

**JAPAN PROGRESS REPORT ON SMALL CETACEAN RESEARCHES**  
**May 2000 to May 2001**

(compiled by)

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This report summarizes small cetacean fisheries and researches conducted during period from May 2000 to May 2001 by the National Research Institute of Far Seas Fisheries (hereafter NRIFSF) and the Fisheries Agency of Ministry of Agriculture, Forestry and Fisheries, the Government of Japan (hereafter FAJ) with cooperation of other related organizations. This report covers information on small cetaceans which does not included in the Japan Progress Reptot on Cetacean Research May 2000 to May 2001 which is submitted to 53rd IWC/SC meeting.

**1. Species and stocks studied**

Following species and stocks of small cetaceans were studied by NRIFSF and FAJ:

Common name	Scientific name	Area/stock(s)	Items referred to
Baird's beaked whale	<i>Berardius bairdii</i>	Off Pacific coast, Sea of Japan, Okhotsk Sea	4.2, 4.4, 7.1, 8
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Off Pacific coast, western North Pacific	3.2, 4.2, 4.4, 7.1, 8
False killer whale	<i>Pseudorca crassidens</i>	Off Pacific coast	7.1
Killer whale	<i>Orcinus orca</i>	Antarctic, North Pacific off Pacific coast	4.1, 8
Striped dolphin	<i>Stenella coeruleoalba</i>	Off Pacific coast, Western North pacific	3.1.2, 3.2, 4.1, 4.2, 4.4, 5, 7.1, 8
Dall's porpoise	<i>Phocoenoides dalli</i>	Off Pacific coast, Okhotsk Sea, Sea of Japan	4.2, 4.4, 7.1, 8
Bottlenose dolphin	<i>Tursiops truncatus</i>	Kagoshima Bay, off Pacific coast	2.1.1, 3.1.1, 3.2, 4.2, 4.4, 5, 7.1
Spotted dolphin	<i>Stenella attenuata</i>	Off Pacific coast	3.2, 4.2, 4.4, 7.1
Finless porpoise	<i>Neophocena phocenooides</i>	Coastal waters of Japan	7.1, 8
Risso's dolphin	<i>Grampus griseus</i>	Western North Pacific	3.2, 4.2, 4.4, 5, 7.1, 8
Additional species taken or sighted during dolphin fisheries or small type whaling operation	-	Off Pacific coast, Sea of Okhotsk	2.1.1, 2.1.2, 3.2, 4.1, 4.2, 4.4, 7.1,
Additional species sighted during the sighting cruise	-	North Pacific, Sea of Okhotsk, Southern Hemisphere	2.1.1, 2.1.2, 4.1
Additional species stranded	-	Around Japan	4.3, 8

## **2.Sighting data (this section overlap with description of sighting data in SC/53/Japan /Progrep.)**

### *2.1 Field work*

#### *2.1.1 Systematic*

Regardless of the target species of sighting cruises, sightings of small cetaceans were recorded. The NRIFSF and FAJ conducted a total of nine sighting and related surveys from May 2000 to March 2001 in the North Pacific and the Southern Hemisphere. Those are seven cruises in the former water and two in the latter. All of the vessels except one vessel are equipped with a top barrel. Names of the vessels, scientists on board, and period of each cruise are given in Table 1.

The IWC/SOWER Antarctic sighting cruise was conducted under auspices of the IWC/SOWER (Southern Ocean Whale and Ecosystem Research) program from 5 January 2001 to 5 March 2001. This cruise consisted of the blue whale research component, the minke whale assessment component. The main purpose of blue whale component was to obtain scientific information relevant to developing shipboard identification methods for separating “true” blue whales (*Balaenoptera musculus intermedia*) from “pygmy” blue whales (*B. m. breviceauda*). For this purpose, acoustic survey, skin biopsy, digital video recording and photo-identification were prepared in addition to sighting survey. The government of Japan offered two research vessels (*Shonan-maru* and *Shonan-maru #2*) and crew for this program, as has been the case for the last 23 years. H. Kato (NRIFSF) acted as an organizer of the cruise and as a member of the steering group of the program. Weather conditions were about average and good survey coverage was obtained on the constructed cruise tracks of minke whale component in Area E and W (110-140W) for 38 days. Six sightings (16 animals) of true blue whale were encountered during the survey. P. Ensor (New Zealand) acted as a cruise leader. K. Matsuoka (Japan) participated in the cruise as senior scientist, Marques (Brazil), Murase (Japan), Pitman (USA), Waerebeek (Peru) as researchers. The details of the cruise and results will be separately reported at the 53rd IWC/SC meeting.

In the North Pacific, of a total seven cruises, the five cruises mainly engaged in sighting survey with skin biopsy at opportunistic base. Miyashita (NRIFSF) and Shimada worked in planning, track designs, searching methods of all the above cruises. Total searching distances made during the cruises were 6,978 n.miles, 7,243 n.miles and 5,700 n.miles for the Southern Hemisphere, the North Pacific in summer and the North Pacific from autumn to winter, respectively. During these cruises, minke whale cruise was oversighted by Miyashita and S.Nishiwaki, (ICR) and Bryde's whale by Shimada. In addition, systematic sighting data were also obtained from the other two cruises for biopsy and marking. The results from the offshore sighting cruises are given in Tables 2, 3 (surveys in summer season) and 4 (in winter season).

