

**A SURVEY OF WHALE MEAT MARKETS
ALONG SOUTH KOREA'S COAST**

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Executive summary

The Republic of Korea (South Korea) has been a party to the International Convention on the Regulation of Whaling (ICRW) since 1978 and a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1993. It currently maintains no objection to the International Whaling Commission's (IWC) moratorium on commercial whaling nor reservations on the CITES Appendix I listings of cetacean species. South Korea banned whaling in 1986 when the IWC moratorium came into effect, but continues to allow the domestic sale of cetaceans caught as incidental catch or 'bycatch'. In accordance with the CITES Appendix I listings, South Korea does not allow the commercial export of species covered by the IWC moratorium.

Between July and December 1999, TRAFFIC East Asia surveyed South Korea's eastern and western coastal areas for the availability and price of whale meat, and collected 35 samples of whale meat products for DNA analysis. Tissue samples collected in August 1999 were presented to the US government's Southwest Fisheries Science Center for DNA analysis. The current report details the results of TRAFFIC's 1999 survey and compares them with the results of an earlier survey conducted in 1997.

Between January and March of 1997, TRAFFIC researchers conducted market surveys in Ulsan, Pusan, Gampo, and Pohang collecting information on availability and price (Mills *et al*, 1997). Eighteen whale meat samples were purchased during this survey and TRAFFIC later facilitated their DNA analysis in a co-operative arrangement between the South Korean and US governments.

The 1999 surveys investigated the availability of whale meat in four localities on the eastern coast: Ulsan, Pusan, Pohang and Gampo; and three localities on the western coast: Seoul, Incheon, and Kunsan. Samples for DNA analysis were purchased on the eastern coast only. Researchers visited wholesale markets, retail markets and restaurants, and purchased thirty-five samples from a variety of sites. Samples included frozen and cooked, but, unlike the 1997 surveys, no raw (chilled) meat was available. This was likely due to the time of year as the 1999 surveys were conducted primarily in August while the 1997 surveys were conducted at a time of year when the weather was cooler. No more than one sample was purchased at each site and all samples were purported to be 'real' whale meat, i.e. not from small cetaceans.

Earlier surveys by TRAFFIC East Asia and others as well as official bycatch data all pointed to coastal communities on the eastern coast as the principal centers for South Korea's whale meat markets. The 1999 TRAFFIC survey found no indication of an expansion of whale meat markets in the three localities visited on South Korea's western coast. Consumption appears to remain centered in traditional consuming areas on the eastern coast with the 1999 surveys finding no appreciable change in the number of whale meat vendors, which would seem to indicate a relatively stable market base. Similarly, despite the 1997 financial downturn, there appeared to be only a slight decrease in the average price of whale meat at the wholesale and retail levels, even with a decrease in reported bycatch of minke whale *Balaenoptera acutorostrata*.

Results of the DNA analysis carried out by the Southwest Fishery Science Center were compared with official bycatch reports. The majority of species identified in the samples reflect declared bycatch for the relevant periods. However, the IWC's Scientific Committee has expressed its concern over the impact of ongoing incidental catch on the Sea of Japan-Yellow Sea-East China Sea stock of minke whale (the 'J' stock) which it considers to be a protection stock. Also of concern was the presence of western North Pacific Humpback Whale *Megaptera novaeangliae* meat in the market.

Since publication of TRAFFIC East Asia's report, *Whale Meat Trade in Asia: A Review of the*

Markets in 1997 (Mills *et al*, 1997), the government of Korea has taken a number of steps to enhance its regulation of domestic whale meat consumption. These steps included issuing a directive requesting that local governments collect and submit a physiological description of individual animals caught as bycatch; and the raising of fines for violations of existing regulations. However, given the apparent resilience of the whale meat market in South Korea, the substantial numbers of minke whale bycatch, the potential threat bycatch poses to the 'J' stock of minke whale, and the presence of western North Pacific Humpback Whale meat in the marketplace, additional measures should be taken. These include the following actions:

1. Clarifying and strengthening measures for domestic trade in whale meat products including:
 - a) The setting of explicit criteria for what constitutes legal trade; and
 - b) The creation of a mandatory registration system for whale meat traders, under which the origin of existing whale meat stocks can be verified.
2. Developing of a system by which meat samples are collected from all incidentally caught and stranded whale specimens covered by the ICRW for inclusion in a central DNA register.
3. Regular sampling and genetic testing of whale meat in the South Korean market to monitor the possible entry of illegal meat into the marketplace.
4. Initiating of public awareness programmes targeted at fishermen, whale meat traders, and enforcement officials focusing on:
 - a) international and domestic laws governing the catching of whales and the trade in whale meat; and
 - b) the conservation status of cetacean species.
5. Researching of methods to reduce bycatch for different gear types and geographical areas.
6. Disseminating information to fishermen on effective techniques for disentanglement of live cetaceans.

