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Japanese Whaling and Other Cetacean Fisheries

Toshio Kasuya

5-30-32-3, Nagayama, Tama, Tokyo, 206-0025, Japan

DOI: <http://dx.doi.org/10.1065/espr2006.09.346>**Abstract**

Background, Aim and Scope. Discussions on management of whales and whaling are factually monopolized by the International Whaling Commission (IWC), resulting in a limitation of information flow to outside communities. With an aim to improve the situation, this article briefly reviews whaling and dolphin/porpoise fisheries in Japan, which is recognized to be the world largest cetacean exploitation.

Main Features. The Japanese government grants an annual take of 22,647 cetaceans of 15 species for scientific whaling and various kinds of active dolphin/porpoise fisheries by the nationals. Further, over 100 baleen whales and numerous small cetaceans are taken in passive net fisheries. They are used mostly for human consumption and some for aquarium display.

Results. Sustainability of the take is not evident and some populations have shown a historical decline. The Japanese program of scientific whaling has been reviewed by IWC and its Scientific Committee (SC), although they have arrived at no consensus.

Discussion. The current scientific whaling program invites arguments from the view points of science as well as concerning the ethics of scientists, economy, and interpretation of the International Convention for Regulation of Whaling (ICRW) of 1946. The scientific whaling and other Japanese cetacean fisheries are benefited from nationalistic public attitude, and ambiguity and weakness of the ICRW.

Conclusions. Japanese cetacean harvest will continue supported by domestic demand for whale products as long as the proceeds can sustain the operation, even with criticisms from outside communities.

Recommendations and Perspectives. For safe management of small cetaceans exploited by Japan, studies are urgent on the population structure, abundance and validity of catch statistics. The results should be open to scientific communities.

Keywords: Conservation; dolphin; International Whaling Commission (IWC); marine ecosystem; porpoise; whale; whaling

Introduction

Hunting cetaceans with hand harpoons and driving schools into harbors have been practiced since prehistoric time in Japan. Documents indicate taxation on dolphin driving in the 14th century and commercial hunting of large whales using hand harpoons in the late 16th century (Kishiro and Kasuya 1993, Kasuya 2000). As reviewed by the Scientific Committee (SC) of the International Whaling Commission (IWC), Japan today retains the world top position in the annual harvest of cetaceans for human consumption (IWC 1992). Here, I will briefly review the recent status of Japanese cetacean

fishery and problems on the management viewed from a whale biologist who worked for the Fisheries Agency of Japan (1983–1997) and used to attend SC meetings (since 1982).

1 Historical Aspects of Extant Japanese Fishery for Cetaceans

For the convenience of a brief historical review of current Japanese fisheries for cetaceans, I grouped them into the following four categories. Omitted are extinct whale fisheries, e.g. traditional net whaling, large-type coastal whaling, pelagic whaling (see Kasuya 2000 for a brief review of these fisheries). So called 'scientific whaling' is dealt with separately. The major, or only, products of these fisheries are meat, blubber, and peripheral connective tissues for human consumption.

1.1 Small-type whaling

This is a whaling operation using vessels below 50 gross tons and a whaling cannon smaller than 50mm in caliber. This fishery started in the early 20th century, and was allowed to take northern minke whales (*Balaenoptera acutorostrata*) and toothed whales other than sperm whales (*Physeter macrocephalus*). It had no additional regulations until December 1947, when the Fisheries Agency placed it (about 80 vessels in operation) under a licensed system and started efforts to decrease the licensee (Kasuya 2000). History of this fishery is given in Ohsumi (1975). In 1988, the take of minke whales was prohibited by the government that accepted the moratorium of commercial whaling by the IWC (see below). Currently, five Japanese, small-type whaling vessels operate with a total annual quota of 62 Baird's beaked whales (*Berardius bairdii*), 100 short-finned pilot whales (50 southern and 50 northern forms) (*Globicephala macrorhynchus*) and 20 Risso's dolphins (*Grampus griseus*), using land stations at Abashiri (44°02'N, 144°17'E), Hakodate (41°47'N, 140°45'E), Ayukawa (38°18'N, 141°31'E), Wadaira (35°02'N, 140°03'E) and Taiji (33°37'N, 135°55'E). Since the 2002 season, four of them are participating in minke whale catch as the coastal component of Japanese scientific whaling in the North Pacific. Their whaling operation is diurnal, i.e. they depart the port in the morning and return to the port by evening even with no catch.

1.2 Drive fishery for dolphins

Until the late 19th or early 20th century, opportunistic dolphin driving for local consumption was operated widely along the coasts of the Sea of Japan, East China Sea, and Pacific south of 40°N latitude, where gregarious species suit-

able for driving migrated (Kishiro and Kasuya 1993). However, villages along the Sea of Japan and Pacific coasts north of Tokyo (about 35°30'N) gradually ceased the operation, and such operation was limited to villages on the coast of Izu Peninsula (34°35'–35°05'N, 138°45'–139°10'E, Shizuoka Pref.), Taiji (Wakayama Pref.), Nago (26°38'N, 127°58'E, Okinawa Pref.), and islands in the Nagasaki Prefecture (32°35'–34°40'N, 128°40'–129°50'E, Northern Kyushu) shortly after the World War II. Such changes could have been a reflection of various social and natural factors, including a possible decline in dolphin populations, a decline in the demand for dolphin meat and oil for light, an increased supply of whaling products, a change in community structure necessary for cooperation among villagers, and in constructions that destroyed beaches suitable for driving. The last two factors have been indicated by the locals or scientists, although there have been few attempts made to evaluate them.

The declining trend is most clear on the coast of Izu Peninsula, although the social environment of the fishery and cause of the decline may not necessarily be the same with other places. Earliest record of the operation on Izu coasts was found in the early 17th century. The driving was operated by 18 villages in the late 19th century (Kawashima 1894) or by 8 in the early 20th century (Bureau of Fisheries 1911). Significance of difference between the two figures is undetermined. The number further declined to five villages (including one established recently) during the post-World War II period (Nakamura 1988) when the demand for food was extremely high. When I started studying catches of this fishery in 1960, there were only three villages operating the driving, but one of them (i.e. Arari) operated in an opportunistic way to conduct driving only when a suitable dolphin school was sighted incidental to other fishing operations, and it carried out the last recorded operation in 1973. Another village, Kawana, performed the last operation in 1983 leaving Futo as the only village of dolphin driving on the Izu coast (Kasuya 1985).