Under cooperative program with the Republic of Korea, two cruises were conducted by both countries; one by R/V *Kurosaki* and another by R/V *Tamgu 3* (Korea). *Kurosaki* investigated coastal waters off the western Japan in the Sea of Japan from 4 May to 12 June. On the other hand, *Tamgu 3* investigated coastal waters off southeast coast of the Korean Peninsula, 9 May – 2 June. The cruises were conducted under Z.G. Kim (National Fisheries Research and Development Institute, Republic of Korea), Yoshida, H.(ICR) joined the cruise from 20 May to 2 June.

Under the cooperation among the NRIFSF, Kochi prefecture government (KPG) and the Whale Watching Association in Tosa Bay (WATB), the sighting surveys on Bryde's whales were conducted in the coastal waters off Kochi in October 2000, using 20 whale watching boats that belong to the WATB. The survey lasted ten days and T. Kishiro (NRIFSF), three research assistants (Kagoshima University and Tokyo University of Fisheries) and the total of 20 members of WATB acted as the researchers on board. A total of eight schools (16 individuals) of Bryde's whales were detected during the survey.

The sighting surveys on Bryde's whales were also conducted in the coastal waters off

Kasasa, Southwest end of Kyushu, in September 2000, under the cooperation among the NRIFSF, Kagoshima prefecture government (KAPG), and Nomaie Fishery Cooperative Union (NFCU). Two to three whale watching boats (belong to the NFCU) were used as the research vessels. The surveys lasted 6 days. Kishiro and 12 research assistants (Kagoshima University) acted as the researchers on board. A total of 13 schools (40 individuals) of Bryde's whales were detected during the surveys.

The coastal sighting surveys were also conducted for bottlenose dolphins in Kagoshima Bay in October 2000 and February 2001 (using 2-6 boats in each day, Kishiro, N. Kubo (Kagoshima Aquarium) and 22 research assistants (Kagoshima University and Kagoshima Aquarium) acted as the researchers on board. Each survey lasted 5-6 days. A total of 3 schools (110 individuals) of bottlenose dolphins and nine schools (483 individuals) of *Delphinus* species were detected during the two surveys.

The Institute of Cetacean Research (ICR) and NRIFSF conducted the non-lethal survey using R/V *Torishima* in waters surrounding Ogasawara Islands, Japan during 10 November-25 December 2000, in order to obtain information on winter feeding and breeding ecology of large cetaceans, i.e., sperm, Bryde's, and minke whales which are target species of JARPN II. H. Yoshida (ICR) joined the survey and sighted 49 schools of cetaceans including 15 of sperm whales and one of sei whales during research of 2266.9 n.miles, though Bryde's and minke whales were not detected. For the sperm and sei whales, swimming behavior was observed for total of 17 hours and 58 minutes. To attach satellite tags, three sperm whale schools were pursued and tags were launched 13 times, whereas no tags were attached successfully. For skin biopsy, darts were launched 16 times to five schools of sperm and one of sei whales, which resulted in two samples of sperm whales.

The ICR and NRIFSF conducted sighting surveys with Caribbean scientists in the Caribbean Sea, in order to obtain information on distribution of cetaceans, especially humpback whales. H. Yoshida (ICR) participated in pre-survey meetings held in Dominica and St. Lucia and then joined in sighting survey conducted in St. Vincent and the Grenadines and Grenada during 3 -11 April 2001. Four schools of cetaceans (three schools of bottlenose dolphins and a solitary humpback whale) were sighted during the research of 349 n.miles. The humpback whale went to the north at high speed. Acoustic survey using a hydrophone was conducted at 30 points and sound of humpback whales was recorded successfully at two points.

The results from the offshore sighting cruises and the coastal whale sighting surveys off Kochi and Kasasa are given in Tables 2, 3 (surveys in summer season) and 4 (in winter season).

#### 2.1.2 Opportunistic, platforms of opportunity

Opportunistic sighting data have been collected during operations by the small type whaling and by dolphin fisheries.

Under the cooperation among NRIFSF, Nomaie Fishery Cooperative Union (NFCU) and Faculty of Fisheries, Kagoshima University opportunistic sighting data of Bryde's whales have been collected during the whale watching operations in the coastal waters off Kasasa, southwest end of Kyushu.

### 3. Marking data

#### 3.1 Field work

##### 3.1.1 Natural marking data

Many photographs were taken through the dedicated sighting cruises above-mentioned and these were preserved for future analysis. Photographs were also collected from local sighting cruises for the coastal Bryde's whales off Kochi and Kasasa. A cumulative total of 43 Bryde's whales (Kochi), seven Bryde's whales (Kasasa) and 20 bottlenose dolphins have been individually identified by mainly shape of dorsal fin, which has been deposited in NRIFSF under the cooperative program.

Table 1. Name of vessels, scientists on board for the sighting and other survey in the North Pacific and the Southern Hemisphere by the Japanese vessels in 2000 fiscal year.