A SURVEY OF WHALE MEAT MARKETS ALONG SOUTH KOREA'S COAST

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Background

The Republic of Korea (South Korea) has been a party to the International Convention on the Regulation of Whaling (ICRW) since 1978 and a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1993. It currently maintains no objection to the International Whaling Commission's (IWC) moratorium on commercial whaling nor reservations on the CITES Appendix I listings of cetacean species. South Korea banned whaling in 1986 when the IWC moratorium came into effect, but continues to allow the domestic sale of cetaceans caught as incidental catch or 'bycatch'. In accordance with the CITES Appendix I listings, South Korea does not allow the commercial export of species covered by the IWC moratorium.

The current project

The current survey was carried out between July and December 1999. As part of the project, TRAFFIC East Asia surveyed South Korea's eastern and western coastal areas for the availability and price of whale meat, and collected 35 samples of whale meat products for DNA analysis. Tissue samples collected in August 1999 were presented to the US government's Southwest Fishery Science Center for DNA analysis. Remaining tissue samples were given to the National Fisheries Research and Development Institute (NFRDI) of the Ministry of Maritime Affairs and Fisheries and to the Korea Ocean Research & Development Institute (KORDI) for use in additional research projects. It is hoped that the results of these various efforts will help to improve the policy and regulatory environment for cetacean management in South Korea, including management of domestic trade.

Korea and whales

The history of Korean minke whaling

During the period 1932-1935, minke whales were a bycatch of catcher boats taking larger baleen whales and catch figures for this species were not reported officially, while statistics for all whales taken during the period 1946-1961 are unknown (Brownell, 1981). However, Brownell (1981) reported that, by the 1960s, minke whale *Balaenoptera acutorostrata* was economically the most valuable of the whales taken in the coastal waters of South Korea.

Catch statistics for coastal whaling have been published in South Korea's *Yearbook of Fisheries Statistics* since 1962 and have been included in the *International Whaling Statistics* since 1978. Total catch of minke whale from 1962 to 1986 was 13,734 animals (Kim, 1998). In 1986, Korea banned the directed catch of all cetaceans in Korean waters.

The current regulatory situation - legislation and guidelines

On 31 December 1985, the National Fisheries Administration (now MOMAF or the Ministry of Maritime Affairs and Fisheries) issued *Notice No. 85-17* banning the taking of all cetaceans in Korean waters effective 1 January 1986. The Notice was based on Article 27 of the *Marine Resources Protection Ordinance* and banned whaling in what Korea refers to as the East Sea, West Sea, and beyond latitude 25° North and a westward area to longitude 140° East. The Notice specifically allows for scientific whaling with a research permit issued by the government and, in

1986, 69 minke whales were taken under this provision (Anon., 1988). However, South Korea has not issued permits for lethal scientific whaling since 1986.

Notice No. 85-15 also describes what the government considers to be illegal whaling and related activities. These include directed whaling using guns or harpoons; deliberate killing of a live, trapped whale; and trade, possession, storage, transportation or export of illegally caught whale meat with the intention of trade. Penalties include fines ranging from two million to twenty million won (approximately US\$1,570 to \$15,700) or imprisonment of up to three years, depending on the offence.

TRAFFIC East Asia's report, *Whale Meat Trade in Asia: A Review of the Markets in 1997* (Mills *et al*, 1997), reported on the high levels of cetacean bycatch, including minke whale, from South Korean waters. Under current government guidelines, live whales caught accidentally must be returned to the sea while dead specimens of bycatch should be buried or consumed locally. The definition of 'consumed locally' has been difficult to clarify and it appears that domestic sale of whale meat is legal and essentially unregulated in South Korea (Mills *et al*, 1997).

MOMAF guidelines have regulated incidental catch or bycatch since 1994. Guidelines were revised in December 1997 to facilitate biological sampling by MOMAF and NFDRI and the monitoring of whale meat distribution by regional fisheries authorities (Kim, 1998).

