DISTRIBUTION AND MIGRATION OF THE WESTERN PACIFIC STOCK OF THE GRAY WHALE*

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ABSTRACT

There are two geographically isolated stocks of gray whales in the North Pacific. One is the eastern stock which migrates between the Bering and Chukchi Seas and Baja California, or California stock, and the other is the western stock which has been thought to migrate between Okhotsk Sea and south coast of Korean Peninsula. This stock was called Korean stock because south coast of Korean Peninsula has long been thought to be its calving ground.

In recent years papers from China reported that in the past gray whales also occurred in the Yellow Sea and East and South China Seas. In the light of these information the Japanese catch and other materials were studied and these supported these information.

In relation to the migration of these gray whales the difference of the ocean structure between the eastern and western North Pacific was noted. In the latter the continental shelf is well developed. The gray whale is thought to have lived in shallow water and migrated directly across the East China Sea between Kyushu and South China, from east to west or reverse way, while some whales have migrated along the coast of the Yellow Sea.

INTRODUCTION

The gray whale, *Eschrichtius robustus* (Lilljeborg, 1861), is the sole member of the family Eschrichtiidae and is considered to be the most primitive surviving baleen whale. There are presently two geographically isolated stocks: an eastern Pacific stock, which migrates between Baja California and the Bering and Chukchi Seas, and a western Pacific stock, which migrates between South Korea and the Okhotsk Sea. These may be designated the California stock and the Korean stock, respectively, on the basis of their breeding grounds (Rice and Wolman, 1971).

The California stock was once reduced heavily by whaling in the 1850s as well as by the operation of floating factories after the turn of the century. Even so this stock made remarkable recoveries. Since it was afforded protec-

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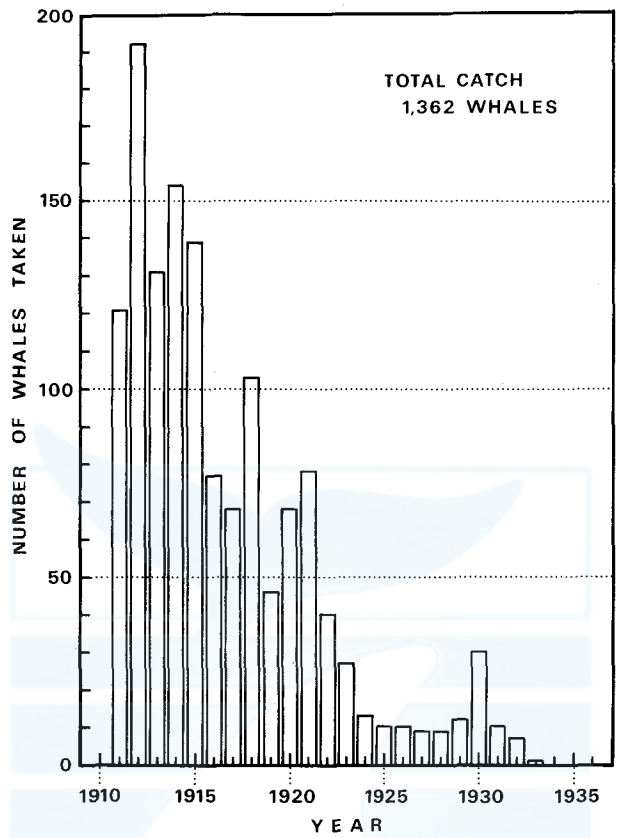

Fig. 1. Catches of gray whales in the western North Pacific region.

tion from commercial whaling in 1946 by the International Convention for the Regulation of Whaling, the population has recovered steadily. The stock has been classified as a Sustained Management Stock since 1978, based on the understanding that it had remained stable at about 11,000 whales over an 11 years period with approximately constant catches (IWC, 1986).

The western Pacific stock of the gray whale was hunted twice in the history of whaling. Prior to the turn of the century whales were taken in Japan using hand harpoon and net (net whaling). This whaling was conducted in two regions of Japan, one the Pacific side and the other on the coasts of southern Sea of Japan and eastern East China Sea (off Kyushu and Yamaguchi prefecture). Right whale (*Eubalaena glacialis*), humpback whale (*Balaenoptera novaeangliae*) and fin whale (*B. physalus*) were the major targets of this whaling, but the gray whale and other species of whales were also taken (Omura, 1984).