Name of vessel	Main objective	Period and region	Scientists on board
[North Pacific]			
<i>Kurosaki</i>	Sighting of minke whales (Japan-Korea Joint sighting survey)	May 4 – June 12, Sea of Japan, 2000	Saito, T.(FAJ), Kariya, T.(FAJ), Okumura, T.(FAJ), Okumura, T.(FAJ)
<i>Shonan-maru No.2</i>	IO passing mode survey of minke whales	July 14-Sep11, 2000. Sea of Okhotsk	Miyashita, T.(July 14-Aug.10), Nishiwaki, S.(ICR)(Aug.11–Sep.11), Kariya, T.(FAJ) (July 14–Sep.11)
<i>Kurosaki</i>	Sighting and observation of diving behavior of minke whales	July 14 – Aug.12, 2000 western Sea of Okhotsk	Saito, T.(FAJ), Tanaka, Y.(FAJ), Okumura, T.(FAJ), Okumura, T.(FAJ)
<i>Toshi-maru No.11</i>	Sighting of Bryde's whales	July 28- Sep.25, 2000 Western North Pacific	Shimada, H. and Takei, J.(FAJ)
<i>Kurosaki</i>	Biopsy and marking for dolphins	Oct.28- Dec.24, 2000 Off the Pacific coast of Japan	Noji, S. and Saino, S. (FAJ, Oct.28-Dec..24)
<i>Kanou-maru*</i>	Sighting and acoustic survey	Jan.28 - Mar.21,2001, Lower latitudinal waters in the western North Pacific	Shimada, H.(Jan26-Feb.19), Noji, S.(FAJ), Okumura, T.(FAJ), Endo, K.(FAJ)
<i>Kurosaki</i>	Biopsy and marking for dolphins	Mar.1-28.,2001, Off the Pacific coast of Japan	Iwasaki, T.(Mar.1-14), Susuki, M.(FAJ), Nonaka, K. (FAJ) (Mar.16-28), Okumura, T. (FAJ), Tanaka, Y.(FAJ)
<i>Kurosaki</i>	Sighting of minke whales (Japan-Korea Joint sighting survey)	Apr.12-May 21,2001 Coastal waters off the western Japan in the Sea of Japan	Saito, T.(FAJ), Isoda, T.(FAJ), Okumura, T.(FAJ), Morino, K.(FAJ)
[Southern Hemisphere]			
<i>Shonan-maru</i>	Sighting SOWER/Blue& Antarctic	Jan.5–Mar.5, 2001, Areas V(175W-180), IV and I(120W-110W)	Ensor, P. (New Zealand), Murase, H.(Japan), Waerebeek, K. V. (Peru)
<i>Shonan-maru No.2</i>	Sighting SOWER/Blue& Antarctic	Jan.5–Mar.5, 2001, Areas V(175W-180), IV and I(120W-110W)	Matsuoka, K.(Japan), Pitman R.(USA), Marques, F.(Brazil)

### 3.1.2 Artificial marking data

Iwasaki (NRIFSF), S. Noji (FAJ), T. Hayashi (FAJ), M. Susuki (FAJ) and K. Nonaka (FAJ) conducted “dart-tag” marking and got a total of 385 successes for 377 striped dolphins (two individuals double-tagged), four short-beaked common dolphins, one bottlenose dolphin and

one spotted dolphin during the cruises of *Kurosaki*. These are also given in Table 5.

### 3.1.3 Telemetry data

Using the improved attachment system, Iwasaki, Y. Kai (Taiji Fishery Cooperative Union), H. Tanakura (FAJ) and Kato attached two ARGOS satellite tags on two bottlenose dolphins. Those dolphins were released and tracked for 12 and 15 days, respectively.

### 3.2 Analyses/development of techniques

Kai and Iwasaki tried to improve the killing techniques for small cetaceans using southern form short-finned pilot whale, Risso's, bottlenose, striped and spotted dolphins.

## 4. Tissue/biological samples collected

### 4.1 Biopsy samples

Biopsy skin sampling was tried at an opportunistic base during the sighting survey cruises in the North Pacific and the Southern Hemisphere as mentioned in Section 2.1.1. Furthermore, two biopsy/marketing cruises were conducted, in which Iwasaki, S. Noji (FAJ), T. Hayashi (FAJ), Y. Tanaka (FAJ) and T. Okumura (FAJ) were on board *Kurosaki* sailing off the Pacific coast of the Main Island of Japan from 17 October to 15 December 2000 and Iwasaki, M. Susuki (FAJ), K. Nonaka (FAJ), T. Okumura (FAJ) and Y. Tanaka (FAJ) were on board *Kurosaki* sailing off the Pacific coast of the Main Island of Japan in 1-28 March 2001 (the ships also conducted line transect sighting survey along the predetermined track line). All of biopsy samples collected during the cruises are listed in Table 6.

### 4.2 Samples from direct catches or bycatch

The national quota of Baird's beaked whales was 62 animals, with permitted operation periods of 8 May to 30 June for one land station at Hakodate on the Sea of Japan coast, 1 July to 31 August for two land stations at Ayukawa and Wadoura on the Pacific coast and 1 to 20 September for Abashiri station on the Okhotsk coast. A total of 62 whales (8 off Hakodate, 2 off Abashiri, 26 off Ayukawa and 26 off Wadoura) were taken using four catcher boats (*Koei-maru* #75, *Taisyō-maru* #28, *Katsu-maru* #7 and *Sumitomo-maru* #31). T. Kishiro (NRIFSF) organized the field data collection from the fishery and all of the catch were examined and sampled by following four biologists; Kishiro, T. Hayashi (FAJ), S. Tabata (FAJ), H. Ohizumi (NRIFSF) and T. Hara (FAJ).

