

# Some analyses on the modern whaling catch history of the western North Pacific stock of gray whales (*Eschrichtius robustus*), with special reference to the Ulsan whaling ground<sup>1</sup>

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## ABSTRACT

This study analysed post-1900 published and unpublished records of gray whales in the western North Pacific. Modern whaling recorded a peak annual catch of 100-200 whales in the 1910s, followed by a rapid decline in the 1920s and 1930s and a continued low level (perhaps 10-20 whales/year) for over 40 years to the 1960s. Catches made during the last phase could have been the major factor suppressing recovery until recently. There are reasons to believe that this gray whale stock breeds in Hainan waters.

KEYWORDS: GRAY WHALE; MIGRATION; WHALING-MODERN

## INTRODUCTION

In contrast to the recovery of the eastern North Pacific stock of gray whales (Darling, 1984), no significant sign of recovery has been detected in the 'Asian' or western North Pacific stock (e.g. IWC, 2002). The present study attempts to clarify the catch history of this stock by reviewing published and unpublished records of catches. It also considers some possible reasons for the stock's lack of recovery.

## MATERIALS AND METHODS

Published and unpublished records of gray whales taken in Korean and Japanese waters were reviewed, in addition to unpublished records of sightings in the same area.

The major sources of published catch records and the periods covered are as follows: (1) 1890-1903, 1906-1945, 1948 and 1957-1966 Park (1987); (2) 1911-1945 Kasahara (1950); and 1945-1966 Brownell and Chun (1977).

Some data are common between the studies —Park (1987) cited all the statistics (1911-1945) in Kasahara (1950) and the 1957-1966 statistics in Brownell and Chun (1977).

Unpublished catch records were obtained from the private log of an ex-whaling gunner, Mr Toraichiro Emoto, covering the coastal seasons 1923/24-1933/34 and 1941/42-1944/45. They include sightings and catches by species and other information on the operation such as area and whales taken by other vessels. Between 1934 and 1941, Emoto was employed in the Antarctic fleet.

A further source of sightings data was the daily records of whale sightings recorded for the Fisheries Agency of Japan by whaling captains operating in the western North Pacific, East China Sea, Sea of Japan and Okhotsk Sea (Fig. 1). The records cover the periods 1971-1987 (large-type whaling) and 1977-1988 (small-type whaling) and are kept at the National Research Institute of Far Seas Fisheries (Far Seas Fisheries Research Laboratory).

<sup>1</sup> A version of this paper was originally presented as SC/A90/G19.

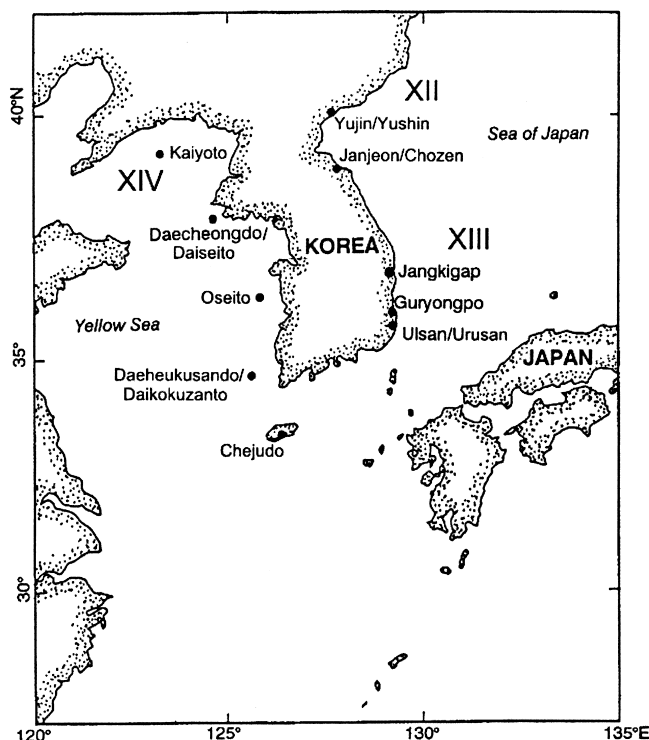


Fig. 1. Land stations (closed circle) used by modern whaling fleets in Korean waters.