When a whale is caught, the fisherman is required to report to the marine police located in each port. A provincial prosecutor with investigative powers is then assigned to review the case to determine the legality of the catch and the disposal of the specimen (MOMAF Guidelines, Dec. 1997). The prosecutor examines the police inspection report and accompanying photographs and then makes his determination. If the evidence points toward drowning (e.g. net marks or scoring on the carcass) rather than harpooning, meat from the specimen may enter the marketplace.

Baleen whale bycatch in South Korea

The 'J' stock of minke whale

In its management of minke whales, the IWC recognizes two major management stocks in the western North Pacific: the Okhotsk Sea-West Pacific stock, and the Sea of Japan (known as the East Sea in Korea)-Yellow Sea-East China Sea stock (Klinowska, 1991). The IWC considers the Sea of Japan-Yellow Sea-East China Sea stock (the 'J' stock) to be a protection stock (Anon., 1984) with the classification coming into effect in 1986. A protection stock is defined in the Schedule to the ICRW as meaning a stock below its maximum sustainable yield stock level. The ICRW does not allow for commercial whaling of protection stocks. The IWC estimates the population of 'J' stock to be approximately 893 animals (Anon., 1997a).

At the fifty-first meeting of the IWC in Grenada (May, 1999), the IWC's Scientific Committee found that the results of all simulation trials considered suggested that the 'J' stock was "likely to decline markedly because of the incidental catches in that area" (Anon., 1999). These incidental catches include primarily bycatch by Japan and South Korea. Based on genetic analysis of whale products purchased in the retail markets of Japan and South Korea from 1993-1999, Baker *et al* (2000) also suggest that estimated levels of undocumented exploitation of 'J' stock will result in stock declines over the next few decades.

Catch figures

Baleen whales

Catch figures for incidental take or bycatch of minke whale from 1994 to 1999 are presented in Table 1. In addition to minke whale, incidental catch of one specimen of Humpback Whale *Megaptera novaeangliae* was reported by the government in 1996 (Mills *et al.*, 1997) and a second in 1999 (Kim, 2000).

Table 1 Reported incidental catch of minke whales by South Korea, 1994-1999

Year	Number
1994	7
1995	15
1996	129
1997	78
1998	45
1999	56

Source: Ministry of Maritime Affairs and Fisheries

Analysis of catch statistics for 1996/1997 suggested that over 95% of South Korea's incidental catch occurred in the Sea of Japan/East Sea area and were landed in the provinces of Kyungbuk and Kangwon (Kim, 1998). Kim (1998) further reported that most bycatch occurred within 20 nautical miles of South Korea's shoreline, corresponding to the location of coastal fishing gears. Fishing gears causing entanglement in the study period included trap net, gillnet, and set net.

Kim (1999) analysed reported minke whale bycatch for 1997 and 1998 by region and gear-type. In both years, the majority of bycatch was in the East Sea (Japan Sea). In 1997, the majority of bycatch was attributed to set nets (38 out of 78 or 49%), trap nets (24/78 or 31%), and drift gillnets (11 out of 78 or 14%). In 1998, the majority of bycatch (25 out of 45 or 56%) involved set nets.

Figures for 1999 indicated a reported bycatch of 56 minke whales and one Humpback Whale (Kim, 2000). Again most catches were in the East Sea, but analysis by gear-type shows bycatch more evenly distributed across set nets (20 out of 56 or 36%), gillnets (19 out of 56 or 34%), and trap nets (17 out of 56 or 30%). The single Humpback Whale was caught in squid angling gear.

Other cetacean species

Small cetacean species reported as bycatch for 1997, 1998, and 1999 included: Short-finned Pilot Whale *Globicephala macrorhynchus*, Pacific White-sided Dolphin *Lagenorhynchus obliquidens*, Risso's Dolphin *Grampus griseus*, Common Dolphin *Delphinus delphis*, Harbor Porpoise *Phocoena phocoena*, Finless Porpoise *Neophocaena phocaenoides*, Stejneger's Beaked Whale *Mesoplodon stejnegeri*, and Baird's Beaked Whale *Berardius bairdii* (Kim, 1999; Kim, 2000).

Kim (1999) states that the total number of cetaceans (excluding minke whale) reportedly caught as bycatch in 1997 and 1998 were 78 and 34 respectively. Reported strandings for 1997 and 1998 included minke whale, Baird's Beaked Whale, Risso's Dolphin, Finless Porpoise, Stejneger's Beaked Whale and Blainville's Beaked Whale *Mesoplodon densirostris*.