Active searching for dolphin schools could have started on the Izu coast some time after the introduction of motor driven vessels that occurred in the 1920s. Searching area expanded with an introduction of several high speed boats in 1962 and further expanded with the improvement of vessel speed (Kasuya 1985, Kishiro and Kasuya 1993). The last two villages cooperatively operated the hunting during the 1968 to 1983 seasons.

They mostly hunted striped dolphins (*Stenella coeruleoalba*) in the late 19th century (Kawashima 1894) and this was also true in the post war operation, i.e. 96% of the catches in the 1960s were striped dolphins (Kishiro and Kasuya 1993). The catch was consumed in the nearby three prefectures (Shizuoka, Yamanashi, and Kanagawa). Catch statistics are incomplete before 1960, but often recorded 10,000 to 22,000 dolphins (mostly striped dolphins) during 1942–1960. The annual catch of striped dolphins has declined from 3,300–12,000 in the early 1970s to less than 1,000 in the early 1980s, during which the number of hunting groups had remained the same (Kasuya 1985, Kishiro and Kasuya 1993). The declining supply of dolphin meat was substituted by Dall's porpoises (*Phocoenoides dalli*) taken by hand harpoon fishery in northern Japan. This importation continues to exist.

I interpret the changes above as being due to the fact that only villages that rigorously pursued the fishery did survive. The decline in the catch could not be explained only by a decreasing number of operating villages. The searching range increased during the period, and female age at sexual maturity declined. The latter is a change expected to accompany a density decline (Kasuya 1985). One of the factors behind the catch decline must be the decline in availability of striped dolphins to the fishery due to a decline in the abundance of coastal components of the species. The most recent estimate of the abundance of the coastal element of this species is only a few times greater than the past annual catch (see Table 1).

Taiji, which is situated about 260 km south-west of the Izu Peninsula, also had a long history of opportunistic dolphin drive, but the operation ceased and renewal of the license discontinued sometime around 1960. The current driving team was established by several fishermen using a technique learned from the Izu fishermen. They conducted their first operation on short-finned pilot whales (southern form) in 1969, started the regular operation in 1971, and expanded hunting to striped dolphin and other species in 1973. Further details are given in Kishiro and Kasuya (1993).

Prefecture governments placed various dolphin drive fisheries under control using licensing systems (Izu in 1959, Taiji in 1982, Nago in unknown year), by forcing autonomous limits to their total catch (not by species; Izu in 1991, Taiji in 1982), or by limiting fishing seasons (Izu in 1959, Taiji in 1982). The year 1993 was the first season when the Izu and Taiji hunters received a catch quota by species decided by the Fisheries Agency. Villages in the Nagasaki Prefecture and Nago in Okinawa did not receive an allocation of the quota in 1993. This indicates that they have already ceased the operation before the date.

Several villages in Nagasaki Prefecture, Katsumoto in particular, were known of culling of dolphins in the late 1970s (Kasuya 1985). The culling continued at a low level until 1995 at an opportunistic base. Further details are available in the Japanese progress report to IWC published annually in the Report of the international Whaling Commission.

1.3 Hand harpoon fishery for dolphins and porpoises

Hunting of cetaceans using hand harpoons is known from prehistoric times, as portrayed by drawings on bird bone tubes and harpoon heads excavated in central and northern Japan (e.g. Kasuya 1975). Main targets of recent Japanese hand harpoon fishery have been billfish and tuna (Ohsumi 1972). However, because of the simple, inexpensive and multipurpose nature of the instrument, most Japanese fishing vessels used to furnish hand-harpoons on board and attempt to use them if a chance arises to harpoon billfish, sunfish or small cetaceans for on board consumption and occasionally for selling. Statistics of such opportunistic hunting have been incomplete and are not dealt with here.

Iwate fishermen in northern Japan started a large scale operation of this method for small cetaceans. It was around 1917 when fishermen of Otuchi region in Iwate Prefecture (38°55'–40°25'N, Pacific coast) started hand harpoon fishery for dolphins and porpoises using techniques learned from billfish hunters who seasonally migrated from Chiba Prefecture

(34°50'–35°50'N, Pacific coast). This accompanied an introduction of motor driven fishing vessels. They soon introduced shot-guns to use before harpooning, and expanded the operation range to Chiba Prefecture in the south and to the coasts of Sakhalin and Kuril Islands in the north during the 1933–34 seasons (Anon. 1983). This method expanded before and after World War II to villages on the Sea of Japan, Okhotsk Sea and Pacific coast for various dolphins and porpoises for meat, oil and leather (Wilke et al. 1953, Kasuya 1982), but the post war expansion soon shrunk to Iwate Prefecture and the surrounding area probably due to the end of food crises or to an increased whale meat supply from the whaling industry.

During the 1960s to 1970s, hand harpoon fishery was limited to villages in Iwate and Miyagi (37°50'–38°55'N) Prefectures in the northern Japan, and to Choshi (35°55'N, Chiba Pref.) and Taiji. All of these places are on the Pacific coast. In the first two prefectures, they mainly took Dall's porpoises in winter when other fishing items were scarce, and the latter two villages also took striped dolphins and some other delphinids (Ohsumi 1972, Kasuya 1982, Miyazaki 1983). Annual catch of Dall's porpoises by this fishery during the period noted above fluctuated between 5,000 and 10,000 individuals, and the total catch of the latter two places fluctuated between 2,000 and 3,000. In the early 1980s the Dall's porpoise fishery again expanded the geographical range to Hokkaido coasts (northernmost Japan) of the Pacific, the Sea of Japan, and the Okhotsk Sea, and the operation season to summer, presumably accompanied by decline in whale meat supply and by an abundance decline of a Dall's porpoise population wintering off the Iwate and Miyagi coasts (Kasuya and Miyashita 1989). It recorded a huge peak catch estimated at 45,600 Dall's porpoises in 1988 (Kasuya 1992). This coincided with the period from the cessation of commercial whaling to the establishment of a national quota for small cetacean fisheries.

