales are easier for the untrained observer to identify than many of the other large rorquals. The sightings occurred throughout the study area, but were most abundant in Dixon Entrance.

Blue, Fin and Sei Whales

Blue whale populations, despite over two decades of protection from whaling, are still not showing signs of recovery (Evans, 1987). In 1983, COSEWIC assigned a "vulnerable" status to blue whales in Canada. As seen from Table 7, fin and sei whale populations were not harvested as intensely as the blue whale, but globally their populations are only 22 and 21 percent respectively, of their pre-exploitation levels. Sei whale populations are currently under status review, but in 1987, the fin whale was also declared vulnerable by COSEWIC (Campbell, 1991).

Occasionally, sightings of other large rorquals such as blue and fin whales are reported in the study area. These should be interpreted cautiously, as it is difficult to distinguish between a fin, a sei, a small blue, or even a minke whale. The sightings for each of these species are widely scattered throughout the study area, and give us optimism that these species may continue to utilize the area.

Baird's Beaked Whales

Very little is known about the present or past distributions of Baird's beaked whales, but this may be a reflection of the fact that they are most commonly found in offshore waters (Leatherwood et al., 1982). No sightings were available for this report.

9.0 CONCLUSIONS

Whaling records from Rose Harbour, Naden Harbour and Coal Harbour reveal that a great abundance of large whales occurred near the Queen Charlotte Islands as recently as three decades ago. Most species of whales are far less numerous today but recent sightings, although sporadic, provide us with a sense of cautious optimism. To reliably assess the present status of these whales, systematic surveys are needed. Public interest in whales is increasing, and the strengthening and expansion of the existing sighting network would also provide much useful information on present-day distribution and abundance.

10.0 LITERATURE CITED

- Anon. 1934. Telegrams. William S. Lagen Collection. Suzallo Library, Manuscripts Division. University of Washington.
- Anon. 1941. Telegrams. William S. Lagen Collection. Suzallo Library, Manuscript Division. University of Washington.
- Anon. 1950. First report of the commission. International Commission on Whaling. 33 pp.
- Brueggeman J., T.C. Newby and R.A. Grotefendt. 1985. Seasonal abundance, distribution and population characteristics of blue whales reported in the 1917 to 1939 catch records of two Alaska whaling stations. Rep. Int. Whal. Commn. Volume 35: 405-411.
- Campbell, R.R. 1991. Rare and endangered fishes and marine mammals of Canada: COSEWIC fish and marine mammal subcommittee status reports: VII. Canadian Field Naturalist 105 (2): 151-156.
- Evans, P.G.H. 1987. The Natural History of Whales and Dolphins. Facts on File Publications, New York. 343 pp.
- Fiscus, C.H., D.W. Rice and A.A. Wolman. 1989. Cephalopods from the stomachs of sperm whales taken off California. NOAA Tech. Rep. NMFS 83. 8pp.
- Gaskin, D.E. 1982. The Ecology of Whales and Dolphins. London and Exeter, New Hampshire. 459 pp.
- Gaskin, D.E. 1991. An update on the status of the right whale *Eubalaena glacialis*, in Canada. Can. Field-Nat. 105(2): 198-205
- Haley, D. 1986. ed. Marine Mammals. Second Edition. Pacific Search Press. 296 pp.
- Hart, J.L. 1973. Pacific Fishes of Canada. Fish. Res. Brd. Can. Bull. No 180. 740 pp.
- Henning, R.A., Loken, M., Olds, B., and L. Morgan. 1978. Alaska Whales and Whaling. Alaska Geographic. Vol 5, (4): 1-144.
- Horwood, J. 1987. The Sei Whale: Population, Biology, Ecology and Management. Croom Helm, New York. 375 pp.
- Hoyt, E. 1984. The Whales of Canada. Camden House, Camden East, Ontario. 128 pp.