The national quota of northern form short-finned pilot whales for the small-type whaling was 50 whales with a permitted season of 1 October to 30 November for two boats (*Kohei-maru* #75 and *Taisyō-maru* #28). A total of 50 whales were taken by the two vessels using one station in Ayukawa. All of the catches were examined and sampled by biologists, T. Hara. The national quota of southern form short-finned pilot whales for the small-type whaling was 56 whales with permitted operation periods of 1 May to 30 September. A total of 56 whales were taken using three catcher boats (*Katsu-maru* #7, *Sumitomo-maru* #31, and *Seiwa-maru*) and two land stations (Taiji and Wadoura). All of the catches were examined and sampled by S. Saino (FAJ), T. Isoda (FAJ), T. Hara, Y. Sekiguchi (FAJ) and K. Miyamoto (FAJ). The FAJ also set a national catch quota of 20 Risso's dolphins for the small-type whaling in Taiji for period from 1 May to 30 June and 1 to 30 September. The 20 individuals were taken by *Katsu-maru* #7, *Sumitomo-maru* #31 and *Seiwa-maru*, and examined by Hara, Saino, Isoda, Sekiguchi and Miyamoto.

Iwasaki and his colleagues (Hara (FAJ), Saino (FAJ), T. Tomita (FAJ) and Y. Tomizawa (FAJ)) collected samples for life history and genetic studies from catches of drive and hand harpoon fisheries in Taiji during operations through 1 October to 20 December 2000 and 7 January to 10 February 2001. They examined a total of 1,746 individuals composed of 848 bottlenose dolphins, 465 striped dolphins, 297 Risso's dolphins, 107 southern form short-finned pilot whales, 27 spotted dolphins and two Fraser's dolphins. Details of biological materials

collected through activities above are given in Table 7.

Ohizumi and T. Isoda (Nihon Univ.) collected stomach contents of toothed whales caught by small-type whaling and hand harpoon fisheries. Stomach contents were collected from 16 Risso's dolphins, 12 bottlenose dolphins, one spotted dolphin and 34 southern form short-finned pilot whales at Taiji in May-June; eight Baird's beaked whales at Hakodate in May.

#### *4.3 Samples from stranded animals*

Kishiro, Ohizumi, Iwasaki and their colleagues collected samples from a stranded pygmy sperm whale at Hamaoka, Shizuoka, Japan during 12-13 April 2001, for life history, food habit and genetic studies.

#### *4.4 Analyses/development of techniques*

In order to clarify stock differentiation among Baird's beaked whales in the Sea of Japan, Kishiro, Ohizumi and H. Yoshida (ICR) conducted further examination on the reproductive organs, external morphology including body proportion, stomach contents and genetic composition of eight Baird's beaked whales taken by the small-type whaling at Hakodate in 2000.

Iwasaki and K. Nonaka (Tokai University) analyzed life history parameters of Dall's porpoises taken by hand harpoon fishing vessels of Iwate and Hokkaido Prefectures.

Iwasaki, X. F. Zhang (Institute of hydrobiology, Peoples Republic of China) and Kato continued to analyze biological materials of spotted dolphins collected at Taiji under drive fisheries in 1991 to 1997. H. Koike (Kyushu University) and Iwasaki analyzed stable isotopes in the teeth of striped dolphins to elucidate the food difference between coastal and offshore individuals. G. Watanabe (Tokyo University of Agriculture and Technology) and Iwasaki also determined testosterone levels in testis tissues of bottlenose dolphins.

Iwasaki started to assess the testis activity of striped dolphins using the area of cross-section of seminiferous tubules and number of germ cells in those tubules. Those parameters are obtained using the optical microscope equipped with the image processing apparatus.

Yoshida continued the mitochondrial DNA sequence analyses of Dall's porpoises using genetic materials from animals caught by dolphin fisheries, in order to obtain further information on their stock structure.

Ohizumi and T. Isoda (Nihon University) analyzed stomach contents of toothed whales caught by small-type whaling and hand harpoon fishery in 1999. They found out geographical variations of stomach contents in some species of small cetaceans as follows. 1) Northern form short-finned pilot whales caught in Ayukawa (Pacific coast of northern Japan) fed exclusively on squids, but southern form caught in Taiji (Pacific coast of central Japan) fed on squids and large mesopelagic fishes. 2) Baird's beaked whales in the North Pacific fed mainly on rattails and deep-sea cods, but the whales in the Sea of Japan fed mainly on mesopelagic squids. The same species in the Sea of Okhotsk fed mainly on mesopelagic squids, but deep-sea cods were also important. 3) Risso's dolphins caught off Taiji showed a difference in prey composition from that of southern form short-finned pilot whales caught off Taiji. Risso's dolphins off taiji fed mainly on smaller squids, but the short-finned pilot whales off Taiji on larger squids and fishes.

Stomach content samples collected in 2000 were partly analyzed. A similar result to that in 1999 was preliminary obtained. Further analyses are ongoing by Ohizumi and his colleagues..

For development of the technique in analysis of stomach contents of whales, Ohizumi, H. Watanabe (Squid section NRIFSF), and Kawahara made a manual for species identification of myctophids using otoliths. T. Kubodera (National Science Museum, Tokyo) and Ohizumi also made a manual for species identification of cephalopods using lower beaks. These manuals are still under preparation for publication in a CD-ROM and internet home page.