At Nago in Okinawa Prefecture, southernmost Japan, there is a so-called cross-bow fishery for dolphins. Although this fishery is classified as hand harpoon fishery for regulation purposes, it uses a kind of cross-bow or catapult powered by rubber strings to discharge harpoons of steel pipe. Six or seven fishermen started the fishery in 1975 to respond to the local demand for pilot whale meat, which was not satisfied since the cessation of opportunistic driving at Nago. The rubber powered harpoon was probably more powerful than the hand harpoon. This functioned in order to avoid the use of a whaling cannon, which was allowed for 'whaling' only by the Japanese government. Six cross-bow fishermen obtained prefecture licenses in 1989, and set an autonomous catch limit of 100 individuals (not determined to species). In 1993, they received a quota by species.

The number of hand harpoon fishermen in the 2000/01 season was 255 for Dall's porpoises (Hokkaido: 17; Iwate: 223; Aomori: 8; and Miyagi: 7), 16 for Chiba, 100 for Wakayama, and six for Okinawa.

1.4 Trap-net fishery

Trap net is a passive fishing gear of a large structure, with fish guide extending from shore to offshore and a fish box attached on the offshore end of the fish guide to keep fish

inside. Fish boxes may or may not have fish pockets. The size is variable, but a fish guide can measure over 1 km long. They are classified into large-scale and small-scale trap nets, the former having fish box deeper than 27 m (over 17 m in Okinawa Pref.) and the latter fish box less than the depth. The number and season of operation vary between years and between nets, but there were 1,742 large-scale and 15,005 small-scale trap nets operated in 1989 (Tobayama et al. 1992). The nets are usually visited twice a day for fish. Some of the trap nets are equipped with fish detectors. The size and position of trap nets are described in licenses and no arbitrary alteration is possible. So, it is unlikely for fishermen to move their trap nets to places where cetaceans are likely to be captured. This makes the trap net fishery different from other Japanese cetacean fisheries.

Traditionally, Japan considered cetaceans taken in the trap nets as 'incidental catch', while any kind of fish with a commercial value were dealt as the 'catch'. This can be accepted when Fisheries Agency prohibited fishermen from commercially utilizing the whale carcasses found in the trap nets, but the Agency changed the rule in July 2001 to permit the selling of whales found in trap nets, with a condition that the fishermen present DNA samples and provide the cost for registration. Although the new rule does not apply to blue whales (*Balaenoptera musculus*), bowhead whales (*Balaena mysticetus*) and finless porpoises (*Neophocaena phocaenoides*), which are protected separately (see below), any other cetaceans taken in Japanese trap nets are now authorized to be sold for profit. This situation is the same for other fish species taken in the trap nets. The trap net fishery is in nature a multi-species fishery, and whales should now be considered as one of the target species.

Tobayama et al. (1992) observed that an average number of minke or other baleen whales (dead or alive) found in the Japanese trap nets was only seven animals per year, which was too small as compared with the results of some trap nets monitored by them. Considering the extremely high value of minke whales taken in trap nets and sold secretly, 6,400 to 40,200 US dollars per whale (when the US dollar was equal to 140 yen), they speculated that most of the minke whales taken in such nets were processed unreported and that the real number of minke whales taken in the trap nets would be close to 100 or more in the entire Japan. If this is the case, the mortality of minke whales in Japanese trap nets can have a significant effect on management.

This new rule of 2001 resulted in a sudden increase of minke whales reported as being taken in trap nets to 120–130 individuals a year. In addition to minke whales and other small cetaceans, trap nets occasionally take other large baleen whales. Species of particular concern are gray whales (*Eschrichtius robustus*), humpback whales (*Megaptera novaeangliae*), and right whales (*Eubalaena japonica*) (e.g. Kasuya et al. 2002, IWC 2006a).

2 Commercial Exploitation of Cetaceans in Japan

2.1 Background

The Japanese government accepted the decision of a moratorium on commercial whaling as established by the IWC, and banned so-called commercial whaling on 1 April 1988

Table 1: Calculation of quota for small cetaceans in 1993, together with comparison against earlier catches (modified from unpublished document of the Fisheries Agency dated January 1993)

| Species/Stocks | Abundance | Increase rate | Safety factor | Special allocation | Quota 1993 | Annual catch (1989–1992) |
|--------------------------------|-----------|---------------|---------------|--------------------|------------|----------------------------|
| Dall-type ^a | 226,000 | 0.04 | | | 9,000 | 12,265–29,048 ^c |
| Truei-type ^a | 217,000 | 0.04 | | | 8,700 | |
| Striped d. | 22,500 | 0.03 | | +50 | 725 | 749–1,225 ^d |
| Bottlenose d. | 35,100 | 0.03 | | +50 | 1,100 | 171–1,298 |
| Spotted d. | 30,100 | 0.03 | | +50 | 950 | 6–636 |
| Risso's d. | 42,000 | 0.03 | | +50 | 1,300 | 13–298 |
| S ^b , s.f. pilot w. | 20,300 | 0.02 | | +50 | 450 | 149–296 ^e |
| N ^b , s.f. pilot w. | 5,000 | 0.02 | 0.5 | | 50 | 10–50 ^f |
| False killer w. | 5,000 | 0.02 | 0.5 | | 50 | 30–91 |
| Baird's bkd. w. | | | | | | 54 ^g |

^a One of two stocks of Dall's porpoises off Japan; ^b Southern and northern stocks of short-finned pilot whales off Japan; ^c Quota started in 1991 with a combined figure of 17,600; ^d Quota started in 1992 with 1,000; ^e Quota started in 1992 with 400; ^f After several management attempts in 1983–85, a quota of 50 was started in 1986; ^g Quota was set at 40 in 1983, 60 (in 1988) and 54 (in 1989) for the Pacific and Okhotsk Sea, then to the current quota of 62 for the Pacific, Okhotsk Sea and Sea of Japan (IWC 1992)

(see below for further details). The prohibition applies only to baleen whales and sperm whales. Unintended or accidental kills are accepted with no penalty. Mortality of cetaceans is known to occur incidentally to various net fisheries within the Japanese EEZ such as using trawl nets, fixed trap nets (also called 'set nets', a literal translation of the Japanese term), drift gill nets, bottom gill nets, and purse seines. These are thought to be unavoidable and no particular action has been taken at present to decrease the mortality.

