Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Eleventh Meeting of the Conference of the Parties
(Nairobi, Kenya, 10 to 20 April 2000)

Proposal from Japan to Transfer Gray Whales *Eschrichtius robustus* Eastern North Pacific Stock from Appendix I to Appendix II

A PROPOSAL

In accordance with the provisions of Article XV 1.(a) of the Convention, Japan proposes the transfer of the eastern North Pacific stock of gray whale, *Eschrichtius robustus,* from Appendix I to Appendix II of the Convention.

This proposal is presented in accordance with Resolution Conf. 9.24 with particular emphasis on the following:

(1) The biological criteria (cf. Annex 1, Res. Conf. 9.24) for Appendix 1 stocks are not met for this stock.
(2) Precautionary measures (cf. Annex 4, Res. Conf. 9.24) are fulfilled through national conservation and management measures and establishment of a trade control system based on DNA analysis techniques.

The most recent scientific findings clearly demonstrate that the population has been increasing steadily, and that it is approaching its carrying capacity. The International Whaling Commission (IWC) permits the take of 140 whales annually from this population for aboriginal subsistence whaling by Russian and US people. In 1994 the Government of the United States of America removed the eastern North Pacific population of the gray whale from the Endangered Species List established under its Endangered Species Act.

Downlisting of this stock to Appendix II will in no way endanger the gray whales. Any commercial harvest would be limited by the IWC's risk averse Revised Management Procedure (RMP) and DNA analysis techniques that allow species and individual identification of whales are already available to prevent illegal trade.

Although the IWC currently maintains its moratorium on commercial whaling its Scientific Committee has never recommended that the implementation or maintenance of this measure is required for conservation reasons.

Since the Eastern North Pacific stock of gray whales is clearly not threatened with extinction its listing on Appendix I contradicts CITES's own criteria for listing on this Appendix, it is critically important for the CITES to support this downlisting proposal in order to demonstrate that the CITES makes its decisions on the basis of scientific and objective information, not for political reasons.

Brief History of the Gray Whale in CITES

The gray whale, *Eschrichtius robustus,* was put on CITES Appendix II in 1979.

Following Resolution Conf. 2.9 on "Trade in certain species and stocks of whales protected by the IWC from commercial whaling", the gray whale was transferred to Appendix I in 1983, to be effective in 1986.

In accordance with Article XXIII of the Convention, Japan entered specific reservations to this listing of the gray whale on Appendix I.

At COP10 Japan submitted a proposal to downlist this stock to Appendix II. Although this proposal was widely accepted with 47 votes in favor, it did not achieve the 2/3 majority needed (61 against, 8 abstention) and was consequently rejected.

For COP11 Japan is submitting a new proposal to downlist this stock from Appendix I to Appendix II. Since COP10, it is becoming clearer that the Gray Whale stock is approaching its carrying capacity as evidenced by the increasing strandings of this animal most probably due to starvation.

B PROPONENT

- Japan

C SUPPORTING STATEMENT

1 TAXONOMY

1.1 Class

- Mammalia

1.2 Order

- Cetacea

1.3 Family

- *Eschrichtiidae*

1.4 Species

- *Eschrichtius robustus* (Lilljeborg, 1861)

1.5 Scientific synonyms

- *Balaena gibbosa* Erxleben, 1777
- *Balaena agamachschik* Palias, 1811
- *Balaenoptera robusta* Lilljeborg, 1861
- *Agaphalus glaucus* Cope, 1868
- *Eschrichtius gibbosus* Deinse, 1937

1.6 Common names

- English: Gray whale, California gray whale, mussel digger, hand head, devil fish, gray back
- French: Baleine grise
- Russian: Seryi kit
- Norwegian: Grahval
- Eskimo: Angtucbhag
- Aleut: Chikalkhluck
- Japanese: Kokukujira, kokujira, aosagi

1.7 Code numbers

The code number of gray whale, *Eschrichtius robustus,* in the CITES Identification Manual is Code A111.006.001.001.