Kasahara (1950) grouped the 11 pre-war Korean coastal whaling stations into three areas: (1) Area XII (the northeastern coast bordering the Sea of Japan, the Jangjeon ground of this study); (2) Area XIII (the southeastern coast bordering the Sea of Japan, the Ulsan ground); and (3) Area XIV (the Yellow Sea ground). His classification has been used in the following analysis. Some of the previous studies used Japanese geographical names in Korean waters, but in this study local names have been used as far as possible.

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## RESULTS

### Catch history

A total of 1,750 gray whales (44 individuals by net whaling) were reported to have been taken from the western North Pacific stock in the 77 years from the start of modern whaling in 1891 to 1966 (Table 1): 1,704 (97.4%) were from the east coast of the Korean peninsula (Jangjeon and Ulsan ground); 3 from the west coast (Yellow Sea ground); and the remaining 43 from elsewhere. It is unclear when the exploitation of gray whales ceased in Asian waters, but it certainly lasted until 1966 (Brownell and Chun, 1977).

Just before modern whaling began off the Korean coast, Japanese net whalers took 16, 15 and 13 gray whales off Pusan (southeastern lower Korean peninsula) in 1890/1891, 1891/1892 and 1898/1899 respectively (Park, 1987). A Russian vessel, from the Pacific Whale Fishing Co., began whaling off the Korean coast in 1890 (Tonnessen and Johnsen, 1982, p.131). This marked the start of modern whaling in Asian waters. The operation continued until February 1904 and the outbreak of the Russo-Japanese war (Akaishi, 1910). Statistics are available for only three seasons in the period 1889/1900-1902/03, i.e. 116, 114 and 96 whales, respectively (Park, 1987). Catches by species are only known for the 1902/03 season, with a take of nine gray whales (about 10% of the total) off Jangjeon (Park, 1987). On the assumption that the Russian whaling fleet took about 100 whales/season and 10% of them were gray whales, the total estimated gray whale take in the 13 seasons 1891/92-1902/03 would be around 130 individuals; these are not included in Table 1, which represents the minimum estimate.

Japanese modern whaling started in Korean waters in February 1900, expanded to wider areas along the Korean and Japanese coasts after the Russo-Japanese war (Akaishi, 1910; Park, 1987) and continued in Korean waters until the end of the Second World War in 1945. Catch statistics by species are available from 1906 onwards. Although no statistics before then give the species composition, at least 37 gray whales are known to have been taken on the Jangjeon ground between 1900-1905 (Park, 1987).

High catches occurred during 1907-1918 with a maximum annual take of 193 whales in 1912. Of the total of 674, 546 (81%) were taken on the Ulsan ground. From 1920, the catch declined annually, but it is clear from the Emoto log that catches continued at a very low level on the Ulsan and Jangjeon grounds until 1945. Although the log does not cover the 1934/35-1940/41 seasons, it is a reasonable assumption that other Japanese vessels will have taken some gray whales in the area. A gray whale was reported in 1942 from a land station on Paramushiro Island in the northern Kuril Islands (Mizue, 1951) which may have originated from the Californian or eastern stock of gray whales.

There are some inconsistencies between the published statistics and the Emoto log. Emoto recorded the take of seven gray whales off the east coast of Korea in 1942/43-1944/45 (Table 1), but none are recorded in the official statistics used by Kasahara (1950) and cited in several studies. Since Emoto's records only covered about half of the total fin whales caught on the Ulsan ground during this period, the total gray whale catch there could have been higher. Additionally, if the operation off northeastern Korea (the Jangjeon ground) is taken into account, the total take of gray whales on the Korean coast could have been higher. During the war years, in the face of threats from enemy submarines, there would have been increased demands on local food sources such as gray whales.