Reasons for continuing commercial hunting of some small cetaceans is based on an interpretation of the ICRW. Biologically speaking there is no distinction between 'dolphins/porpoises' and 'whales', and biologists may have trouble in classifying some cetacean species into either of the groups. However, it is also true that many human communities have some kind of ethnological distinction between the two words. The distinction may not be the same between communities. Arguments of IWC on competence come from the ambiguity of terms in the ICRW signed in 1946. It seems to define 'whaling' as an activity of hunting whales, but there is no definition of 'whales'. It is probably true that almost no delegates at the meeting in 1946 have thought about small cetaceans, or have expected small cetaceans to be listed in the agenda of future annual meeting of IWC. However, it is true that some of the small cetacean stocks are so heavily hunted or killed incidentally that invite conservation concerns. Some IWC commissioners now wish to place the hunting of small cetaceans (e.g. Baird's beaked whale which grows over 10 m, and Dall's porpoise which is hunted heavily) under the control of the IWC, but others, including Japan, reject it. Currently many of the small cetaceans are not managed by the IWC, and they are not bound by the moratorium of commercial whaling adopted in 1982.

In 1993, the Fisheries Agency of the Government of Japan placed three cetacean species, blue whales, bowhead whales and finless porpoises, under the umbrella of the Fisheries Resources Protection Act. One now requires a special permit to take these species, and it demands the reporting of

individuals killed incidentally. The basis for selecting the three species is unclear, and the significance of the listing for conservation is dubious.

The commercial hunting of cetaceans is allowed only for species and stocks where an annual catch quota is set by the Fisheries Agency (Table 1). Exceptions to this rule are trap-net fishery, the culling of harmful marine organisms and the take for a scientific purpose.

2.2 Objective species and quota

The nation-wide quota system by species/stocks came into effect in 1993 and continued to exist with almost no changes in the numbers as well as involving other regulation measures such as vessels and fishing seasons. This stable management policy will benefit detecting a trend in the affected cetacean populations. The quotas were calculated for species and stocks for which an abundance of estimates was available, by multiplying abundance, an increase rate of the population and safety factor, and then adding a figure associated with specific allocations.

The abundance was estimated by sighting surveys (Miyashita 1991 and 1993, IWC 1992 and 1993). They were usually accompanied by broad 95% confidence intervals often exceeding 50% on each side of the mean estimate. The use of a mean value of such estimates is accompanied by a large risk. Another concern of the abundance estimate is related to the discrepancy between the operation area of a fishery and coverage of the abundance estimates. Care is made to exclude individuals offshore of the fishing ground, although the near-shore waters included for the estimation are still too broad. For example, Japanese pilot whale driving usually operates within a radius of 15–20 nautical miles (28–37 km) from the harbor, while the abundance estimates include entire coastal waters approximately within 200 nautical miles (370 km) from the shore. Information on movement of cetaceans or on stock structure within the range is needed before the abundance estimates are accepted as a basis for quota calculation.

The increase rate was assumed at 4% for Dall's porpoises (partially sympatric, two color morphs), 3% for bottlenose dolphin (*Tursiops truncatus*), striped dolphin, spotted dolphin (*Stenella attenuata*) and Risso's dolphin, and 2% for short-finned pilot whales (two geographical forms) and false killer whales (*Pseudorca crassidens*). The order of these figures (from the greatest to the smallest) was as suggested by biologists based on their understanding of the life history, but the actual figures were above the level suggested by biologists of the Far Seas Fisheries Research Laboratory including myself. It was also true that no scientists would have been able to present such figures with certainty. A quota for Baird's beaked whale started in 1983 (IWC 1992) based on political judgment, and was eventually found to be about 1% of abundance estimates obtained later (IWC 2001). This process ignores the difference in population levels between stocks. Most of the currently exploited cetacean stocks off Japan have a long history of harvest, and the levels of depletion cannot be the same.

The safety factor of 0.5 was set for the northern form of short-finned pilot whales and false killer whales, and functioned as a safeguard for such small populations. The special allocation of +50 contributed to increasing the quota above figures obtained from abundance estimates and assumed increase rates, and functioned to tune the quota close to the previously reported catches. Comparison of the quota against catches of preceding seasons will find similarity between the two sets of figures.

2.3 Allocation of quota and results of operation

The national quota in Table 1 is first differentiated by the Fisheries Agency to each prefecture, and then by the prefecture governor to each fishery of the prefecture (Table 2). Not all of the national quotas seem to be shared by prefectures. For example, the prefecture total of the Risso's dolphin quota is only half of the national quota.

The process of allocating the quota to individual fishermen is unknown. It will be easier for drive fisheries, where each prefecture has only one group of drive fishermen who work

together. However, difficulties are to be expected in dividing the quota among numerous hand harpoon fishermen as well as collecting catch statistics from them. Collecting catch statistics is also a responsibility of the prefectures, but the prefectures usually request that the tasks be attributed to the fishery cooperative unions. In cases of Dall's porpoise fishery in northern Japan, a 'cease hunting' order is issued by an association of hunters or by the prefecture governor (Thornton 2000), probably based on landing records of fishery cooperative unions.

Catch statistics of Dall's porpoise fisheries was once found to contain significant underreporting (Kasuya 1992). Fishermen usually landed their catch at their mother port or some other ports near the place of operation, but they could sell their catch directly to dealers. In the last case the catch was unlikely to be included in the statistics of the cooperative unions (Kasuya 1992). The recent process of collecting catch statistics seems to be the same, in principle, with the one examined by Kasuya (1992). All the hand harpoon fishermen mentioned above can either process their catch in the ocean or bring them to the port. In the former, case numbers have to be estimated from the weight of meat and identification of species/stocks must rely on reports of fishermen or geographical region of the operation. It seems to be important, however, to validate the accuracy of the catch statistics of small cetacean fisheries.

Annual takes of small cetaceans in recent 10 years are listed in Table 3. An interpretation of these figures is often difficult, because single species are taken by multi type fisheries of different locations. For example, striped dolphins are hunted in Chiba (hand harpoon), Shizuoka (driving) and Wakayama (driving and hand harpoon), southern form short-finned pilot whales in Chiba (small-type whaling based at Wadaura), Wakayama (small-type whaling at Taiji and driving), and Okinawa (cross-bow fishery at Nago), and Baird's beaked whales in the Pacific, Okhotsk Sea and Sea of Japan. It is urgent to determine if fisheries of different locations are hunting the same population, or if hunters in different locations are hunting different populations. Such questions have been resolved for none of the three species mentioned above.