2. BIOLOGICAL PARAMETERS

The stock of eastern North Pacific gray whales has been the subject of extensive research, and a large amount of biological data and knowledge have been accumulating on this stock. The Comprehensive Assessment (CA) of this stock was conducted by the Scientific Committee of the IWC in 1991. Since that time, this assessment has been reviewed every year to provide information for the Subcommittee on Aboriginal Subsistence Whaling.

2.1 Distribution

The gray whale is the most neritic baleen whale inhabiting coastal waters shallower than 200m. It seasonally moves along the coast toward the north for feeding in summer and down to the south for breeding in winter. Although the North Atlantic stock(s) of this species were extinct by the early 19th century, two stocks are

recognized in the North Pacific, known as the western stock or Korean stock and the eastern stock or Californian stock. As to separation of the two stocks in the North Pacific, IWC (1993) concluded that the eastern and western stocks of the gray whales "probably represent geographically isolated stocks". Geographic distribution of the two stocks is given in Fig. 1.

With regard to the distribution of the eastern North Pacific stock, IWC/SC/A90/G6, IWC/SC/A90/G25 and IWC/SC/A90/G27 indicate that gray whales are distributed along the Siberian coast and in the southern Chukchi and northern Bering Seas from May to November and begin their southward migration from October to November. Rice and Wolman (1971) and others have documented that southward migrating gray whales are found along the coast of North America from November to February with the majority of the whales passing central California in early December to early February as reported in IWC/SC/A90/G3, IWC/SC/S90/G4 and IWC/SC/A90/G9. IWC/SC/A90/G9 estimated that the arrival of the fall southward migration at the Granite Canyon counting station in central California had been delayed at an approximate rate of a half-day per year over the period 1967-1987, however no trend had been detected for the end of the migration, as quoted from the report of the Special Meeting of the Scientific Committee of IWC on the Assessment of Gray Whales.

The historical distribution of the eastern North Pacific stock is assumed to be similar to the present distribution (See 2.3). Range states are Canada, Mexico, Russian Federation, and the United States of America.

2.2 Habitat availability

The habitats in both breeding and feeding grounds have been generally well preserved. In a part of the feeding habitat, the gray whale has been traditionally utilized by the local people under the category of aboriginal subsistence whaling of the IWC. Various kinds of fisheries have operated in the feeding grounds, but the gray whale does not compete directly with these fisheries, because the target species of these fisheries are not food animals of the gray whale.

On the breeding habitat whale watching, mainly for the gray whale takes place. There is a plan to develop a salt factory in a part of the breeding ground, but the Government of Mexico has protected most of the breeding habitat by the establishment of a sanctuary for this whale stock. The frequency of stranding of gray whales has been increasing at Baja California Sur, Mexico in recent years. Poor body condition due to low nutrient concentration at the feeding grounds has been suggested as a possible cause (Perez-Corte et al., 1999).

Although considerable development has taken place on the shore along the coast of North America adjacent to part of the migratory route of this stock and the sea surface is used in various ways by humankind, these human activities do not have a large effect since the gray whale only passes through the area. Therefore, the habitat availability is not regarded as a crucial issue for this stock.

2.3 Population status

This stock is relatively easy to monitor, because it migrates within visible distance of the shore along parts of the California coast. The US National Marine Mammal Laboratory has been conducting systematic shorebased censuses of this stock during the south bound migration at Granite Canyon near Monterey, California since 1967/68, although not every year (Wade, 1996: Table 1). The current population was estimated to be 21,113 (20,415 - 21,801) in 1987/88 (IWC, 1989). Abundance for the Eastern North Pacific stock of gray whales was estimated by Hobbs and Rugh (1999) to be 26,635 whales (CV=10.06%; 95 log-normal confidence interval=21,878 to 32,427) in the 1997/98. This estimate is similar to the previous estimates of 23,109 whales (CV=5.42%; 95% confidence interval = 20,800 to 25,700) from the 1993/94 survey and 22,263 whales (CV=9.25%; 95% confidence interval =18,700 to 26,500) from the 1995/96 survey.