Gray whales in the above two regions may represent different populations. The gray whales coming to the Pacific side is thought to have followed a migration route along the east coast of Japan (Nishiwaki and Kasuya, 1970;

Omura, 1974, 1984; Bowen, 1974). Bowen (1974) describes further that those gray whales should be regarded as strays from the Bering Sea. Migration of these whales, however, is not discussed in detail in the present paper. The gray whales coming to the coasts of Kyushu and Yamaguchi prefecture are portion of those whales migrating in the waters adjacent to Korea (Omura, 1984).

After the turn of the century (in the years 1911–1933) gray whales were hunted heavily by modern catchers on the coast of Korea, and once the stock was thought to be exterminated (Mizue, 1951; Bowen, 1974), but this was not the case and some still survive (Brownell and Chun, 1977; Yablokov and Bogoslovskaya, 1984) (Fig. 1).

The calving ground of the western Pacific stock was once believed to be the southern coast of South Korea (Andrews, 1914; Mizue, 1951; Rice and Wolman, 1971; Omura, 1984; Yablokov and Bogoslovskaya, 1984). Wang (1984), however, noted the occurrence of gray whales in the Yellow Sea, the East and South China Seas and described that the calving grounds of these whales are possibly in Baya Bay and Wailuo Harbour. In the light of these reports I have tried to make clear their migration route using data in hand.

MIGRATION OF GRAY WHALES ALONG THE KOREAN PENINSULA

Andrews (1914) who firstly investigated gray whales at Ulsan, Korea, during a period in January and February 1912 states as follows:

"In November and December, when the females are taken, almost every individual will be found to be carrying young nearly for birth. As these would necessarily be delivered within two or three weeks after passing Ulsan, the birth must occur in the bays among the numerous small islands at the extreme southern end of the peninsula."

In fact he examined 24 gray whales during his stay at Ulsan, in which 21 whales were males and 3 were females. One of the females contained a fetus 476cm long. The mean body length at birth of the gray whale fetus is 4.9 meters for the California stock whales (Rice and Wolman, 1971). This fetus, therefore, can be regarded as near term. This is, however, the only fetal record he had. It is clear, therefore, that the statement was based largely on information supplied from others, especially a Norwegian whaling gunner H. G. Melsom, who worked with him.

As already stated a portion of the Korean stock had migrated to the north coast of Kyushu, where they were taken by net whaling prior to this century. No catch statistics by species in Kyushu are available (Omura, 1984), but it is clear that gray whales (Ko-kujira) were also taken at Ikitsuki Island in addition to right, humpback and fin whales (Yamada, 1983)*. There the

* An English translation from a Japanese old book entitled 'Isanatori-ekotoba', which means "Whaling, explained with pictures". In the translation this was erroneously written as 'Yogiotoru eshi'.

TABLE 1. CATCHES OF GRAY WHALES BY JAPANESE WHALE CATCHER (AFTER KASAHARA, 1950)

Year \ Area	XII	XIII	XI	XIV	Total	F. and W.[1]
1910						6
1	13	106	2	–	121	121
2	?	?	?	–	192[2]	193
3	?	?	?	–	131[2]	131
4	30	109	15	–	154	155
5	–	130	9	–	139	139
6	41	36	–	–	77	78[3]
7	13	53	–	2	68	69
8	10	91	–	2	103	104
9	11	35	–	–	46	46
1920	14[3]	52[3]	2	–	68[3]	68
1	53	23	2	–	78	78
2	19	19	–	2	40	40
3	23	4	–	–	27	27
4	13	–	–	–	13	17
5	–	10	–	–	10	10
6	1	9	–	–	10	11
7	3	6	–	–	9	10
8	–	9	–	–	9	9
9	–	11	–	1	12	12
1930	–	30	–	–	30	30
1	–	10	–	–	10	11
2	–	7	–	–	7	7
3	–	1	–	–	1	2
Total	244	750	38	7	1,362	1,374

(1) Cited from Rice and Wolman (1971) which includes catches of gray whales in other areas, e.g. Okhotsk Sea.
(2) Cited from other sources kept at the Japan Whaling Association.
(3) Corrected in this table.
For the areas see text and Fig. 2.

whale migrating from north to south was called as the Down-going whale and that coming from south to north as the Up-going whale. This is applied to above four species of whales, including the gray whale. Hence the island was on the route of the southward and northward migration of the gray whale, while it is situated more southerly than the south coast of Korea.