- Hustwick, A. 1914. reprinted from B.C. Magazine. In The Queen Charlotte Islands. 1973. K. Dalzell. Evergreen Press. Prince Rupert. p. 297-298.
- International Whaling Commission. 1983. Special Issue 5. Special Issue on Historical Whaling Records. eds. M.F.Tillman and G.P. Donovan. 269 pp.
- International Whaling Commission. 1990. Special Issue 12. Individual Recognition of Cetaceans: Use of Photo-identification and Other Techniques to Estimate Population Parameters. eds. Hammond, P.S., S. A. Mizroch and G.P. Donovan. 440 pp.
- Kawakami, T. 1980. A review of sperm whale food. Sci. Rep. Whales Res. Inst. 32: 199-218.
- Kellogg, R. 1931. Whaling statistics for the Pacific Coast of North America. J. Mammal. 12: 73-77.
- Leatherwood, S., R.R. Reeves, W.E. Perrin and W.E. Evans. 1982. Whales, Dolphins, and Porpoises of the Eastern North Pacific and Adjacent Arctic Waters: A Guide to their Identification. NOAA Tech. Rep. NMFS Circular 444. 245 pp.
- Leatherwood, S. and R.R. Reeves. 1983. The Sierra Club Handbook of Whales and Dolphins. Sierra Club Books, San Francisco. 302 pp.
- Merilees, B. 1985. Humpbacks in our strait. Waters. J. of the Vancouver Aquarium. 8: 7-24.
- Mitchell, E. 1986. Finner Whales. In Marine Mammals. D. Haley, ed.. Pacific Search Press, Seattle. p. 46-55.
- Morgan, L. 1978. Modern Shore-based Whaling. In Alaska Whales and Whaling. Henning, R.A., Loken, M., Olds, B., and L. Morgan. Alaska Whales and Whaling. Alaska Geographic. Vol 5, (4): 35-44.
- Nemoto, T. 1959. Food of baleen whales in the northern Pacific. Sci. Rep. Whales Res. Inst. 14: 149-290.
- Nemoto, T. and A. Kawamura. 1977. Characteristics of food habits and distribution of baleen whales and special reference to the abundance of north pacific sei and bryde's whales. Rep. Int. Whal. Commn. (special issue 1): 80-87.

- Northcote T.G., A.E. Peden and T.E. Reimchen. 1989. Fishes of the coastal marine, riverine and lacustrine waters of the Queen Charlotte Islands. In The Outer Shores. eds. G.G.E. Scudder and N. Gessler. Based on the proceedings of the Queen Charlotte Islands First International Symposium, University of British Columbia, August 1984. p. 147-174.
- Payne, K.B. 1991. A change of tune. *Natural History*. March (3): 45-46.
- Pike, G.C. 1956. Age, growth and maturity studies on fin whales from the coast of British Columbia. Unpubl. Manuscr. 56 pp.
- Pike, G.C. 1958. The blubber thickness of fin whales taken at Coal Harbour, B.C. Unpubl. Manuscr. 8 pp.
- Pike, G.C. 1965a. A proposed schedule of age and reproduction in northern female sperm whales. Paper submitted to Norwegian Whaling Gazette 7 pp.
- Pike, G.C. 1965b. Schooling and migration of sperm whales off British Columbia. Unpubl. manuscr. 18 pp.
- Pike, G.C. and I.B. MacAskie 1969. Marine mammals of British Columbia. *Fish. Res. Board Can. Bull. No. 171*. 54 pp.
- Reeves, R.J. 1983. A note on interpreting historic logbooks and journals. *Int. Whal. Commn. (Special Issue 5)*: 31-34
- Reeves, R.R., S. Leatherwood, S.A. Karl and E.R. Yohe. 1985. Whaling results at Akutan (1912-39) and Port Hobron (1926-37), Alaska. *Rep. Int. Whal. Commn. Volume 35*: 440-453.
- Rice, D.W. 1977. Synopsis of biological data on the sei whale and bryde's whale in the Eastern North Pacific. *Rep. Int. Whal. Commn. (Special Issue 1)*: 92-97
- Rice, D.W. 1986a. The Gray Whale. In *Marine Mammals*. D. Haley, ed.. Pacific Search Press, Seattle. p. 64-71.
- Rice, D.W. 1986b. The Blue Whale. In *Marine Mammals*. D. Haley, ed.. Pacific Search Press, Seattle. p.40-45.
- Rice, D.W. 1986c. The Sperm Whale. In *Marine Mammals*. D. Haley, ed.. Pacific Search Press, Seattle. p. 94-101.