2.4 Population trends

Whaling for this whale stock by aboriginal whalers had commenced at the latest by the beginning of the 17th century around Washington State, Vancouver Island and the eastern Aleutian Islands. One hundred fifty six to 263 whales were removed annually from the stock between 1600 and 1850 (Mitchell and Reeves, 1990).

Estimates of the population of the eastern North Pacific stock before the start of whaling by Europeans was no more than 30,000 by the subjective impression of Scammon (1874), and from around 15,000 to certainly not more than 20,000 based on known catches by Hendersch (1972).

The commercial catch of the gray whale commenced in 1846 in Baja California and spread to the Bering Sea later. Table 2 shows commercial and recent aboriginal catches from the eastern North Pacific stock of gray whales after Punt and Butterworth (1997) and the IWC data. At least 11,000 gray whales were removed from the stock between 1846 to 1874, reducing it down to 8,000 to 10,000 whales (Scammon, 1874). It was further depleted until the beginning of the 20th century to the level of 2,000 whales (IWC, 1993).

Since the end of World War II, the stock has recovered due to protection by the IWC. Under the IWC aboriginal subsistence whaling quotas 140-180 animals a year were taken by a Soviet whaling vessel on behalf of Chukotoka local people till 1992. From 1994 they were taken by sea hunters independently from whale boats and motor boats using hunting guns (Brokhin, 1997). The most recent catches have been 122 whales from Russia in 1998 (Zemsky et al., 1999), and one gray whale was caught by the USA in 1999 (IWC, 1999).

The estimated rate of annual increase was 3.2% (S.E. 0.5%) over the period 1967/68-1987/88 with an average catch of 174 whales. There is evidence of leveling off of the rate of increase in recent years which indicates that the stock is approaching its carrying capacity as shown in Fig. 2 after Breiwick (1996). The carrying capacity of the eastern North Pacific stock is estimated to be 24,000-32,000 (IWC, 1996). As the most recent estimation was 21,900-32,400 (Hobbs and Rugh (1999)), the population has fully recovered, and the current population level is approaching the carrying capacity.

Wade (1996) and Punt and Butterworth (1997) assessed the population of the eastern North Pacific gray whale stock using Bayesian method. According to Punt and Butterworth (1997), the carrying capacity of this stock is 31,200 animals and the population level in 1996 (24,020) was 77 % of the carrying capacity, and the population is 9 % above the level which gives the maximum sustainable yield (MSY).

2.5 Geographic trends

The carrying capacity at the beginning of the commercial whaling in 1846 was estimated to be less than 30,000 (Scammon, 1874), and the present carrying capacity is also estimated to be 24,000-32,000 (IWC, 1996). This indicates that the carrying capacity has remained at the same level, although a part of the breeding ground and migratory route were lost due to development activity.

2.6 Role of the species in its ecosystem

According to Wolman (1985), unlike other baleen whales, gray whales are primarily, although not exclusively, bottom feeders. Infaunal benthic species, especially of gammaridean amphipods such as *Anonys nugax, Pontoporeia femorata, P. affinis, Ampelisca macrocephala, A. eschrichti, Nototropis ekmani,* and *N. bruggeni* predominate among stomach contents from northern waters (Pie, 1962; Rice and Wolman, 1971; Zimushko and Lenskaya, 1970; Bogoslovskaya et al., 1981). Polychaete worms and mollusks are poorly represented, suggesting that the whales are selective feeders, although small, densely schooling fish and crab juveniles have been reported in a few cases. (Mizue, 1951; Ray and Schevill, 1974; Rice and Wolman, 1971; Sund, 1975; Walker, 1949). Nerini (1984), however believes that benthic faunal representation is probably reflective of area community composition rather than true selection.