Kasahara (1950) analyzed the catch statistics of Japanese coastal whaling between 1911 and 1949. A total of 83 land stations were operated by Japanese industry during the period in the western Pacific. He grouped these land stations into 16 areas and made clear the yearly catches of each species in each area in his Table 10.

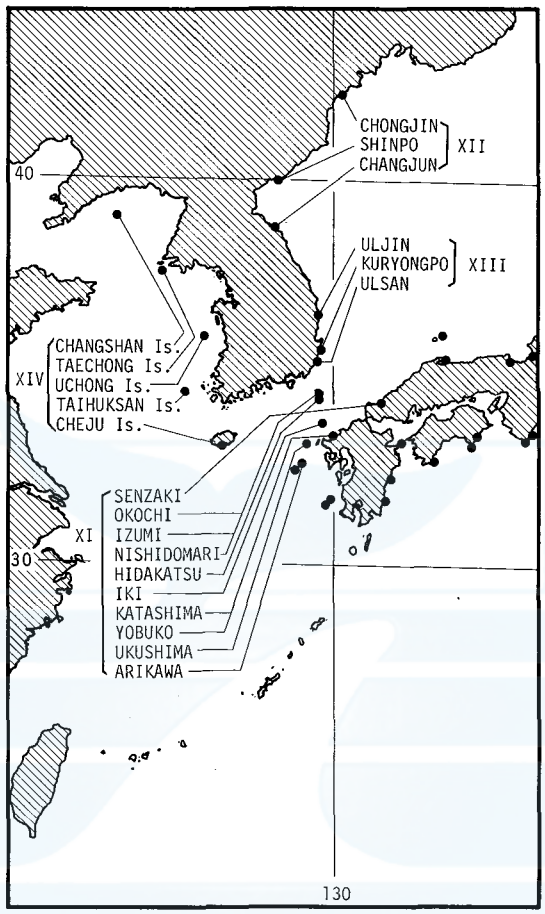

Fig. 2. Positions of land stations concerned with catches of gray whales (after Kasahara, 1950).

Table 1 was rearranged from his Table 10, extracting areas where gray whales were mostly taken during this period.

As to the Kasahara's area some explanation may be needed here (Fig. 2). Area XII means northeast Korea and includes land stations at Chongjin, Shinpo and Changjun. Area XIII means southeast Korea and includes Uljin, Kuryongpo and Ulsan. Area XI means North Kyushu and includes Senzaki, Okochi, Izumi, Nishidomari, Hidakatsu, Iki, Katashima, Yobuko, Ukishima and Arikawa. Area XIV means Yellow Sea and includes Cheju Island, Taihuksan, Uchong Island, Taechong Island and Changshan Island (Kantoshu).

As seen in Table 1 gray whales were mostly taken in Area XIII or southeast coast of Korean Peninsula and Ulsan was the center. This was followed by the Area XII or northeast coast of Korean Peninsula, and then North Kyushu. It is noted, however, some gray whales were taken in the Yellow Sea.

This supports the recent reports of Wang (1978, 1984) that gray whales occur in the Yellow Sea.

In this connection I recall a whale observed by Professor K. Uchida of the Kyushu University. He was a famous ichthyologist who studied fish larvae. Prior to 1945 he worked at the Fisheries Research Laboratory at Pusan, Korea and made an expedition to collect fish larvae in May 1930 in the Yellow Sea. He positively identified a gray whale during this expedition near Inchon, an island locally called "Chanchangon" and situated at northwest of 60 nautical miles from Inchon. His observation of the whale is well described in his book (1964). He observed clearly the fluke-lifting behaviour of a gray whale. He also writes that the area was said to be a gathering place of whales.

Andrews (1914) writes that Captain H.G. Melsom has often observed them (gray whales) in this vicinity, but because of the abundance of other and more valuable species, they are not killed at this time by the Japanese. This was written about the whaling off the south coast of Korean Peninsula, but it is thought this was applicable also to the Yellow Sea, because the main catches in this area were fin whales.

It is possible, therefore, that the so-called Korean stock of gray whales, or at least a portion of them, entered into the Yellow Sea and hence migrated south along the east coast of China, as shown in Fig. 2 of Wang (1984). It is also possible that some whale went westwards from south coast of Korean Peninsula to the east coast of China, across the southern border of the Yellow Sea.