Table 2: Allocation of catch quota in Table 1 to individual fisheries (2004/05 season)

| Species and stocks | Allocation to fisheries and prefectures | | | | National total |
|-------------------------------|---|------------------|--------------------|-------|----------------|
| | hand harpoon | driving | small-type whaling | total | |
| Dall's p., <i>dalli</i> -type | 9,000 | | | 9,000 | 9,000 |
| Dall's p., <i>truei</i> -type | 8,420 | | | 8,420 | 8,700 |
| Striped dolphin | 180 ^a | 520 ^b | | 700 | 725 |
| Spotted dolphin | 70 ^c | 855 ^d | | 925 | 950 |
| Bottlenose dolphin | 110 ^e | 965 ^f | | 1,075 | 1,100 |
| Risso's dolphin. | 250 ^h | 300 ^h | 20 | 570 | 1,300 |
| N, short-f. pilot w. | | | 50 | 50 | 50 |
| S, short-f. pilot w. | 100 ^g | 300 ^h | 50 | 450 | 450 |
| False killer whale | 10 ^g | 40 ^h | | 50 | 50 |
| Baird's beaked w. | | | 62 | 62 | 62 |

^a 80 for Chiba and 100 for Wakayama; ^b 70 for Shizuoka and 450 for Wakayama; ^c for Wakayama; ^d 450 for Shizuoka and 400 for Wakayama; ^e 100 for Wakayama and 10 for Okinawa; ^f 75 for Shizuoka and 890 for Wakayama; ^g for Okinawa; ^h for Wakayama

Table 3: Recent catch of small cetaceans by small-type whaling, driving and hand harpoon fisheries in Japan, culling not included^a

| Species | Dall's porpoise | | Striped d. | Spotted d. | Bottle-nose d | Risso's d. | Short-f. p. w. | | False k.w. | Baird's bk. w. |
|---------|-----------------|--------------|------------|------------|---------------|------------|----------------|-------|------------|--------------------|
| | <i>dalli</i> | <i>truei</i> | | | | | south | north | | |
| Quota | 9,000 | 8,420 | 700 | 925 | 1,075 | 570 | 450 | 50 | 50 | 54–62 ^b |
| 1995 | 7,002 | 5,394 | 539 | 105 | 975 | 405 | 189 | 50 | 49 | 54 |
| 1996 | 8,038 | 8,062 | 303 | 67 | 314 | 372 | 434 | 50 | 40 | 54 |
| 1997 | 8,533 | 10,007 | 602 | 23 | 352 | 228 | 297 | 50 | 43 | 54 |
| 1998 | 5,303 | 6,082 | 449 | 460 | 266 | 445 | 194 | 38 | 48 | 54 |
| 1999 | 6,379 | 8,428 | 596 | 38 | 749 | 489 | 334 | 60 | 5 | 62 |
| 2000 | 7,513 | 8,658 | 300 | 39 | 1,426 | 506 | 254 | 50 | 8 | 62 |
| 2001 | 8,430 | 8,220 | 484 | 10 | 247 | 474 | 344 | 47 | 45 | 62 |
| 2002 | 7,614 | 8,335 | 642 | 418 | 801 | 387 | 129 | 47 | 7 | 62 |
| 2003 | 8,308 | 7,412 | 450 | 132 | 180 | 378 | 118 | 42 | 21 | 62 |
| 2004 | 4,614 | 9,175 | 661 | 2 | 632 | 511 | 163 | 13 | 3 | 62 |

^a Quota is given for fishing season which varies between fisheries but usually starts in summer and ends in the spring of the next year, but catch statistics are given for calendar year; ^b see footnote in Table 1

2.4 Management of small cetaceans and IWC competence

The Sub-committee on Small Cetacean was established by the IWC in June 1973, and had their first meeting in April 1974. In June 1975, SC recommended that it should continue the activity on management of small cetaceans as the Standing Sub-Committee on Small Cetaceans (SM), and this was approved at the IWC meeting of the same month.

The SM had great concern, since the first meeting on the status of small cetaceans harvested by Japanese fisheries, and reviewed their status frequently. Conclusions of SM were always approved by SC and became SC advices for Japan. The Japanese government accepted much of this advice and attempted to respond to them in faithful manner, but SC is still unconvinced that the current Japanese exploitation of small cetaceans is sustainable.

Although it appears to me that the SM has been authorized to work for management of small cetaceans by IWC in June 1975, Japan used to express its view, at least since 1982 when I first attended the SC, that activities of SC (and of SM) on small cetaceans should be limited to biological matters and shall not include advice on management. And this view is copied in the current activities of SM. However, I do not know the details of this background.

To make the situation worse, Japan started to boycott all the activities of the SM in 2001, including the participation of scientists, and submission of statistics and research results. This is probably the easiest way to avoid criticism on Japanese management policy of small cetaceans, but escaping from criticism increases the risk of management failing.

Following is a brief review of considerations of the SC made on some selected cetacean species taken by Japan. Further information is available in the references.

(1) **Short-finned pilot whale.** This species has two, morphologically distinct, geographical forms, the 'northern form' and the 'southern form' off Japan, and is known to have a matrilineal social structure and a long post-reproductive life time of females (Kasuya and Tai 1993). The former inhabits the Pacific coasts at latitudes of 36°–44°N and is harvested by small-type whaling at an annual level of about one percent of the stock. The latter inhabits a broad area south of

the northern form and west of 155°E, and is hunted by drive fishery at Taiji, cross bow fishery at Nago and small-type whaling. The wide geographical ranges of the southern form and of fisheries harvesting it warrant further study on the population structure. This form has highest commercial value among delphinids off Japan, and has been pursued rigorously. While the catch was greater in the past, e.g. mean annual catch was 450 individuals in the 10 year period of 1976–1985 (most of which were taken off Taiji, Wakayama Pref.), the recent 10 year annual catch has never reached the quota of 450/year (see Table 3). This species was last reviewed by the SC in 1992 (IWC 1992 and 1993),