It is possible that gray whales stir up bottom sediments with snouts, then filter the turbid water immediately above the bottom from which the heavier mollusks have settled out. The occurrence of sand, silt and gravel in the stomachs provides further evidence (Andrews, 1941; Tomilin, 1937; Zenkovich, 1934), although Ray and Schevill (1974) consider feeding to be a sucking action involving use of the strongly muscled tongue and flexible lips. Muddy snouts or trails have been observed several times in the Chukchi Sea (Pike, 1961; Scammon, 1874; Wilke and Fiscus, 1961; Rugh and Braham, 1979, Fig. 5), while the same behavioral pattern has been reported on the Baja California grounds, in spite of there being little or no significant food quantities available. Oliver *et al*. (1988) surveyed six lagoons in Baja California and benthic invertebrate communities in the Bering Sea, comparing signs of gray whale feeding such as feeding excavations and faecal slicks. They concluded that gray whale feeding on benthic invertebrates is rare in the calving lagoons of Baja California and along the open coast near Scammon's Lagoon.

The gray whale therefore competes with marine organisms which feed on these food species and changes in abundance of the gray whales will influence the abundance of other competitors in the feeding ground since the gray whale consumes large amounts of food. However, other whale species do not consume the food animals of the gray whale, so that they do not compete with gray whale for food.

The killer whale and some kinds of sharks are natural enemies of the gray whale, but changes in abundance of the gray whales is unlikely to influence its natural enemies, because their feeding habitat is wide.

The gray whale does not consume much food during its migration and while in its breeding grounds. Excretion and whale carcasses will add nutrients to the waters throughout its life range.

2.7 Threats

There are at the present no serious threats to gray whales in the eastern North Pacific. The population is healthy. This is what has prompted the Government of the United States of America in 1994, to remove the gray whale from the Endangered Species List established under the US Endangered Species Act.

As human development activities have been minimal in the feeding ground, the contamination of the marine environment in this area is not a threat. The development of fisheries for the competitor animals could positively effect the gray whale.

Human activity does not threaten this stock of gray whales. The carrying capacity has remained at almost the same level during past 150 years. The population is now approaching the carrying capacity.

3 UTILIZATION AND TRADE

3.1 National Utilization

Traditional

Hunting of gray whales has always been an important means of livelihood for traditional and indigenous communities in the coastal areas of the migratory range of the Gray Whale. Aboriginal catch on the Eastern North Pacific stock can be traced as far back as the year 1600. As an example, it is estimated that in 1891, 83 whales were hunted by aboriginal people. This level dropped to about 18 for the period 1929 to 1930.

The annual catches taken by local people in the USSR which have averaged about 175 per year over the last 30 years have not prevented the population from increasing. Sixty-one gray whales were documented as entangled in gillnets along the southern California coast in the 1980s, even though only a small proportion of the nets were examined (Heyning and Lewis, 1990).

The Makahs from the United States of America succeeded to revive their traditional hunt of gray whales by getting permission from the IWC for aboriginal subsistence whaling. One whale was taken in 1999. At least one other aboriginal tribe in Canada have also expressed their intent to revive their traditional hunt.

At the present time, the current annual catch quota of 140 whales by the IWC is substantially below the estimated average sustainable yield of 670 whales.

Commercial

The commercial hunt of gray whales started in 1846 and was phased out in 1946. The major whaling period was from 1854 to 1865, with catches throughout the range, but by about 1874 so few were left that the whalers more or less abandoned the southern whaling grounds. The shore whalers, who had alternative means of support, continued to operate in some cases until the turn of the century. There were some takes of gray whales by modern pelagic expeditions (Norway, USSR, Japan and USA) up to the time of commercial protection, which began from 1937 but was not completely implemented until 1946 (Jones, Swartz and Leatherwood, 1984).

Whale watching

Since the 1960s whale watching has become an eco-tourism business in the breeding grounds and along the migratory route as a non-lethal utilization of the gray whale in California and Mexico.

3.2 Legal international trade

At present there is no international trade in gray whale products. In case of resumption of international trade in whale products, import to Japan would be subject to stringent control mechanisms. Under the Decree of Import Trade Control, imports are not allowed unless the Government has confirmed the authenticity of the Certificate of origin by way of its diplomatic channels or other means.