MIGRATION ROUTE OF GRAY WHALES THROUGH THE COAST OF NORTHERN KYUSHU

Gray whales migrating to the northern Kyushu is a part of the Korean stock and its migration past Ikitsuki Island was noted above. However, the migration of these individuals are very difficult to be understood. Fig. 7 of Omura (1984) shows only the distribution of gray whales then known to him. In the case of humpback, fin and right whales it is possible that they migrated further south through the west coast of Kyushu. At Kasasa, a fishing village on the west of Kagoshima prefecture, these three species of whales were sometimes taken accidentally entangled in fishing nets (Nasu, 1974; Anon., 1978).

Gray whales, on the other hand, have never been noticed by villagers of Kasasa. It is possible, therefore, that gray whales took different course of migration from the above three species.

In this connection this problem should be considered in relation to the depth of the ocean. It is well known that the gray whale relies upon the benthic animals for food, though peripheral areas and pelagic resources are also exploited (Nerini, 1984). This does not mean, however, that they also live in pelagic seas. The California stock of gray whales migrates along the coastal

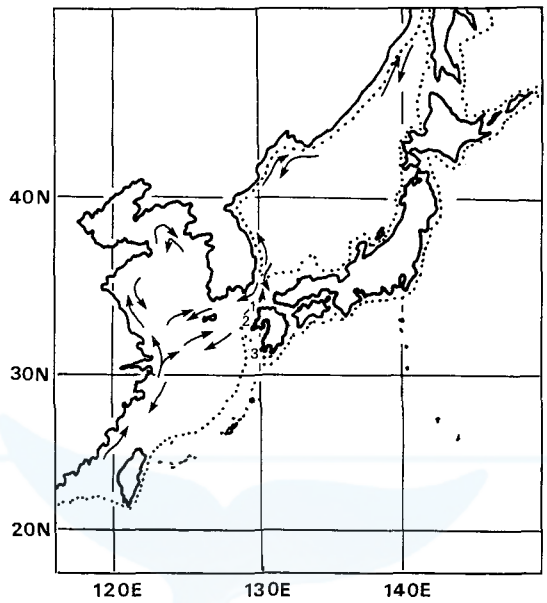

Fig. 3. Migration of the western Pacific stock of gray whales. (Excludes those occurring on the Pacific side of Japan).
1. Ikitsuki Island
2. Goto Island
3. Kasasa, Kagoshima prefecture

waters, and even in the eastern Bering Sea they travel within 2km from shore to Nuvivak Island after passing through Unimak Pass in the northbound migration. They migrated offshore only from that island to waters around St. Lawrence Island (Braham, 1984).

In comparing the migration of the eastern and western stocks of the gray whale we should consider the difference of the ocean structure between the eastern and western North Pacific. In the eastern North Pacific the continental shelf is less developed and the deep sea is close to the continent. On the contrary in the western North Pacific the continental shelf is well developed, and the Yellow Sea and most parts of the East China Sea are shallower than 200 meters.

The gray whale is thought to have evaluated to live in shallow water. In Fig. 3 the continental shelf or 200 meter depth line is shown by dotted line. As seen in this figure most part of the East China Sea is shallower than 200 meters, and the 200 meters line extends from east side of Formosa to the south side of Kyushu, but a tongue of deep water projects along southwest Kyushu as far north as it reaches westside of the Goto Islands, a group of small islands situated southwest of Ikitsuki Island. The gray whale, therefore, is thought to travel westwards, instead of southwards, avoiding this deep water, from Ikitsuki until it reaches to the coast of China. Such migrations directly crossing the East China Sea, from east to west or reverse way can not

be denied. In this case they travel about 400 nautical miles of offshore.

Wang (1984) speculated that the western Pacific stock of the gray whale migrated in the former times through the waters off the east coast of China, and entered the calving grounds in the coastal waters of Guangdong Province. He also extended the speculation that these calving grounds are possibly in Baya Bay and Wailuo Harbour and that a few individuals probably reached occasionally as far south as 20°N in the adjacent waters of the east coast of Hainan Island.

In the light of the above knowledge of the distribution of the two gray whale stocks the names of "California" and "Korean" stocks seem to be inappropriate. The better expression will be "eastern Pacific" and "western Pacific" stocks of the gray whale.

Present size of the western Pacific stock of the gray whale, however, has been reduced to such a low level that it can no longer function as a significant part of its ecosystem (Brownell, 1977). Yablokov and Bogoslovskaya (1984) referred to a statement of Berzin (1978) that they were not recovering and the number continuing to decline.

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