## 5. Pollution studies

Iwasaki analyzed testosterone and PCBs levels in the testis tissues of 30 bottlenose dolphins to examine the correlation.

(Item6 – omitted)

## 7. Statistics for small cetacean

### 7.1 For the calendar year 2000

For the small type whaling, the national quota of Baird's beaked whales was 62 animals, with permitted operation periods of 8 May to 30 June for one land station at Hakodate on the Sea of Japan coast, 1 July to 31 August for two land stations at Ayukawa and Wadoura on the Pacific coast and 1 to 20 September for Abashiri station on the Okhotsk coast. A total of 62 whales (8 off Hakodate, 2 off Abashiri, 26 off Ayukawa and 26 off Wadoura) were taken using four catcher boats. The national quota of northern form short-finned pilot whales for the small-type whaling was 50 whales with a permitted season of 1 October to 30 November for two boats (*Kohei-maru* #75 and *Taisyo-maru* #28). A total of 50 whales were taken by the two vessels using one station in Ayukawa. The national quota of southern form short-finned pilot whales for the small-type whaling was also established to be 56 whales with permitted operation periods of 1 May to 30 September. A total of 56 whales were taken using three catcher boats (*Katsu-maru* #7, *Sumitomo-maru* #31, and *Seiwa-maru*) and two land stations (Taiji and Wadoura). The FAJ also set a national catch quota of 20 Risso's dolphins for the small-type whaling in Taiji for period from 1 May to 30 June and 1 to 30 September. The 20 individuals were taken by *Katsu-maru* #7, *Sumitomo-maru* #31 and *Seiwa-maru*.

For dolphin fisheries, as explained in the last year progress report presented to 52<sup>nd</sup> IWC/SC, FAJ introduced in 1996 new management season starting on 1 August and closing on 31 July for Dall's porpoise fisheries and from 1 October to 30 September of the next year for the other species. However, as in many previous years also following the modified guideline for IWC national progress report, the statistics covers catch of through 1 January to 31 December 2000 while FAJ carries out the management of dolphin fisheries by their own yearly season above. Thus there may be some cases the calendar yearly catch apparently exceed the seasonal (yearly) catch, but FAJ controls the seasonal catch should be well below the allocated catch quota. Such direct small cetacean catches are given in Table 8 by Prefecture and type of fisheries, also summarized by species in Table 9 with incidental or non-natural mortalities. And statistics have been collected by the Far Seas Division of the FAJ based on report from the prefecture governments.

For the 2000/2001 season, the catch quota remains unchanged from the last year as 9,000 *dalli*-type Dall's porpoise, 8,700 *truei*-type Dall's porpoises, 1,300 Risso's dolphins (including 20 for the small type whaling), 1,100 bottlenose dolphins, 950 spotted dolphins, 725 striped dolphins, 450 southern form short-finned pilot whales (including 50 for the small-type whaling) and 50 false killer whales.

For corresponding operation months divided by prefecture in 2000 (January – September in 2000 and October – December of the 2000/2001 season) was as follows: Japanese hand harpoon fishery for porpoises was permitted for nine months (1 February to 31 October) in Okinawa Prefecture: seven months (1 January to 28 February, 1 May to 31 August, 1 to 31 December) in Wakayama; six months (1 January to 30 April and 1 November to 31 December) in Aomori, Miyagi, Iwate and Chiba: 4.5 months (1 May to 15 June and 1 August to 31 October) in Hokkaido. The drive fishery was allowed for 7 months in Wakayama (1 January to 30 April and 1 October to 31 December) and Shizuoka (1 January to 31 March and 1 September to 31 December).

### 7.2 Earlier years' statistics

No changes from the last year' statistics.

## 8. Stranding

Information of stranded cetaceans has been officially collected by the Far Seas Division of the FAJ, 1-2-1, Kasumigaseki, Tokyo 100-8907, Japan. The information is summarized in Table 10. In addition, the Institute of Cetacean Re-search, Tokyo Suisan Building, 4-18 Toyomi, Chuo-ku, Tokyo 104-0055, Japan; T. Yamada, National Science Museum, Hyakunin-cho, Shinjuku-ku, Tokyo 164, Japan voluntarily collected relevant information to the stranding.

## 9. Other studies and analyses

From a view of future multispecies management, Okamura and Kawahara examined how the Ecopath model performed for the test data. They concluded that the Ecopath model was useful for the ecosystem study to some degree. However they also stated that the models including the fishery dynamics such as the Ecosim or the Multspec were needed for more detailed analyses.