3.3 Illegal international trade

Pursuant to Resolution Conf. 9.12, the Secretariat will be kept continuously updated with regard to any report of cases, or illegal attempt to trade in whale products. There has been no report of illegal trade of products of Gray Whales.

3.4 Actual or potential trade impacts

The survival of the gray whale stock will not be threatened by trade if current quotas are maintained and if/because:

- the Revised Management Procedure completed by the Scientific Committee of the IWC or the Aboriginal Subsistence Whaling Management Procedure currently being developed are used when the quotas are set;
- the control of the hunting is closely observed, both at sea and at landing sites, so that the quota is not overfished;
- the control of export of marine products from the exporting country is supervised closely and attempts of illegal export are prosecuted (see 3.3); and
- an importing country of products from gray whales can ensure that it has sufficient import controls to separate legal trade from attempts of illegal trade.

Traditional hunts carried out by aboriginal peoples are indeed conservative and well within the scope recommended by the Scientific Committee of the IWC.

It is unlikely that catch and subsequent landing from national waters could be made unnoticed. The Ministry of Agriculture, Forestry and Fisheries of Japan, together with the Ministries of Finance and of International Trade and Industry are responsible for controlling the import of marine products in Japan, and consequently also the legality of exporting the products in question. No import of whale products to Japan will be permitted unless there is sufficient control in a possible country of exportation and all imports requirements under Japanese laws have been fulfilled.

3.5 Captive breeding or artificial propagation for commercial purposes (outside country of origin)

Although a calf of the eastern North Pacific gray whale stock was held in captivity in the USA two separate times (Evans, 1974), captive breeding is not thought to be feasible from a practical point of view or even useful for conservation purposes.

Given the quantity of food required to maintain even a yearling, conservation through captive breeding would be quite impractical for this species, even if suitable large accommodation could be found (IUCN Red Data Book).

4 CONSERVATION AND MANAGEMENT

4.1 Legal Status

4.1.1 National

At present, the Government of Japan does not allow taking of this species.

Range states of the eastern North Pacific stock of the gray whale are Canada, Mexico, Russia and USA. All of these countries (potential countries of origin) have domestic legislation to protect gray whales. Mexico has particularly detailed legislation protecting the breeding lagoons from disturbance by visitors (IUCN Red Data Book).

The USA has the Marine Mammal Protection Act, which prohibits the taking of gray whales except for aboriginal subsistence use. In 1994 the Government of the USA removed the gray whale from the Endangered Species List established under its Endangered Species Act (Federal register, 1994).

In Canada, the Marine Mammal Regulations made under the Canada Fisheries Act provides for the issuance of licenses for the hunting of whales however, as a matter of policy, licenses are not issued for whaling by non-aboriginal people. Although these same regulations would permit the taking of gray whales by aboriginal peoples for food, social or ceremonial purposes none have been taken for more than 50 years.

4.1.2 International

Presently, the IWC is the international body responsible for management of gray whale stocks. According to the International Convention for the Regulation of Whaling of 1946 (ICRW), the objective is to ensure "increases in the numbers of whales which may be captured without endangering these natural resources" (Preamble). Moreover, the Convention lays down that the harvesting level shall "be based on scientific findings" (Article V), shall provide for "the conservation, development and optimum utilization of the whale resources... and... shall take into consideration the interests of the consumers of whale products" (Article V). In other words, the objective of the Convention is not to protect the whales for their own sake, but to regulate catches of whales for the benefit of mankind both now and in the future.

Under its New Management Procedure (NMP), the IWC classifies the eastern North Pacific stock of the gray whale as a Sustained Management Stock (SMS) under which a take is allowed. This stock should be now reclassified as an Initial Management Stock (IMS) under the same NMP, because it is near the level of the carrying capacity however; the IWC is in the process of revising its management procedures. The Commission has at its 46th meeting May 1994 accepted the Revised Management Procedure as the main scientific component in the development of a Revised Management Scheme for commercial baleen whaling. The IWC Scientific Committee is currently developing an Aboriginal Subsistence Whaling Management Procedure (ASWMP).