After the Second World War, whaling resumed in the Republic of Korea in 1946 (Park, 1987) and possibly also in the Democratic Peoples Republic of Korea (North Korea). Brownell and Chun (1977) report a total of 67 gray whales taken on the Ulsan ground in the period 1948-1966. Information is not available on catches made in the Democratic Peoples Republic of Korea.

The Peoples Republic of China began modern whaling in 1964 using a catcher boat and there is a recorded catch of at least three gray whales, one each in September 1949, June 1958 and April 1960 (Wang, 1978).

### Sightings of gray whales on the Ulsan ground

According to the Emoto log, the catcher boat operated up to 40 n.miles from the coast, mainly for minke and fin whales. There were no gray whale sightings beyond 10 n.miles from the coast.

Emoto recorded 17 sightings (36 individuals) of gray whales on the Ulsan ground during the winter (December and January) in the period 1923-1944. Positions are available for 11 sightings. Most occurred at a depth of  $\leq 100$ m and between Jangkigap and Wejeulgap (Fig. 2). The Emoto log records that the majority frequented the waters off Sogi. School sizes were: 7 singles; one school each of 2 and 3 whales; and 2 schools of 4 animals. There were no records of cow and calf pairs, but it is uncertain whether such schools were either not sighted or not recorded as such.

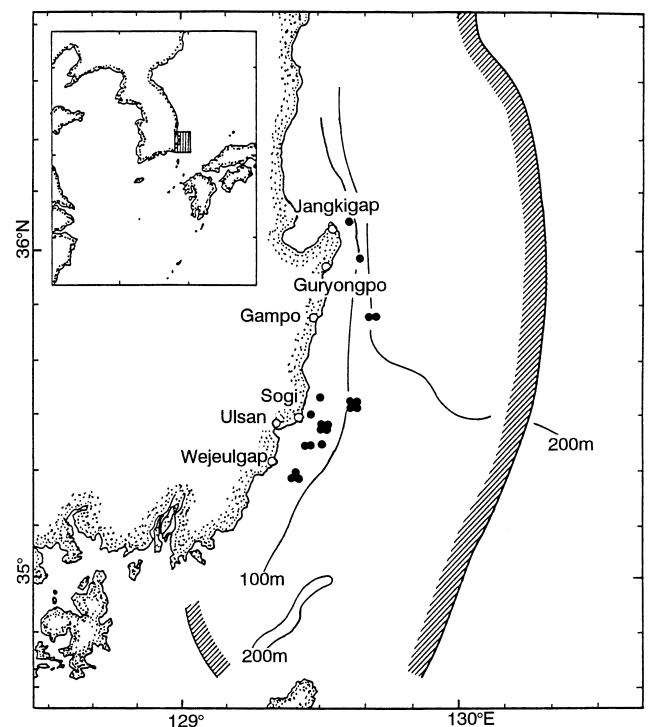


Fig. 2. Sighting positions of gray whales (closed circle) in the Emoto log (1923/1924-1933/1934; 1941/1942-1944/1945) and the ordinary daily rate of operation for fin and minke whales (inside of the shaded area).

### Monthly changes in the catch

Table 2 provides monthly catch data from the Ulsan and Jangjeon grounds from published records. These occurred from November-April, with a major peak in December/January and another, smaller peak some three months later, in March/April. Although the discrepancy in magnitude of the two peaks could be due to the general operational pattern of taking fin whales in the Yellow Sea in early spring this could also be interpreted as a reflection of migratory movement south to the breeding ground.

Table 1

Catch history of the Asian stock of gray whales by modern whaling from published records and catch information from the field log by T. Emoto.