Kim (2000) reported bycatch figures for 1999 for small cetaceans as totaling 47. Strandings included minke whale (1), Stejneger's Beaked Whale (2), and Finless Porpoise (2).

Recent debate over South Korea's whaling policy

In 1999, Korean fisheries agencies were subjected to criticism in the local media for what was perceived as their failure to protect the interests of Korean fishermen. While this criticism was related primarily to access to commercial fish species, the subject of harvesting cetaceans has also been raised. Articles have described surveys of cetacean populations in South Korea's offshore and coastal waters and have quoted fisheries officials as saying that recent increases in cetacean populations could lead to a re-opening of limited commercial whaling (*Hankook Daily*, 22/02/99). The potential impact of growing cetacean populations on commercially important species of fish has also received attention in the media. However, South Korea does not have an objection to the IWC's current moratorium on commercial whaling and could not commercially harvest species covered by that moratorium.

Also in 1999, the NFRDI initiated a series of research activities in cooperation with Japanese researchers to collect scientific data to support the conservation and management of cetaceans in Korean waters (Kim, 2000). Research includes sighting surveys, biological sampling of bycatch, genetic studies, analysis of collected tissues for pollutants, and systematic reporting of general cetacean sightings by research vessels.

TRAFFIC East Asia's work in South Korea

Overview of previous surveys in South Korea

Although South Korea banned whaling in 1986 in order to implement the IWC's moratorium on commercial whaling, the rules governing whale bycatch and disposal remain unclear (Chan *et al.*, 1995; Anon., 1996; Mills *et al.*, 1997). TRAFFIC research first documented whale meat on sale in Pusan at Chagalch'i Market and a major department store in 1994 (Anon., 1994). Over a three-day period in April 1995, seven or eight stalls in Chagalch'i market were identified as offering whale meat for sale, but no whale meat was found in any of the department stores visited (Chan *et al.*, 1995). In 1996, TRAFFIC East Asia staff returned to South Korea to investigate whale meat markets in the port cities of Ulsan and Pusan. Nearly a dozen restaurants selling whale meat in Ulsan were identified as well as the continued presence of vendors selling whale meat in Pusan (Anon., 1996).

Limited price information was collected in 1994, 1995 and 1996. Samples were not purchased during the three surveys, but physical inspection during the 1994 and 1995 surveys found meat pieces bearing grooves characteristic of the lower jaw and throat of baleen species in the genus *Balaenoptera* (Anon., 1994; Chan *et al.*, 1995).

The 1997 market surveys

Between January and March of 1997, TRAFFIC researchers conducted market surveys in Ulsan, Pusan, Gampo, and Pohang collecting information on availability and price (Mills *et al.*, 1997). Eighteen whale meat samples were purchased during this survey and TRAFFIC later facilitated their DNA analysis in a co-operative arrangement between the South Korean and US governments. TRAFFIC researchers also conducted a number of interviews with industry and government representatives which drew attention to the high levels of whale bycatch in South Korea in 1996 (Mills *et al.*, 1997).

In the 1997 survey, researchers visited wholesale markets, retail markets and restaurants, and the eighteen samples were purchased from a variety of sites. Samples included frozen, cooked, and raw (chilled) meat and all samples were purported to be 'real' whale meat. No more than one sample was

purchased at each site. Each sample was given a reference number. All samples were then frozen. Samples for DNA analysis were later extracted by researchers from the US government's Southwest Fisheries Science Center.

Results of species identification from the eighteen samples included: minke whale *Balaenoptera acutorostrata*; Harbour Porpoise *Phocoena phocoena*; Finless Porpoise *Neophocaena phocaenoides*; Risso's Dolphin *Grampus griseus*; Pacific White-sided Dolphin *Lagenorhynchus obliquidens*; False Killer Whale *Pseudorca crassidens*; and Common Dolphin *Delphinus delphis* (Brownell *et al*, 2000). Three of the eighteen samples contained meat from more than one species.

All of the cetaceans identified in the TRAFFIC samples are known to be found in Korean waters. However, Baker *et al* (1996) report that analysis of surveys conducted in South Korea in 1994 and 1995 found meat from two species not normally associated with local Korean waters: Southern Minke Whale *Balaenoptera bonaerensis* and a possible pygmy form of Bryde's Whale *Balaenoptera edeni*.

The 1999 market surveys

Methodology

The TRAFFIC East Asia consultants who conducted the 1997 survey were again engaged to conduct surveys of communities along South Korea's eastern coast in August 1999 and the western coast in November 1999.