## 10. Publications (excluding IWC volumes and documents submitted to the IWC meetings)

- Amano, M., Marui, M., Guenther, T., Ohizumi, H. and Miyazaki, N. 2000. Re-evaluation of geographic variation in the white flank patch of dalli-type Dall's porpoise. *Marine Mammal Science*, Vol. 16, No 3. 631-636.
- Hunt, G. L., Kato, H. and Mckinnell, M. 2000 Predation by marine birds and mammals in the subarctic North Pacific Ocean. *PICES Scientific Report No. 14*, pp165,
- Isoda, T., Ohizumi, H., Asahina, K. and Kato, H. 2001. Comparison of feeding habits of southern form short-finned pilot whales and Risso's dolphin in Kii peninsula, central Japan. Abstract for the meeting of the Japanese Society of Fisheries Science. p92. (in Japanese).
- Kato, H. and Miyashita, T. 2000. Cetaceans in Okhotsk Sea from current joint survey Japan and Russia. Report, Japan-Russia Joint Symposium "Iturup, Kunasir, Shikotan, Habomai Islands of the 21st Century - The coexistence between rich nature and human-" (in Japanese).
- Kida, M., Ohizumi, H., Ito, M. and Tanaka, S. 2001. Structure of peripheral airways in Baird's beaked whale (*Berardius bairdii*). Abstracts of 60th meeting of central Japan branch, The Japanese Association of Anatomists. p25-26.
- Miyashita, T. 2000 Case study on marine mammal: shipboard survey for cetacean population. Abstract, Ninth Annual Meeting of PICES. November 2000
- Miyashita, T. 2000. Distribution of whales in the North Pacific inferred from the Japanese sighting surveys. Abstract, Symposium on whale in Japan-Korea. February 2001.
- Ohizumi, H. 2000. Approaches to dietary study of cetaceans and problems in the analyses of stomach contents. Abstract, North Pacific Marine Science organization (PICES), Ninth Annual Meeting, Hakodate, Japan. October 2000.
- Ohizumi, H., Kuramochi, T., Amano M. and Miyazaki, N. 2000 Prey switching of Dall's porpoise, *Phocoenoides dalli*, with population decline of Japanese Pilchard, *Sardinops melanostictus*, around Hokkaido, Japan. *Marine Ecology Progress Series*, Vol. 200. 265-275.
- Ohizumi, H., Terasawa, F., Kitamura, M., Fujimoto, A., Kato, H. and Tsuda, A. 2001. Development of the methods for respiratory study of captive toothed whales. Abstract for the meeting of the Japanese Society of Fisheries Science. p91. (in Japanese).
- Tamura, T. and Ohizumi, H. 2000. Foods and feeding habits of cetaceans, and their food consumption in the North Pacific –Especially western North Pacific Marine Science Organization (PICES). Abstract, Ninth Annual Meeting, Hakodate, Japan October 2000.



Table 2. Small cetaceans sighted by Japanese dedicated sighting surveys (*Shonan-maru* and *Shonan-maru No.2*) in the Southern Hemisphere in the 2000/2001 austral summer season (including SOWER/Blue whale cruises, SOWER/Antarctic cruises and those before and after the cruises).

The number is given for the noon position of vessels. Key : K = killer whale, Zi = Cuvier's beaked whale, Zx = ziphiids, Ba = Baird's beaked whale and Ps = short- finned pilot whale.

10' square	Distance (n.miles)	Number of small cetaceans sighted				
		K	Zi	Zx	Ba	Ps
A 25	424	-	-	7	-	-
B 25	407	13	-	-	-	-
26	116	4	-	-	-	-
27	170	-	-	-	-	-
28	43	-	-	-	-	-
29	918	33	-	7	-	-
30	1,096	24	-	-	5	-
31	1,434	50	-	36	11	-
C 25	136	-	-	-	-	-
28	54	-	-	-	-	-
29	94	-	-	-	-	-
31	70	13	-	-	-	-
D 24	495	-	10	69	-	-
29	86	-	-	2	-	-
E 28	236	-	-	5	-	-
29	509	-	-	3	-	35
F 28	572	2	-	1	-	-
G 28	118	-	-	-	-	-
Total	6,978	139	10	130	16	35

Table 3. Small cetaceans sighted by Japanese dedicated surveys (*Toshi-maru No.11*, *Shonan-maru No.2* and *Kurosaki*) operated in the North Pacific during 2000summer season (June to October 2000) in addition two local line transect surveys off Kochi and Kagoshima in September. Number of sighting by 10° square are based on the noon position of the vessels. For species keys, see Table 2.

10° Square	Distance (n.miles)	Number of small cetaceans sighted				
		K	Zi	Zx	Ps	
K	20	459	-	-	7	-
	21	1,029	3	-	5	15
L	20	468	7	-	-	6
	21	532	-	4	2	12
M	20	1,725	-	2	2	-
	21	228	-	-	19	-
N	20	323	-	-	-	-
	21	1,211	47	-	-	-
P	20	108	5	-	-	-
	21	846	18	-	-	-
	22	314	9	-	-	-
Total	7,243	89	6	35	33	

Table 4. Whales sighted by Japanese dedicated sighting surveys (Kurosaki, Kano-maru and transit cruises of the SOWER by Shonan-maru and *Shonan-maru No.2*) in the North Pacific in 2000/2001 autumn-winter Season (October 2000-March 2001). For species key, see Tables 2 and 3.

10° Square	Distance (n.miles)	No. small cetaceans sighted		
		K	Zx	Ps
E 23	119	-	1	15
F 23	98	-	2	-
G 27	328	-	-	-
H 25	120	-	-	-
	26	277	-	-
J 21	563	-	-	-
	22	365	-	-
	24	18	-	-
	25	60	-	-
K 20	121	-	-	-
	22	147	-	-
	23	113	-	-
	24	222	-	-
L 20	254	-	-	-
	21	109	-	-
	22	246	-	-
M 20	1,314	12	-	-
	21	1,226	2	-
Total	5,700	12	5	15

Table 5. Artificial marking data released by NRIFSF, May 2000-May 2001.