Year <sup>1</sup>	Published records <sup>2</sup>						Emoto log		
	Ulsan ground	Jangjeon ground	Yellow Sea	Others	Place unknown	Total	Ulsan	Jangjeon	Total min. catch
1890	16 <sup>3</sup>	?	?	-	-	16+			16
1891	15 <sup>3</sup>	?	?	-	-	15+			15
1892			No data			?			?
1893			No data			?			?
1894			No data			?			?
1895			No data			?			?
1896			No data			?			?
1897			No data			?			?
1898	13 <sup>3</sup>	?	?	-	-	13+			13
1899			No data			?			?
1900	?	23+	?	-	-	23+			23
1901	?	?	?	-	-	?			?
1902	?	9+	?	-	5+	14+			14
1903			No data			?			?
1904			No data			?			?
1905			No data			?			?
1906	59	-	-	-	11	70			70
1907	125	-	-	-	-	125			125
1908	26	-	-	-	-	26			26
1909	?	?	?	?	?	?			?
1910	?	?	?	?	?	?			?
1911	106	13	-	2	-	121			121
1912	?	?	?	?	-	193			193
1913	?	?	?	?	-	131			131
1914	109	30	-	16	-	155			155
1915	?	?	?	9	-	139			139
1916	36	41	-	-	-	77			77
1917	53	13	2	-	-	68			68
1918	91	10	2	1	-	104			104
1919	35	11	-	-	-	46			46
1920	51	14	-	10	-	75			75
1921	23	53	-	2	-	78			78
1922	19	19	2	-	-	40			40
1923	4	23	-	-	-	27			27
1924	-	13	-	-	4	17	1	-	18
1925	10	-	-	-	-	10	2	-	10
1926	9	1	-	1	-	11	1	-	11
1927	6	3	-	1	-	10	-	-	10
1928	9	-	-	-	-	9	-	-	9
1929	11	-	1	-	-	12	2	-	12
1930	30	-	-	-	-	30	-	-	30
1931	10	-	-	-	-	10	-	-	10
1932	7	-	-	-	-	7	1	-	7
1933	1	-	-	-	-	1	1	-	1
1934	-	-	-	-	-	-	No data		?
1935	-	-	-	-	-	-	No data		?
1936	-	-	-	-	-	-	No data		?
1937	-	-	-	-	-	-	No data		?
1938	-	-	-	-	-	-	No data		?
1939	-	-	-	-	-	-	No data		?
1940	-	-	-	-	-	-	No data		?
1941	-	-	-	-	-	-	No data		?
1942	-	-	-	1	-	1	1	-	2
1943	-	-	-	-	-	-	1	-	1
1944	-	-	-	-	-	-	-	-	-
1945	-	-	-	-	-	-	-	5	5
1946	-	-	-	-	-	-			-
1947	-	-	-	-	-	-			-
1948	9	-	-	-	-	9			9
1949	4	-	1	-	-	5			5
1950	-	-	-	-	-	-			-
1951	7	-	-	-	-	7			7
1952	1	-	-	-	-	1			1
1953	7	-	-	-	-	7			7
1954	?	-	-	-	-	?			?
1955	?	-	-	-	-	?			?
1956	?	-	-	-	-	?			?

cont...

Table 1 continued.

Year <sup>1</sup>	Published records <sup>2</sup>					Emoto log			
	Ulsan ground	Jangjeon ground	Yellow Sea	Others	Place unknown	Total	Ulsan	Jangjeon	Total min. catch
1957	?	-	-	-	-	?			?
1958	7	-	1	-	-	8			8
1959	7	-	-	-	-	7			7
1960	8	-	1	-	-	9			9
1961	3	-	-	-	-	3			3
1962	-	-	-	-	-	-			-
1963	2	-	-	-	-	2			2
1964	3	-	-	-	-	3			3
1965	4	-	-	-	-	4			4
1966	5	-	-	-	-	5			5

<sup>1</sup> Calendar year except for 1900 and 1902 indicating 1900/01 and 1902/03 seasons respectively. <sup>2</sup> 1890-1908, 1948 Park, 1987; 1911-45, Kasahara, 1950; 1946-66, Brownell and Chun, 1977. <sup>3</sup> Catch by net whaling.

Table 2

Monthly changes in the catch of gray whales in the Ulsan and Jangjeon whaling grounds.