The 1999 surveys investigated the availability of whale meat in four localities on the eastern coast: Ulsan, Pusan, Pohang and Gampo; and three localities on the western coast: Seoul, Incheon, and Kunsan. Earlier surveys and bycatch data all pointed to coastal communities on the eastern coast as the principal centers for South Korea's whale meat markets. The Pusan metropolitan area, Pohang (in Kyungbuk Province), and the Ulsan metropolitan area are all on the eastern coast. During the eastern coastal survey, emphasis was placed on revisiting those communities surveyed in 1997. During the survey of the western coastal area, Karak and Noryangjin markets were chosen as survey sites because they are the largest and best-known fishery markets in Seoul. Incheon was chosen because of its proximity to the capital and Kunsan because it is the biggest port city on the western coast.

Samples for DNA analysis were purchased on the eastern coast only. Researchers visited wholesale markets, retail markets and restaurants, and purchased thirty-five samples from a variety of sites. Samples included frozen and cooked, but, unlike the 1997 surveys, no raw (chilled) meat was available. This was likely due to the time of year as the 1999 surveys were conducted in August while the 1997 surveys were conducted at a time of year when the weather was cooler. No more than one sample was purchased at each site and all samples were purported to be 'real' whale meat (i.e. not from small cetaceans).

Each sample was given a reference number. Time and place of collection as well as price per unit were recorded. All samples were then frozen. Tissue samples for DNA analysis were later extracted by scientists from the US government's Southwest Fisheries Science Center. The remaining meat was provided to NFRDI and KORDI for use in additional research projects.

The eastern coast

Local media coverage of criticisms leveled by local and international wildlife conservation groups over South Korea's high levels of bycatch as well as stricter enforcement of regulations governing disposal of cetacean bycatch had had an obvious impact on whale meat markets since the 1997 survey. Traders

unanimously stated that meat was from bycatch, was certified as legal products by the local prosecutor's office, and auctioned openly in the fish markets. The attitude of market stall owners often was defensive and suspicious. Many were aware that NFRDI, several universities, and a number of conservation groups previously had collected samples.

Ulsan (7 samples)

Ulsan is an industrial city and port with a population of approximately one million (Anon., 1999). The city is home to a historical whaling port and consumption of whale meat is an established local custom. Ulsan is clearly the center of the whale meat market in South Korea. There are markets in Jangsangpo and Bangeojin areas, and whale meat restaurants are spread throughout the city. In Jangsangpo, there has been an annual 'Whale Festival' for the last five years in order to continue support for the whaling spirit. This new festival also could be interpreted as a form of protest against the government's failure to protect the interests of Korean whalers in contrast to Japan where the harvest of small cetaceans continues as does limited whaling for scientific purposes.

Jangsaengpo (8 samples)

Jangsaengpo, a district of Ulsan, was once South Korea's main whaling port. In this port area, a number of restaurants sell whale meat and investigators located one butcher shop selling whale meat. Overall, prices had not decreased in this district in comparison with the 1997 survey.

Bangeojin (2 samples)

There were two market stalls selling whale meat inside the general market in Bangeojin.

Pusan (8 samples)

Pusan is the second largest city in South Korea with a population of 3.9 million (Anon., 1998). It is a cosmopolitan city with an international seaport and airport. The TRAFFIC consultants found more vendors in Pusan's Jagalchi Market specializing in whale meat than in the 1997 survey (12 as compared to seven or eight in 1997). Whale meat is also served in Japanese restaurants as *zukidashi*, an appetizer. Eight samples were purchased in Jagalchi Market from eight individual vendors. Five out of eight vendors claimed their products were from 'real' whales while one admitted that the meat could be dolphin meat. Two of the five vendors claiming to sell 'real' whale specifically referred to minke whale. Also noteworthy in this market were the Japanese-language signs posted by two of the vendors. These signs were not in place in 1997.

Pohang (5 samples)

Pohang is an industrial city and seaport with a population of 500,000 (Anon., 1998). In Jukdo market, a wholesale fishery market, there are two relatively large market stalls equipped with large deep-freezing units as well as a number of whale meat restaurants. Several of the restaurants also act as whale meat wholesalers. Overall, the number of vendors had not increased since the 1997 survey. One of the two long-time vendors told the consultants that some Japanese residents in Pohang hand-carry whale meat to Japan on return visits. However, when the consultants mentioned a possible intention to export whale meat to Japan to two other vendors, they both stated that such export would be illegal.