Species	Area	No. marked
Striped dolphin	N.Pacific	377
Short-beaked common d.	N.Pacific	4
Bottlenose dolphin	N.Pacific	1
Spotted dolphin	N.Pacific	1

Table 6. Biopsy samples collected through Japanese research, May 2000 - May 2001.

Species	Area	No. collected	Archived (Y/N)	No. analyzed	Total holdings	Contact Institute
Killer whale	Antarctic	2	Y	0	2	NRIFSF
Arnoux's beaked whale	Antarctic	1	Y	0	1	NRIFSF
Striped dolphin	N. Pacific	11	Y	0	11	NRIFSF
Short-beaked common dolphin	N. Pacific	2	Y	0	2	NRIFSF

Table 7. Samples collected during operations by small-type whaling and dolphin fisheries and samples from bycatch, May 2000-May 2001.

Species	Area	Type of fishery	No. collected	Archived (Y/N)	Tissue type(s)	Contact Institute	
Striped dolphin	N.Pacific	Hand harpoon	30	Y	Tooth, skin, muscle, ovary, uterine horn, testis and epididymis	NRIFSF	
		Driving	446	Y	Tooth, skin, muscle, ovary, uterine horn, testis and epididymis		
Spotted dolphin	N.Pacific	Hand harpoon	6	Y	Tooth, skin, muscle, ovary, uterine horn, testis and epididymis	NRIFSF	
		Driving	27	Y	Tooth, skin, muscle, ovary, uterine horn, testis and epididymis		
Bottlenose dolphin	N.Pacific	Hand harpoon	30	Y	Tooth, skin, muscle, ovary, uterine horn, testis and epididymis	NRIFSF	
		Driving	846	Y	Tooth, skin, muscle, ovary, uterine horn, testis and epididymis		
Risso's dolphin	N.Pacific	Small-type whaling	20	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis, epididymis and vertebral epiphysis	NRIFSF	
		Hand harpoon	2	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis		
		Driving	297	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis		
Short-finned pilot whale	Northern form	N.Pacific	Small-type whaling	50	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis, epididymis and vertebral epiphysis	NRIFSF
	Southern form		Small-type whaling	56	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis, epididymis and vertebral epiphysis	
			Driving	107	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis	
Fraser's dolphin	N.Pacific	Hand Harpoon	3	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis	NRIFSF	

(continue to next page)

(Table 7. continued)

Species	Area	Type of fishery	No. collected	Archived (Y/N)	Tissue type(s)	Contact Institute	
Dall's porpoise	<i>dalli</i> -type	Okhotsk Sea	Hand harpoon	50	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis	NRIFSF
		N.Pacific	Hand harpoon	50	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis	NRIFSF
		Sea of Japan	Hand harpoon	122	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis	NRIFSF
	<i>truei</i> -type	N.Pacific	Hand harpoon	30	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis and epididymis	NRIFSF
Baird's beaked whale		N.Pacific	Small-type whaling	52	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis, epididymis and vertebral epiphysis	NRIFSF
		Okhotsk Sea	Small-type whaling	2	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis, epididymis and vertebral epiphysis	NRIFSF
		Sea of Japan	Small-type whaling	8	Y	Tooth, skin, liver, muscle, ovary, uterine horn, testis, epididymis and vertebral epiphysis	NRIFSF

Table 8. Catch of small cetaceans by Japanese fisheries by type of fisheries by Prefecture, January-December 2000. Unless otherwise stated species and figures are those reported (provisional figures).

Species	Prefecture <sup>1)</sup>	Type of fishery	Direct catch <sup>2)</sup>	Incidental catch	Live capture
Dall's porpoise <i>dalli</i> -type	Hokkaido <sup>3)</sup>	Hand harpoon	1,203	0	0
	Iwate <sup>3)</sup>	Hand harpoon	6,106	0	0
	Miyagi	Hand harpoon	204	0	0
	Total		7,513	0	0
<i>truei</i> -type	Hokkaido	Hand harpoon	69	0	0
	Iwate	Hand harpoon	8,589	0	0
	Total		8,658	0	0
Finless porpoise	Aichi	Other coastal fishery	0	3	0
	Yamaguchi	Trap net	0	1	0
		Other coastal fishery	0	5	0
	Fukuoka	Other coastal fishery	0	9	0
	Saga	Other coastal fishery	0	1	0
	Kumamoto	Other coastal fishery	0	1	0
	Total		0	20	0
Pacific white-sided dolphin	Hokkaido	Trap net	0	0	1
Striped dolphin	Wakayama	Hand harpoon	65	0	0
	Wakayama	Driving	235	0	0
	Total		300	0	0
Spotted dolphin	Wakayama	Hand harpoon	12	0	0
		Driving	27	0	0
	Total		39	0	0
Bottlenose dolphin	Wakayama	Hand harpoon	79	0	0
	Wakayama	Driving	1,271	0	68
	Okinawa	Hand harpoon	8	0	0
	Total		1,358	0	68
Risso's dolphin	Wakayama	Small-type whaling	20	0	0
	Wakayama	Hand harpoon	119	0	0
	Wakayama	Driving	367	0	0
	Total		506	0	0
Short-finned p.w. northern form	Miyagi	Small-type whaling	50	0	0
		southern form	7	0	0
	Wakayama	Small-type whaling	49	0	0
		Driving	109	0	0
	Okinawa	Hand harpoon	89	0	0
	Total		254	0	0
False killer whale	Okinawa	Hand harpoon	8	0	0
Baird's beaked whale	Hokkaido	Small-type whaling	10	0	0
	Miyagi	Small-type whaling	26	0	0
	Chiba	Small-type whaling	26	0	0
	Total		62	0	0
Stejneger's beaked whale	Hokkaido	Trap net	0	1	0
	Toyama	Trap net	0	1	0
	Total		0	2	0