The IWC allows the take of 140 animals of the eastern North Pacific stock a year for Russian and US aboriginal people or on behalf of aboriginal people under the category of the aboriginal subsistence whaling, for their own use. The IWC prohibits the export of products from aboriginal subsistence whaling.

The IWC adopted a moratorium on commercial whaling in 1982 (entered into effect 1986).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) decided, in 1983, to place the gray whale on Appendix I to be effective in 1986. In accordance with Article XXIII of the Convention, Japan registered a Reservation on that decision and is consequently not bound by that decision. However, Japan has never used the trade possibilities existing under this Reservation.

4.2 Species Management

4.2.1 Population monitoring

The US National Marine Mammal Laboratory has been conducting systematic shorebased censuses of this stock during the southbound migration at Granite Canyon near Monterey, California since1967/68, although not every year. Current population has been estimated and monitored as documented in Section 2.4 of this paper.

4.2.2 Habitat conservation

The Government of Mexico has designated the breeding ground as a sanctuary to protect the eastern North Pacific stock of gray whales.

As a result of favorable environmental conditions, the major stocks of gray whale prey species in eastern North Pacific are presently at high levels.

4.2.3 Management measures

The IWC Aboriginal Subsistence Whaling Sub-committee reviews the cultural and dietary needs related to aboriginal subsistence whaling and makes recommendations to the Commission at its annual meetings. The IWC has decided on a block quota of 620 animals for the years 1998, 1999, 2000, 2001 and 2002 provided that the take in any one of these years shall not exceed 140 animals.

As the IWC's Revised Management Procedure (RMP) was designed for commercial whaling of baleen whales the IWC is currently developing a management procedure for aboriginal subsistence whaling known as the AWMP.

4.3 Control measures

4.3.1 International trade

Trade regulations under the Agreement Establishing the World Trade Organization (WTO) and CITES are the relevant legal instruments regarding international trade in marine species.

The IWC prohibits the export of products derived from aboriginal subsistence whaling.

4.3.2 Domestic measures

In Japan, the management authorities including the Fisheries Agency, Ministry of International Trade and Industry, Customs Office, Maritime Safety Agency, regional police headquarters and municipal fishery administrative authorities throughout Japan prevent smuggling of whale products.

DNA analysis provides the means to identify species, identify individuals, determine the gender and in some cases the stock of origin. On the basis of this method, Japan has now developed a control system that will be able to detect any illegal trade in whale products.

5 INFORMATION ON SIMILAR SPECIES

Hunting

The shape of the gray whale is characteristic, and cannot be confused with other species of whale. With control and inspection systems in place, it is highly unlikely that any other than the target species of whale will be harvested. At the international level, the IWC is currently developing a new system for supervision and control that will include satellite tracking and international observers.

Trade/commerce

In the past it may have been difficult to distinguish between whale meat from different species of baleen whales and between individual gray whales. However, as indicated above (4.3.2), DNA analysis provides the means to detect any attempted illegal trade. In order to prevent smuggling and poaching of whales, Japan has established a series of enforcement and control measures and will further establish necessary measures within the WTO and CITES frameworks. With the transfer of gray whale from Appendix I to Appendix II such efforts will be strengthened (see 3.4).

6 OTHER COMMENTS

Japan consulted with the IWC Secretariat and four range states about this proposal on October 13, 1999 in accordance with the Conf. 8.21 and Conf 9.24 of the CITES. The IWC Secretariat did not provide any additional scientific information but informed Japan that IWC had not yet completed a revised management scheme and that zero catch limits were still in force for whale species managed by the IWC. Although the United States indicated its opposition to this proposal mainly because of the IWC moratorium on commercial whaling, other range states either showed their support and/or favorable attitude to this proposal or did not respond.

7 ADDITIONAL REMARKS

Japan's proposal to transfer gray whale from Appendix I to Appendix II is based on (1) the relevant provision of the Convention and (2) the criteria for amendment of appendices I and II, cf. Resolution Conf. 9.24.