Kuryongpo (4 samples)

Kuryongpo is a port on the outskirts of Pohang. In Kuryonpo, there are two large fish wholesalers / restaurants who supply whale meat to others. Neither was interested in selling small quantities of meat, only amounts of one kilogram or more. There were about 20 restaurants selling whale meat, but these restaurants did not specialize in whale meat, but included it as one of many dishes on their menu. One restaurant owner suggested that the two large wholesalers have their own fishery operations, but the TRAFFIC researchers were unable to confirm this.

Gampo (1 sample)

Gampo is a port between Ulsan and Pohang. The number of whale meat restaurants had stayed the same since 1997 with only two restaurants selling whale meat found in each survey. When purchasing a sample from one of the restaurants serving whale meat, the researchers were told that many restaurant owners were not interested in handling whale meat because of a recent prosecution in the area.

The western coast

Surveys were also carried out in three cities on the western coast of South Korea to determine if the market for whale meat was expanding beyond the traditional centers on the eastern coast. Researchers visited three cities: Seoul, Incheon, and Kunsan.

Seoul

Seoul, the capital of the Republic of Korea since 1394, has a population of 10.3 million (Anon., 1998). Researchers visited two wholesale markets in Seoul: Karak and Noryangjin. Karak market is the biggest wholesale market for agriculture and fisheries products in Seoul. Noryangjin market is a wholesale market in Seoul. No whale meat was found on sale in either market.

Incheon

Incheon is a port on Korea's western coast. Because of its location between North and South Korea, Incheon, population 2.1 million, has become an important city in Korea's recent history (Anon., 1998). Investigators visited Incheon's fish wholesale market, but no whale meat was found.

Kunsan

Kunsan is the largest port on the west coast with a population of 300,000 (Anon., 1998). Investigators visited Kunsan fish market, but no whale meat was found.

Prices in 1999

Overall, prices in 1999 were similar or slightly lower than those found in TRAFFIC East Asia's 1997 survey. However, certain factors make direct prices comparisons difficult. The 1999 survey, conducted in August during the hot weather, found no raw meat for sale. In the 1997 survey, raw or chilled meat, when available, was higher priced than cooked meat. Also, later in 1997, after the first survey, South Korea entered a period of financial crisis which greatly affected foreign exchange rates and domestic consumption.

In general, 1999 prices were extremely consistent between cities and between vendor types. Prices ranged from a low of KRW40,050 (US\$39) per kilogram to a high of KRW66,750 (US\$52) per kilogram.

Table 2 **Whale meat samples collected in 1999**

Sample No.	Location (type of vendor)	Date of purchase	Condition of sample	Price per catty* (KRW)	Price per kg (KRW)	Price per kg (USD)**
99-01	Pusan (M)	18/08	Boiled/frozen	20,000	53,400	\$42
99-02	Pusan (S)	18/08	Boiled	25,000	66,750	\$52
99-03	Pusan (S)	18/08	Boiled	20,000	53,400	\$42
99-04	Pusan (S)	18/08	Boiled	20,000	53,400	\$42
99-05	Pusan (S)	18/08	Boiled	20,000	53,400	\$42
99-06	Pusan (S)	18/08	Boiled	20,000	53,400	\$42
99-07	Pusan (S)	18/08	Boiled	20,000	53,400	\$42
99-08	Ulsan (M)	19/08	Boiled	15,000	40,050	\$39
99-09	Ulsan (M)	19/08	Boiled	20,000	53,400	\$42
99-10	Ulsan (M)	19/08	Boiled	20,000	53,400	\$42
99-11	Ulsan (M)	19/08	Boiled	20,000	53,400	\$42
99-12	Ulsan (M)	19/08	Boiled	20,000	53,400	\$42
99-13	Pusan (S)	18/08	Boiled	20,000	53,400	\$42
99-14	Pohang (M)	20/08	Boiled	20,000	53,400	\$42
99-15	Pohang (M)	20/08	Boiled	20,000	53,400	\$42
99-16	Pohang (M)	20/08	Boiled	20,000	53,400	\$42
99-17	Pohang (R)	20/08	Frozen	20,000	53,400	\$42
99-18	Pohang (R)	20/08	Frozen	20,000	53,400	\$42
99-19	Ulsan (M)	20/08	Boiled	25,000	66,750	\$52
99-20	Jangsaengpo (R)	21/08	Frozen	20,000	53,400	\$42
99-21	Jangsaengpo (R)	21/08	Frozen	25,000	66,750	\$52
99-22	Jangsaengpo (R)	21/08	Frozen	15,000	40,050	\$39
99-23	Jangsaengpo (R)	21/08	Frozen	20,000	53,400	\$42
99-24	Jangsaengpo (R)	21/08	Frozen	20,000	53,400	\$42
99-25	Jangsaengpo (B)	21/08	Frozen	20,000	53,400	\$42
99-26	Jangsaengpo (R)	21/08	Frozen	25,000	66,750	\$52
99-27	Jangsaengpo (R)	21/08	Boiled	15,000	40,050	\$39
99-28	Ulsan (R)	21/08	Frozen	20,000	53,400	\$42
99-29	Gampo (R)	21/08	Boiled	25,000	66,750	\$52
99-30	Bangeojin (R)	22/08	Boiled	15,000	40,050	\$39
99-31	Bangeojin (M)	22/08	Boiled	20,000	53,400	\$42
99-32	Kuryongpo (R)	23/08	Frozen	20,000	53,400	\$42
99-33	Kuryongpo (R)	23/08	Frozen	20,000	53,400	\$42
99-34	Kuryongpo (R)	23/08	Frozen	15,000	40,050	\$39
99-35	Kuryongpo (R)	23/08	Frozen	20,000	53,400	\$42
Vendor key: S= Street stand; M = Market stall; R = Restaurant; B = Butcher						
* 1 catty is a traditional unit of measurement equal to 375 grams						
** Exchange rate KRW:USD = 1,276:1 (25/08/99 from Hong Kong Shanghai Banking Corporation)						