Month	Ulsan ground				Jangjeon ground	
	1906-1908 <sup>1</sup>	1910-33 <sup>2</sup>	1948 <sup>1</sup>	1958-66 <sup>1</sup>	1910-33 <sup>1</sup>	1945 <sup>3</sup>
Nov.	3 (2, 1)	9	-	-	2	-
Dec.	112 (53, 59)	209	-	12	61	-
Jan.	90 (19, 71)	125	6	13	3	3
Feb.	1 (0, 1)	-	-	9	1	-
Mar.	4 (1, 3)	5	-	-	12	-
Apr.	- (-, -)	2	-	4	35	-
May	- (-, -)	-	-	1	13	2

<sup>1</sup> Park, 1987; numbers in parenthesis are catches of males and females respectively. <sup>2</sup> Kasahara, 1950. <sup>3</sup> Emoto log.

In contrast to the Ulsan ground, the Jangjeon ground recorded two distinct peaks in December and April (about four months apart) and the discrepancy in magnitude of the two peaks is less distinct. The greater time interval on the northern ground (Jangjeon) reflects the difference in timing of the gray whale migration.

### Post-war records of gray whales in the northwestern North Pacific

Positions of gray and right whale sightings from Japanese catcher boats are given in Fig. 3. Japanese small-type whaling vessels operated from April-September usually within 60 n.miles of the coast; whale sightings were reported for the seasons 1977-88. Some right whales but no gray whales were recorded by those operations.

Japanese large-type whaling vessels usually operated within 300 n.miles from the coast and reported sightings of whales throughout May-March in the years 1971-87. Records included 'one like gray whale' at 34°31'N, 145°43'E (about 250 n.miles from the nearest coast). The record appears in the Japanese progress report to the International Whaling Commission (IWC) (Anon., 1981) as 'a gray whale'; however it is ignored here as the species identification may be incorrect. The large-type whalers reported nine sightings of right whales, concentrated off Sakhalin, mostly in 1974, suggesting that gray whales wintered much further to the south of the Korean peninsula possibly for breeding.

In addition to the above, there have been five sporadic records (Fig. 3) of gray whales on the Pacific coast of Japan during the period 1968-90 (one whale sighted off the Kii Peninsula; *ca.* 33°30'N-135°30'E) in June *ca.* 1959

(Nishiwaki and Kasuya, 1970); one taken off the Kii Peninsula, February 1968 (Nishiwaki and Kasuya, 1970), one sighting in Ise Bay (34°30'N-136°E), March-April 1982 (Furuta, 1984); one sighting off the Kii Peninsula (*ca.* 33°30'N-136°E), April 1985 (Kasamatsu and Ishikawa, 1990); one stranding on the coast of Sagami Bay (*ca.* 35°N-139°E), February 1990 (Kasamatsu and Ishikawa, 1990).

More recent sightings, of two individuals, were off Izu-Oshima Island (*ca.* 34°30'N-139°30'E) in April 1993 (K. Nakamura and A. Mochizuki, pers. comm.). One animal was stranded at Suttu Town (*ca.* 43°N-140°E), Hokkaido (Kato and Ishikawa, in prep.).

Information on recent sightings of this species in the waters of the Russian Federation is detailed in Weller *et al.* (1999). One juvenile was sighted off the Pacific coast of Kochi, southwest Japan (*ca.* 33°N, 133°E; Kato and Tokuhiko, 1997).

### DISCUSSION

The minimum total take of gray whales by modern whaling from the Asian stock since 1891 is estimated to be 1,750 individuals, including 44 caught in net whaling in the 1890s. However, taking into account species uncertainties in the Russian records (100-200 whales) and possible under-recording during the Second World War (10 or more), a better estimate would be between 1,800 and 2,000 individuals. The rapid annual decline to 10-20 whales/season following the peak catches of 100-200 individuals/year at the turn of the century, probably reflected a decline in stock size.