The criteria for determining what species are to be listed in which Appendices, and the criteria for amendment of Appendices I and II are contained in Resolution Conf. 9.24. The biological criteria for Appendix I listing are contained in Annex I of this resolution.

Present knowledge shows that the stock of whales in question is indeed not threatened with extinction and for that reason, its listing on Appendix I is not consistent with the fundamental principles of Article II of the Convention for inclusion in Appendix I. Furthermore, the listing of the gray whale on Appendix I of the Convention is in direct conflict with the national legislation of the United States of America which has delisted the gray whale from its own Endangered Species List.

In our view the intention of Article II when negotiating the Convention was clearly that species not threatened with extinction (biological criteria) should not be included in Appendix I. However, species could be included in Appendix II depending on their trade status. This was clarified upon adoption of the Bern criteria. Resolution Conf. 9.24 now sets the criteria for Amendment of Appendices I and II.

While in 1983, there might have been reasons to believe that the listing of the gray whale on Appendix I was warranted, scientific information is now available to strongly support the downlisting of the Eastern North Pacific stock of gray whale from Appendix I to Appendix II.

Based on the criteria listed in Annex I of Resolution Conf. 9.24 the Eastern North Pacific stock of gray whales do certainly not qualify for Appendix I and should rather be placed on Appendix II. All precautionary measures

relating to this downlisting as specified in this resolution are satisfied. Split-listing is not a problem since DNA analysis can distinguish between species and individuals such that enforcement will not be a problem.

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Table 1. Estimates of absolute abundance for the eastern north Pacific stock of gray whales based on shore counts (source: Wade, 1996).

Year	Estimate	*SE*
1967/68	13,012	893
1968/69	12,244	484
1969/70	12,777	525
1970/71	11,170	806
1971/72	9,841	442
1972/73	16,962	660
1973/74	14,817	592
1974/75	13,134	540
1975/76	14,811	690
1976/77	15,950	524
1977/78	17,127	966
1978/79	13,300	501
1979/80	16,581	668
1984/85	21,942	994
1985/86	20,450	727
1987/88	21,113	688
1992/93	17,674	1,029
1993/94	23,109	1,262
1995/96	22,571	1,174

Table 2. Commercial and recent aboriginal (post 1943) catches from the eastern north Pacific stock of gray whales.

Year	Male	Female	Year	Male	Female	Year	Male	Female	Year	Male	Female
1846	23	45	1884	23	45	1922	2	5	1960	58	115
1847	23	45	1885	21	41	1923	5	11	1961	71	141
1848	23	45	1886	17	33	1924	5	11	1962	49	98
1849	23	45	1887	7	13	1925	50	99	1963	60	120
1850	23	45	1888	7	13	1926	19	38	1964	70	140
1851	23	45	1889	7	13	1927	16	32	1965	68	108
1852	23	45	1890	7	13	1928	9	18	1966	123	97
1853	23	45	1891	7	13	1929	6	12	1967	94	156
1854	23	45	1892	7	13	1930	5	10	1968	67	134
1855	162	324	1893	0	0	1931	5	11	1969	59	155
1856	162	324	1894	0	0	1932	5	10	1970	26	125
1857	162	324	1895	0	0	1933	3	7	1971	58	102
1858	162	324	1896	0	0	1934	18	36	1972	22	160
1859	162	324	1897	0	0	1935	11	23	1973	97	81
1860	162	324	1898	0	0	1936	34	68	1974	94	90
1861	162	324	1899	0	0	1937	5	9	1975	58	115
1862	162	324	1900	0	0	1938	18	36	1976	69	96
1863	162	324	1901	0	0	1939	10	19	1977	86	101
1864	162	324	1902	0	0	1940	35	70	1978	94	90
1865	162	324	1903	0	0	1941	19	38	1979	57	126
1866	79	159	1904	0	0	1942	34	67	1980	53	128
1867	79	159	1905	0	0	1943	33	66	1981	36	100
1868	79	159	1906	0	0	1944	0	0	1982	56	112
1869	79	159	1907	0	0	1945	10	20	1983	46	125
1870	79	159	1908	0	0	1946	7	15	1984	59	110
1871	79	159	1909	0	0	1947	3	6	1985	55	115
1872	79	159	1910	0	0	1948	6	13	1986	46	135
1873	79	159	1911	0	0	1949	9	17	1987	47	112
1874	79	159	1912	0	0	1950	4	7	1988	43	108
1875	17	33	1913	0	1	1951	4	9	1989	61	119
1876	17	33	1914	6	13	1952	15	29	1990	67	96
1877	17	33	1915	0	0	1953	13	25	1991	57	113
1878	17	33	1916	0	0	1954	13	26	1992	0	0
1879	21	42	1917	0	0	1955	20	39	1993	0	0
1880	17	34	1918	3	5	1956	41	81	1994	15	29
1881	17	33	1919	1	1	1957	33	65	1995	44	41
1882	17	33	1920	1	1	1958	49	99	1996	93	
1883	19	39	1921	1	1	1959	65	131	1997	79	
									1998	62	60