DNA analysis of 1999 and 1997 survey samples

In 1997 and 1998, TRAFFIC East Asia purchased samples of whale meat products in the commercial markets of South Korea. A total of 53 products were purchased, 18 in 1997 and 35 in 1999. Several of the products appeared to contain more than one type of meat so additional subsamples were collected. A total of 61 subsamples were provided to the US government's Southwest Fishery Science Center for identification through analysis of mitochondrial DNA sequences. A total of ten species were identified, all of which appear to be found in the North Pacific. Results of the analysis are summarized in Table 3.

Table 3 Summary of species identified from TRAFFIC samples collected in South Korean markets in 1997 and 1999

Common name	Scientific name	1997 samples (n=21)	1999 samples (n=40)
Minke Whale (N. Pacific)	<i>Balaenoptera acutorostrata</i>	11	25
Finless Porpoise	<i>Neophocaena phocaenoides</i>	3	4
Short-beaked Common Dolphin	<i>Delphinus delphis</i>	1	4
False Killer Whale	<i>Pseudorca crassidens</i>	2	1
Risso's Dolphin	<i>Grampus griseus</i>	1	2
Humpback Whale (N. Pacific)	<i>Megaptera novaeangliae</i>	0	2
Pacific White-sided Dolphin	<i>Lagenorhynchus obliquidens</i>	2	0
Harbor Porpoise	<i>Phocoena phocoena</i>	1	0
Bottlenose Dolphin	<i>Tursiops truncatus</i>	0	1
Baird's Beaked Whale	<i>Berardius bairdii</i>	0	1

Source: Brownell, *et al.*, 2000

The majority of species identified in the samples reflect declared bycatch for the relevant periods except for False Killer Whale and, in 1999, the Bottlenose Dolphin. Official reports indicate bycatch of one Humpback Whale specimen in 1996 (Mills *et al.*, 1997) and a second in 1999 (Kim, 2000).

Clapham (1999) states that the status of the western North Pacific population of Humpback Whales is unknown, but quotes Darling and Mori (1993) as saying that research has begun in recent years. The western North Pacific population of Humpback Whales is thought to be the smallest of all the various North Pacific populations. Using fluke photographs, Darling and Mori (1993) identified 177 western Humpback Whales off the Ogasawara and Okinawa, Japan breeding/calving grounds. Calambokidis *et al.* (1997) estimated the abundance of this population at 384 and 400 in 1992 and 1993, respectively.

Discussion

South Korea continues to prohibit directed catch of all cetacean species, but does allow domestic sale and consumption of incidental catch or bycatch. Mills *et al* (1997) refers to the financial implications of freeing live whales entangled in fishing gear both in terms of lost time, loss of catch, and damage to nets. There may be little incentive for a fisherman to free a live whale caught in his net, but some profit in allowing it to drown.