Although it has generally been believed that the catch of gray whales ceased from 1933-1945 (Kasahara, 1950; Mizue, 1951; Omura, 1988), small scale exploitation continued during that period until the mid 1960s. Low level exploitation after World War II has already been documented (Brownell and Chun, 1977). Thus, this stock of gray whales was the focus of low level, but presumably significant, catches for over 60 years following earlier high catches and rapid decline; this may explain the apparent lack of recovery of this stock (and see Weller *et al.*, 2002).

Analysis of available data has identified two distinctive migration peaks along the east coast of the Korean peninsula. These peaks uphold the probability of a breeding area to the south of the Korean peninsula, the first peak in December/January due to southbound migration for winter breeding and the later March/April peak accounting for northbound migration for summer feeding. The waters

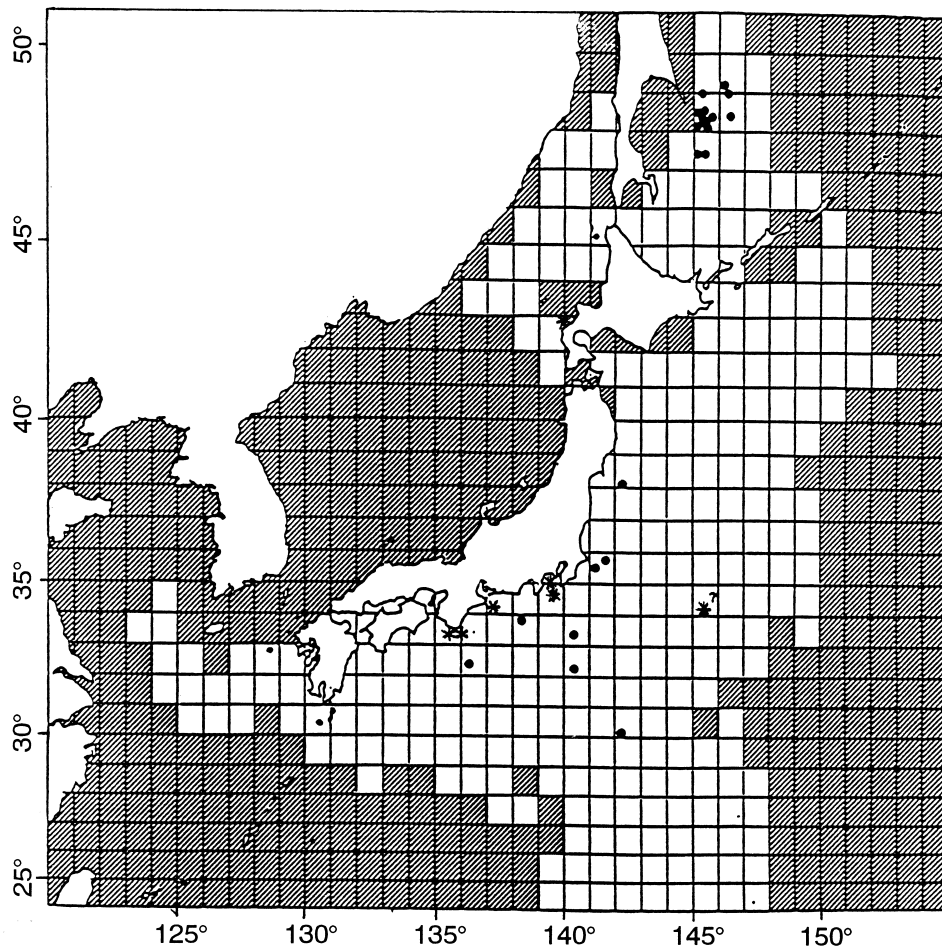


Fig. 3. Position of sightings of gray and right whales reported by Japanese coastal whaling catcher boats and some additional records of gray whales (for details see text). Species key: closed circle = right whale; star = gray whale.

around Hainan Dao island (ca. 20°N, 100°E) were considered by Brownell and Chun (Brownell and Chun, 1977) as the most probable breeding site for the western stock of gray whales. Comparing migration times to those of the eastern stock, the four-month period between southbound and northbound migration for the western stock upholds the possibility of Hainan Dao Island as the southern destination for the migrating whales.

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