Sources: 1846 - 1854 : IWC (1990)
1855 - 1961 : Lankester and Beddington (1986)
1962 - 1991 : C. Allison, pers comm
1994 : Blokhin (1995)
1995 : Beradin (1996)
1996-1998 : Punt and Butterworth (1997) and IWC data

Fig. 1. Geographic distribution of the gray whale. After Ohsumi (1995).

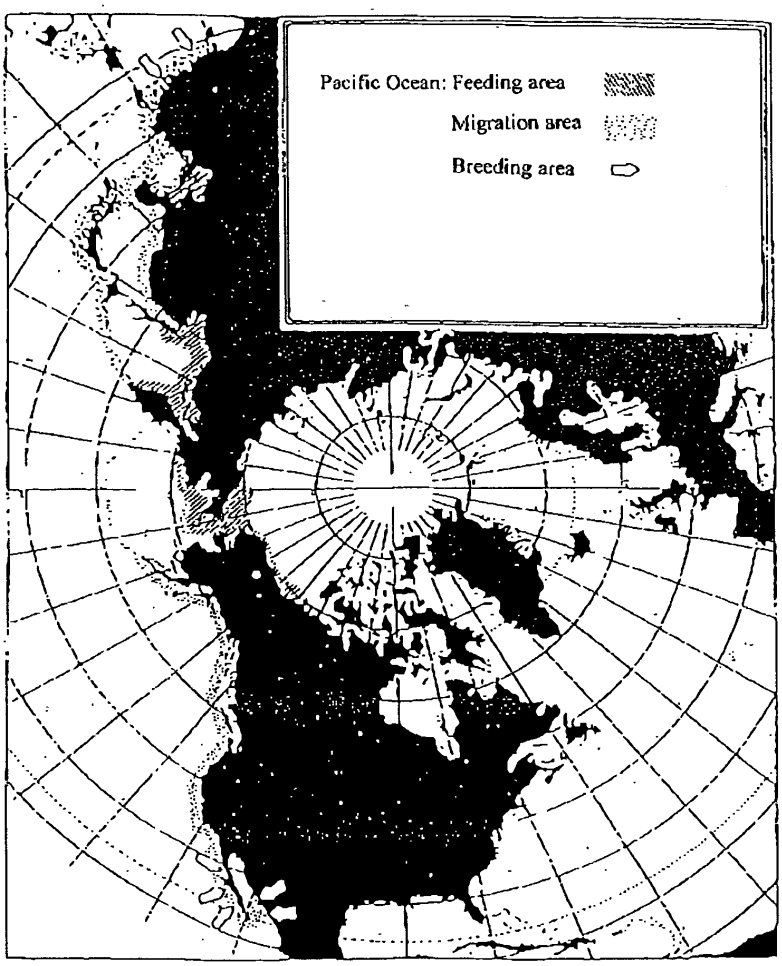

Fig. 2. Gray whale abundance estimates with fitted exponential curve (---) and extrapolated logistic (-) curve. The dashed horizontal line is the estimated asymptote. After Breiwick (1996).