Despite this, officially reported levels of minke whale bycatch have declined since a high in 1996 of 129 animals (as shown in Table 1). Seventy-eight, 45, and 56 minke whales were reported as bycatch in 1997, 1998, and 1999 respectively. This would appear to indicate that the 1996 catch was

unusually high. However, TRAFFIC East Asia's surveys in 1999 found no appreciable change in the number of whale meat vendors on South Korea's eastern coast, which would seem to indicate a relatively stable market base. Similarly, despite the 1997 financial downturn, there appeared to be only a slight decrease in the average price of whale meat at the wholesale and retail levels, even with the decrease in reported minke whale bycatch.

Several different scenarios could explain this. A decrease in supply could have been balanced by a decrease in demand due to economic factors, resulting in a relatively stable price. A decrease in the supply of minke whale products could have been offset by substitutes, possibly the meat of smaller cetaceans which is often considered of lower quality and thus lower price, although official bycatch records do not support this. Alternatively, if existing procedures for the reporting of bycatch are seen as burdensome, some fishermen and dealers may be tempted to avoid formal reporting requirements. The latter possibility would be of particular concern given the conservation status of the 'J' stock of minke whales.

Although not extensive, TRAFFIC East Asia's 1999 survey found no indication of an expansion of whale meat markets in the three localities visited on South Korea's western coast. Consumption appears to remain centered in traditional consuming areas on the eastern coast. Since the 1997 survey, signs in Japanese had appeared at two restaurants in Pusan. Although one vendor in Pohang claimed that small amounts of whale meat for individual consumption were sometimes carried to Japan by Japanese residents, none of the vendors interviewed were aware of larger-scale commercial shipments from South Korea to Japan. Several pointed out that minke whale meat in South Korea was of generally poor quality as it came from animals that had drowned in nets. The resulting meat is seldom fresh and is often boiled for storage purposes. It should be noted that TRAFFIC researchers found no raw or chilled meat available in the 1999 surveys, likely because the surveys were conducted in mid-summer (August).

However, the possibility of illegal trade cannot be completely discounted. There have been several cases of attempted smuggling of whale meat to South Korea or to Japan via South Korea. In 1993, 3.5 tons of whale meat bound for Pusan was discovered at an airport in Oslo, Norway (Anon., 1994a). In 1994, Japanese Police and Customs officials in Nagasaki seized 11 tons of Bryde's whale meat, apparently packaged in Taiwan, aboard a Korean vessel (Anon., 1995). In December 1995, Japanese Customs officials in Osaka confiscated 5.4 tons of Bryde's Whale meat from a Korean vessel (Anon., 1996). Also, DNA analysis of market samples collected in South Korea has identified a number of samples of questionable origin (Baker *et al*, 1996).

Finally, the possibility of deliberate 'incidental' catch with animals being herded or driven towards nets also cannot be completely discounted. Given the relatively permanent nature of existing market channels and outlets, it is unclear what options suppliers and vendors would have if supply dropped below average levels of demand. However, TRAFFIC found no evidence that directed catch is taking place.

Conclusions and recommendations

Since publication of TRAFFIC East Asia's report, *Whale Meat Trade in Asia: A Review of the Markets in 1997* (Mills *et al*, 1997), the government of Korea has taken a number of steps to enhance its regulation of domestic whale meat consumption. These steps included issuing a directive requesting that local governments collect and submit to NFRDI a physiological description of individual animals caught as bycatch; and the raising of fines for violations of existing regulations. However, given the apparent resilience of the whale meat market in South Korea, the substantial

numbers of minke whale bycatch, the potential threat bycatch poses to the 'J' stock of minke whale, and the presence of western North Pacific Humpback Whale meat in the marketplace, additional measures should be taken. These include the following actions:

- Clarifying and strengthening measures for domestic trade in whale meat products including:
 - The setting of explicit criteria for what constitutes legal trade; and
 - The creation of a mandatory registration system for whale meat traders, under which the origin of existing whale meat stocks can be verified.
- Developing of a system by which meat samples are collected from all incidentally caught and stranded whale specimens covered by the ICRW for inclusion in a central DNA register.
- Regular sampling and genetic testing of whale meat in the South Korean market to monitor the possible entry of illegal meat into the marketplace.
- Initiating of public awareness programmes targeted at fishermen, whale meat traders, and enforcement officials focusing on:
 - International and domestic laws governing the catching of whales and the trade in whale meat; and
 - The conservation status of cetacean species.
- Researching of methods to reduce bycatch for different gear types and geographical areas.
- Disseminating information to fishermen on effective techniques for disentanglement of live cetaceans.

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