(2) **Striped dolphin.** This species off Japan inhabits south of 40°N and the range extends offshore to 180°, and has been taken in large numbers by drive fishery off Izu coasts. A small number is currently taken off Choshi (hand harpoon), off Izu (drive), and off Taiji (drive and hand harpoon) and nearby villages of Taiji (hand harpoon). The population structure is undetermined, but the SC considered it to be likely that almost vanishing coastal fishery for this species and the presence of large aggregation (497,000 individuals, with CV=0.18) in offshore waters and available biological information suggest the presence of heavily depleted coastal population(s). SC first expressed concern on this stock in 1975, and last reviewed it in 1993 (IWC 1992, 1993, 1994, 1995 and 1998),

(3) **Baird's beaked whale.** This species of Japan inhabits western North Pacific north of 34°30'N, Okhotsk Sea, and the Sea of Japan, and is hunted by small-type whaling in each area. Population structure and seasonal movement is to be clarified and catch quotas need to be evaluated based on that information. Post-war statistics before the mid-1970s are believed to contain poached and mislabeled sperm whales, so that statistics overreport the true catch (Kasuya 1999). A biological explanation is still sought for the unusually greater male longevity (85 years vs. 55 years) (Kasuya et al. 1997). Last reviewed in 2000 (IWC 1992, 1994, 2001),

(4) **Dall's porpoise.** Two populations represent this species off Japan. The one, *dalli*-type color morph, winters in the Sea of Japan and migrates to the summer breeding ground in southern Okhotsk Sea via the east and west coasts of Hokkaido. Another population, the *truei*-type color morph, winters off

the Pacific coast of Japan north of 35°N and breeds in the central Okhotsk Sea. They are known to be geographically segregated by growth and reproductive stages as well. Both populations are hunted by Japanese hand-harpoon fishery. Few *dalli*-type individuals of other population(s) mingle with Japanese populations along the Pacific coasts of northern Japan. The accuracy of catch statistics and reliability of current reporting systems needs to be confirmed. This species was first listed for SC consideration in 1975, and was last reviewed in 2001 (IWC 1992, 1993, 2002, 2003, 2004).

(5) **Finless porpoise.** This species inhabits coastal waters south of 36°30'N. At least five local populations are known off Japan from their morphology and genetic analysis. An abundance is known for some of the stocks. The density of Inland Sea population has declined to less than 10% (central and eastern region) or to 50–60% (western region) of the level of the late 1970s. Entanglements in bottom gillnets and accumulations of pollutants are possible threats to their survival (Kasuya et al. 2002). This situation is comparable to that of conspecific species in the Yangtze River (Wang et al. 2005) and perhaps to other populations of the coastal/riverine species. Last reviewed in 2005 (IWC 2001, 2006b).

(6) **Minke whale.** An apparently recent decline of Antarctic minke whales (*Balaenoptera bonaerensis*) is a great concern of the SC. In the western North Pacific, two stocks migrate seasonally along the coasts of Japan (Sea of Japan/Yellow Sea/East China Sea stock, and Okhotsk Sea/west Pacific stock). A discussion has been continuing by the SC concerning the additional stock structure for these populations. They are currently taken by Japanese scientific whaling and trap net fishery in Japan and Korea. This species has been discussed annually by the SC. Effort continues to estimate incidental mortalities using market survey and DNA testing (see 'revised management procedure', 'bycatch and other human induced mortality', and 'DNA testing' in SC Reports).

3 Scientific Whaling

3.1 Moratorium of commercial whaling

IWC first received a proposal for the moratorium of commercial whaling in 1972, and adopted it with three-quarter majority at the 34th annual meeting in 1982 to end commercial whaling from the 1985/86 pelagic season and the 1986 coastal season.

Japan lodged objections to this decision for a moratorium of commercial whaling (IWC 1984). 'Objection' is a right of minorities allowed by the ICRW, and has functioned to diminish management measures supported by majorities. Then, due to international pressures, Japan withdrew the objections in July 1986, with the effects from 1 May 1987 (Antarctic), 1 October 1987 (coastal baleen whales) and 1 April 1988 (coastal sperm whales) (IWC 1988a), and Japan presented its plan of scientific whaling to start in the Antarctic season of 1987/88 (IWC 1988b) at the meeting of the IWC in June 1987.

The Japanese government and the industry group criticized the moratorium by saying that the decision was not based on scientific evidence. And this view has been accepted by

general public in a nationalistic manner. The criticism means that some whale populations were considered by the SC to be at or above 55% of the initial population level, a commercially exploitable level defined by the 'new management procedure' implemented since the 1975/76 Antarctic season and the 1976 coastal season.

The SC was expected to advise the IWC annually on the management of whale stocks, but it recognized the difficulty in applying the new management procedure to whale stocks due to the lack of sufficient scientific data, and there were often diverse views, which were both optimistic and pessimistic. If the SC failed to advise the IWC on quotas, the IWC would maintain past quotas which were often high or make any arbitral decision to delay effective management. To avoid such situation to happen, the SC often created advice using every data available at the time. This was called 'best scientific advice' based on 'best available information'. Such advice could eventually be found wrong after a few years accumulation of additional data. Antarctic sei whale (*Balaenoptera borealis*), which was protected since the 1978/79 season, represented one of such cases. Even if SC provided correct advice and the IWC accepted it, there were possibilities that the decision was not followed reliably. Some governments could object it for a right of free whaling, or industry might ignore the regulation and make illegal operations. This was not a matter of natural science, but a problem of human skill to use science or to control industries. Under such situations, human wisdom could only stop any further depletion of some remaining whale stocks. This kinds of background information has not been well understood in Japan.

3.2 Emergence of current scientific whaling program

Article VIII of the ICRW signed in 1946 authorizes for member governments to grant nationals to take any number of any whale species for scientific purpose independently of any other decision of the commission. The article also requests a full utilization of whale carcasses thus taken. This has been used by various governments as the basis for their scientific whaling programs (see Gambell 1999 for such cases). Japanese first scientific whaling occurred in 1956 and took two North Pacific right whales, which was followed by several other scientific whaling programs of Japan. These programs were different from the current series of Japanese scientific whaling program in the shorter duration and smaller numbers of whales to be taken.