- Robbins L.L., Oldham F.R. and E.M.K. Geiling 1937. The stomach contents of sperm whales caught off the west coast of British Columbia. Report of the Provincial Museum. Vol. 19-20.
- Scammon, C.M. 1874. The Marine Mammals of the North-Western Coast of North America, Described and Illustrated Together with an Account of the American-Whale Fishery. J. H. Carmany, San Francisco. 319 pp.
- Scarff, J.E. 1986. Historic and present distribution of the right whale (*Eubalaena glacialis*) in the eastern North Pacific, south of 50° N and east of 180°W. Rep. Int. Whal. Commn. (Special Issue 10): 43-63.
- Sherman, S.C. 1983. The nature, possibilities and limitations of whaling logbook data. Rep. Int. Whal. Commn. (Special Issue 5): 35-39.
- Small, G.L. 1971. The Blue Whale. Columbia University Press, New York. 248pp.
- Thomson, R.E. 1981. Oceanography of the British Columbia Coast. Can. Spec. Publ. Fish. Aquat. Sci. 56: 291p
- Thomson, R.E. 1989. The Queen Charlotte Islands physical oceanography. In The Outer Shores. Eds. G.G.E. Scudder and N. Gessler. Based on the proceedings of the Queen Charlotte Islands First International Symposium, University of British Columbia, August 1984. p.27-63.
- Townsend, C.H. 1935. The distribution of certain whales as shown by logbook records of American whalships. Zoologica. (N.Y.) 19 (1): 1-50.
- Webb, R.L. 1988. On the Northwest: Commercial Whaling in the Pacific Northwest, 1790 -1967. University of British Columbia Press, Vancouver. 425pp.
- Weilgart, L.S. and H. Whitehead. 1991. Moby's click. Natural History. March (3): 64-67.
- Wolman, A. 1986. The Humpback Whale. In Marine Mammals. D. Haley, ed.. Pacific Search Press, Seattle. p. 56-63.

11.0 APPENDIX 1: SOURCES OF DATA

The following is a brief description of the main historical sources of data used in this report. Sources are presented in chronological order, and present locations where sources are stored are shown in square brackets.

ROSE HARBOUR AND NADEN HARBOUR SOURCES: 1910-1943

1) Daily Catch Records

(Rose Harbour, 1910 -24 and Naden Harbour 1911 -24). Typewritten accounts of daily catch by species. [British Columbia Provincial Archives].

2) Logbooks from chaser boats

(1917, 1928-30, 1933-38, 1940-43). These contain descriptive accounts of the position where the whale was caught. [British Columbia Provincial Archives].

3) Weekly Catch and Production Reports

(Rose Harbour 1920, 1922-30, 1933-38, 1940-43 and Naden Harbour, 1920, 1922-30, 1934, 1936-38 and 1941). These are bound sets of company forms that report the weekly catch by species and the amount of oil, fertilizer and bonemeal produced. [William S. Lagen Collection, Suzzallo Library, University of Washington].

4) Ledgers of Whale Catch Records

Rose Harbour (1924-28) and Naden Harbour (1924-27). These are bound, handwritten entries on company forms that report date, species, sex, location of capture and the name of the chaser boat. [William S. Lagen Collection, Suzzallo Library, University of Washington].

COAL HARBOUR SOURCES: 1948-1963

5) International Whaling Commission Database

(1948-1959) Details of each whale processed at Coal Harbour, including date, species, sex, length, foetuses, and location of capture were sent annually to the International Whaling Commission, to the Bureau of International Whaling Statistics. [Pacific Biological Station].

6) Whale Tallybooks

(1952-55, 1963-67). These are handwritten entries in a ledger format, reporting date, species, sex, length, foetus sex and foetus length on each whale brought in. Tallies from 1963 through 1967 also record the position of capture in degrees and minutes. [Pacific Biological Station].

7) Catch Slips

(1958-62). These forms report the date, time, species and position of capture of each whale caught, and were recorded by the whaling ship's crews. [Pacific Biological Station].

8) Pacific Biological Station Datasheets

(1962 to 1967). These forms, with handwritten entries, were apparently completed by Pacific Biological Station personnel. The forms record stomach contents, blubber thickness, foetus length and sex, testis or ovary weight and indicate whether specimens were collected. [Pacific Biological Station].

9) Catcher Logs

(1963 to 1966). These are handwritten entries in logbooks specifically designed to record whale sightings and capture information including date, location, sea conditions and water temperature. [Pacific Biological Station].