Preparation for the current series of Japanese scientific whaling program started in 1984, two years before the withdrawal of objections against the moratorium on commercial whaling. In July of the year, a private advisory group of the Director General of the Fisheries Agency produced a report on the future of Japanese whaling, which included a proposal of scientific whaling in the Antarctic. A few months prior to this, the IWC commissioner of Japan convened a small meeting at the Far Seas Fisheries Research Laboratory in Shimizu. According to my notes, the attendants were staff from the whaling section of the Fisheries Agency, whale scientists of the Lab (including myself) and personnel of the Kyodo Hoge Co. Ltd. (only pelagic whaling company of the time in Ja-

pan), and the agenda included feasibility of scientific whaling in the Antarctic and North Pacific. These are the earliest I know of Japanese actions for the current series of scientific whaling program.

Then, a group of whale scientists of the Japanese government was asked to create the plan. Members of the group, chaired by the late Dr. I. Ikeda, were almost identical to Japanese scientific delegates to the SC. The conditions given to the group included that the project (1) shall be self sustainable and (2) shall require long period perhaps until the reopening of commercial whaling. Scientists created an objective to estimate age-specific, natural mortality rate of Antarctic minke whales, and considered that the annual take of 1,500 minke whales will be ideal, but could be almost halved depending on sampling strategy (IWC 1988c). In April 1987 the industry side judged that 825 minke whales could sustain the operation, but the figure was rejected by government, by way of political reasons and the take of 300 minke whales was decided in October 1987.

Whaling and research systems were also reorganized for the current series of scientific whaling program. Half of the staff of the Kyodo Hogeï merged with the then existing institute, the Whales Research Institute, to form a new institute named the 'Institute of Cetacean Research (ICR)'. Remaining staff and vessels of the Kyodo Hogeï moved to the Kyodo Senpaku Co. Ltd., a shipping company newly established by Japanese major whaling companies (Kasuya 2000). The ICR received a government grant to take whales for science, and the Kyodo Senpaku carried out whaling and selling of the products on commission. Since the 2002 season, small-type whaling vessels were chartered to capture minke whales in the Japanese coastal waters. Recently, the ICR has acquired some shares of the stocks of the Kyodo Senpaku and started offering cooperation to a newly established company for whale meat marketing and promotion of consumption. Thus, involvement of the ICR with whaling business seems to be increasing. The budget of ICR for the fiscal year of 2003/04 (October 2003 to September 2004), with a proposed take of 660 ± 40 whales, amounting to about six billion yen (US dollar equals 100–120 yen), of which five billion yen came from the whaling products and 1 billion yen from Government subsidiaries (ICR 2004). Budgets for more recent years are not available in the annual reports.

Vessels used for the current Japanese scientific whaling include one whaling factory ship which processes the catch and serves as a research base, three whale catcher and sighting vessels, and a dedicated whale sighting vessel. These are used both in the Antarctic and North Pacific. In addition to these, another dedicated sighting vessel, a trawler equipped with scientific echo sounder and four small-type whaling boats are used in the North Pacific (IWC 2005).

3.3 Expansion of the scientific whaling program

The current series of Japanese scientific whaling first started in the 1987/88 Antarctic season with an annual take of 300 'Antarctic' minke whales. The primary objective was to estimate age-specific, natural mortality rate, and the secondary objective to understand the marine ecosystem. The duration was expected to last for 12 years, but Japan stated also that it will be continued endlessly (IWC 1988b). The main research objective gradually shifted to average natural mortality of recruited age classes, and then to understanding the marine ecosystem, apparently because it became clear that the sample size was insufficient to estimate age-specific natural mortality rate with desired precision. This program came to the end with the 2004/05 Antarctic season, and, in 2005, Japan presented to the SC meeting a plan of new scientific whaling to be started in the 2005/06 season. The new plan retained the similar objectives (ecosystem studies) and the area of operation unchanged (from 70°E eastward to 160°W, and south of 50°S), but it increased both whale species and number of individuals to be taken. It will start with a catch of 850 ± 85 minke whales and 10 fin whales (*Balaenoptera physalus*), but at the full scale operation to be started in the 2007/08 season it will take 50 fin and 50 humpback whales, in addition to 850 ± 85 minke whales (Table 4). Japan stated that the project will continue for unlimited period.

In 1994, Japan expanded the scientific whaling into the western North Pacific for understanding of marine ecosystem, with a catch of 100 northern minke whales. Then, in the year 2000, the second phase of the project started also as an endless project, with a catch of 100 minke, 50 Bryde's (*Balaenoptera edeni*) and 10 sperm whales. This project further expanded to sei whales in 2002. The current series of Japanese plans of scientific whaling, at the full scale operation, will annually take a maximum of 1,415 whales of seven species in the Antarctic and western North Pacific (see Table 4).

Table 4: Number and species of whales proposed for the current series of Japanese scientific whaling

| Season | Ocean | Minke | Fin | Humpback | Bryde's | Sei | Sperm | Total |
|----------|------------|-------------------------|-----|----------|---------|-----|-------|--------------|
| 1987/88~ | Antarctic | 300 | | | | | | 300 |
| 1989/90~ | Antarctic | 300 ± 30 | | | | | | 300 ± 30 |
| 1995/96~ | Antarctic | 400 ± 40 | | | | | | 400 ± 40 |
| 2005/06~ | Antarctic | 850 ± 85 | 10 | | | | | 860 ± 85 |
| 2007/08~ | Antarctic | 850 ± 85 | 50 | 50 | | | | 950 ± 85 |
| 1994~ | N. Pacific | 100 | | | | | | 100 |
| 2000~ | N. Pacific | 100 | | | 50 | | 10 | 160 |
| 2002~ | N. Pacific | 100 50 ^a | | | 50 | 50 | 10 | 260 |
| 2004 | N. Pacific | 100 110 ^a | | | 50 | 100 | 10 | 370 |
| 2005~ | N. Pacific | 100 120 ^a | | | 50 | 100 | 10 | 380 |

^a This is taken by four small-type whaling catcher boats in the coastal waters and processed at land stations. Others are taken by pelagic operation using vessels of the Kyodo Senpaku Co. Ltd.

3.4 Criticism of Japanese scientific whaling

The SC has annually reviewed scientific aspects of proposals and research results of scientific whaling of various countries, using 18 partially overlapping guidelines. For convenience I have grouped them into the following five large categories; (1) if the proposal is likely to achieve the stated objectives, (2) if the objective really requires lethal method, (3) if the proposal is likely to produce information useful for management of whale stocks by IWC, (4) if the effect of proposed take on whale stocks is acceptable, (5) if arrangement for participation of scientists from other nations is acceptable.

Reviews of SC thus conducted on the current series of Japanese scientific whaling were always extremely controversial and reached at no consensus. This difficulty is reasonable, as identified by SC, because proponents of their own proposal or report participate in the review. SC once proposed to use independent reviewers, but it could not be reached at agreement (IWC 2006c). Another difficulty in the review comes from the fact that scientific aspects cannot be isolated from other elements in the evaluation (IWC 2006c). It is my opinion that some additional, non-scientific aspects will be needed to correctly understand the nature of Japanese scientific whaling, which are (1) ethics of scientists, (2) system that carries out the program, (3) gap between ICRW and public views on whales and (4) interpretation of Article VIII of ICRW.

Fishery science is probably exceptional in accepting massive slaughter of animals for research purposes, e.g. to test fishing gear, to explore new fishing ground, to collect abundance data, or to obtain data free from bias of particular gear. Such massive slaughter may not be accepted in other fields of biology or in studying other wildlife. Scientific whaling apparently relates to the two fields, i.e. fishery science and wild mammal studies. However, the great whales being taken by the project are mammals of long life, slow growth and low reproductive rate, and attract public attention. So it is likely that annual kill of about 1,400 individuals of such species for unlimited time period is considered as a selfish utilization of common property by scientists or an activity causing unacceptable pain to the wildlife. Some scientific community may refuse it.

Article VIII of ICRW allows the taking of whales for scientific purpose, and requests utilization of the carcasses. However, this does not permit the whale hunting aimed at raising fund for research or for other political purposes (Gales et al. 2006). We do not know how great the economic incentives are behind the current Japanese scientific whaling. However, if scientific whaling should be planned and conducted, it is essential to ensure independence of those scientists from political pressures and to separate scientists from monetary benefit which might come from processing the carcasses. The institute or its scientists shall be rewarded for scientific information produced, not for whale carcasses collected. This does not seem to be satisfied for the system that is pursuing the current Japanese scientific whaling. There are risks of corruption of scientists and industry control over science.

It is perfectly clear that the ICRW of 1946 considers whales as food or a source of materials, i.e. fishery resources. However, almost 60 years have passed since that time, and the situation has also changed. Many recent communities do not consider whales as fishery resources, but evaluate them

as one of the elements of our environment. Such a position will find it difficult to compromise with the old concept retained by some economically significant countries, and will ask for Japan to live with a similar sense of values. Under such circumstances, the current Japanese scientific whaling program will not be accepted, because it considers whales as fisheries resources and, as often stated by ICR personnel, intends to contribute reopening of commercial whaling. Although, IWC or SC is not structured to resolve such controversy, they are actually becoming the place of such confrontation. And scientists suffer from the situation as well.

The Article VIII of ICRW states "Notwithstanding anything contained in this Convention ... kill, take and treat whales for purpose of scientific research ... shall be exempt from the operation of this Convention". However, Article VIII does not seem to have expected such large-scale and long-lasting scientific whaling as comparable to the commercial whaling (Claphan et al. 2003), but the words could have meant taking a small number of whales for a short duration, perhaps accompanied by ordinary commercial whaling operations. If this had not been the case, Article VIII itself must then have contradicted the intent of ICRW, stated in the preamble "desiring to establish a system of international regulation for the whale fisheries". Therefore, in both the annual take and period to be covered, the current Japanese scientific whaling program does not seem to be consistent with the Article VIII of the Convention.

4 Conclusions

Japan has a long history of utilizing cetaceans for human consumption, and has experienced a decline of several cetacean populations thus exploited. The government currently grants three types of fisheries to be operated for cetaceans, which are considered to be exempt from the IWC decision of moratorium of commercial whaling established in 1982. The total annual catch allowed for these fisheries is over 20,000 individuals covering eight species of small toothed whales. The quota was calculated in 1993 based on then available abundance estimates and arbitrarily selected population growth rates of 2–4%, and the sustainability has not been demonstrated. Some catch statistics reported by fishermen have not been validated, and changes in the abundance in these populations during the 13 years since the implementation of current quota has not been studied. However, there are apparent symptoms of population decline for some of the small toothed whales that have been harvested or killed incidental to fishery operations. Current attitude of Japan to refuse cooperation with SC on management of these small cetaceans is of extreme concern.

The current series of Japanese program of scientific whaling started in the 1987/88 Antarctic season by utilizing the system of previous commercial whaling, expanded to North Pacific, and now plans to take about 1,400 individuals of seven species of large cetaceans for unlimited period. The operation is sustained mainly by the proceeds. The project has been discussed by IWC and its SC with no consensus. The SC made an annual review of the project with an attempt to limit itself within the scientific aspect, but it recently experienced difficulties in ignoring other elements

behind the project, i.e. ethics of scientists, economy of the system, and interpretation of ICRW.

Current Japanese cetacean harvests of various types, including scientific whaling and small cetacean fisheries, seem to be utilizing ambiguity and lack of enforcement in ICRW and IWC, and support the domestic food habits for whale products.

5 Recommendations and Perspectives

(1) Scientific activities are not free from mistakes or errors, but the risk will be decreased through rigorous discussions with other parties. To ensure sustainable utilization of small cetaceans by Japanese coastal fisheries, Japan should be encouraged to reestablish cooperation with SM on the management.

(2) The following studies should be conducted with urgency for the management of small cetaceans exploited by Japan: stock structure, abundance, biology of the species, and validation of catch statistics.

(3) Various large and small cetaceans are killed in Japanese passive coastal net fisheries, and such kills are believed to have significant effects on some of the populations. Efforts made to decrease such mortality are urgent.

(4) Observing that the current Japanese scientific whaling is supported by the proceeds of the whaling products, deficits of the ICRW admitting the situation, and public indifference to international criticisms, I would expect that the program will continue until such situations change, perhaps until there is a change in such food customs or a reopening of commercial whaling which could result in a flood of whale products.

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