1) Catches by small-type whaling, drive fishery and trap nets are recorded to the place of landing of products. And catches by hand harpoon fishery are recorded to the place of registration of vessels.

2) Statistics of small-type whaling are based on reports of biologists and gunners. Those of other fisheries

are based on reports of prefecture governments to the Fisheries Agency, which are compilation of landing slips (hand harpoon fisheries in Iwate and Hokkaido) or reports from individual fishermen or fishery cooperative unions (other prefectures).

- 3) Most of catches by hand harpoon fishery off Hokkaido were landed as meat by fishermen and converted into individual number of *dalli*-type Dall's porpoise using a rate of 50kg/porpoise (c.f. Ishikawa et al. 1990) by prefecture governments.
- 4) Besides above records, following small cetaceans were incidentally taken but later released alive, one finless porpoise in Kagawa (trap net), 35 Pacific white-sided dolphins in Kyoto (trap net), two southern form short-finned pilot whales in Kochi (trap net), one Baird's beaked whale in Niigata (trap net), two and three *Delphinus sp.* in Fukui and Kochi, respectively (trap net), three *Delphinus sp.* in Kagoshima (large-mesh drift net), four harbor porpoises in Hokkaido (trap net) and ten unidentified dolphins in Niigata (trap net).

Table 9. Summary of small cetacean catches by Japanese fisheries and small cetacean strandings in 2000, by species and type of fisheries. For further details see Tables 8 and 10. D= direct take, I= incidental take. (provisional figures).

Species	Small- whaling	Hand harpoon	Driving	Live capture	Trap net	Other coastal fisheries	Strand- ings	Total
	[D]	[D]	[D]	[D, I]	[I]	[I]	[I]	
Dall's porpoise								
<i>dalli</i> -type	0	7,513	0	0	0	0	1	7,514
<i>truei</i> -type	0	8,658	0	0	0	0	0	8,658
Harbor porpoise	0	0	0	0	0	0	1	1
Finless porpoise	0	0	0	0	1	19	92	112
<i>Delphinus</i> sp.	0	0	0	0	0	0	4	4
Pacific white-sided dolphin	0	0	0	1	0	0	3	4
Striped dolphin	0	65	235	0	0	0	1	301
Spotted dolphin	0	12	27	0	0	0	0	39
Bottlenose dolphin	0	87	1,271	68	0	0	0	1,426
Risso's dolphin	20	119	367	0	0	0	6	512
Rough-toothed dolphin	0	0	0	0	0	0	2	2
Pygmy killer whale	0	0	0	0	0	0	12	12
Melon-headed whale	0	0	0	0	0	0	48	48
Killer whale	0	0	0	0	0	0	1	1
Short-finned pilot whale								
northern form	50	0	0	0	0	0	0	50
southern form	56	89	109	0	0	0	1	255
False killer whale	0	8	0	0	0	0	0	8
Baird's beaked whale	62	0	0	0	0	0	6	68
Stejneger's beaked whale	0	0	0	0	2	0	21	23
Dwarf sperm Whale	0	0	0	0	0	0	1	1
Pygmy sperm whale	0	0	0	0	0	0	3	3
Unidentified dolphin	0	0	0	0	0	0	6	6
Unidentified cetacean	0	0	0	0	0	0	9	9
<b>Total</b>	<b>188</b>	<b>16,551</b>	<b>2,009</b>	<b>69</b>	<b>3</b>	<b>19</b>	<b>218</b>	<b>19,057</b>



Table 10. Strandings of small cetaceans in Japan, January-December 2000. Species and figures are based on reports of prefecture governments to the Fisheries Agency which are reports from individual fishermen, fishery cooperative unions or the general public (provisional figures).

Species and stocks	Prefecture <sup>1)</sup>	No. of individuals
Dall's porpoise ( <i>dalli</i> -type)	Aomori	1
Harbor porpoise	Aomori	1
Finless porpoise	Ibaraki	5
	Chiba	6
	Shizuoka	1
	Aichi	30
	Mie	20
	Hiroshima	6
	Okayama	1
	Yamaguchi	14
	Fukuoka	4
	Nagasaki	1
	Kumamoto	4
	Total	92
<i>Delphinus</i> sp.	Hokkaido	1
	Ishikawa	1
	Kagoshima	2
	Total	4
Pacific white-sided dolphin	Niigata	1
	Ishikawa	2
	Total	3
Striped dolphin	Ibaraki	1
Risso's dolphin	Chiba	1
	Ishikawa	1
	Wakayama	2
	Mie	1
	Fukuoka	1
	Total	6
Rough-toothed dolphin	Fukuoka	1
	Saga	1
	Total	2
Pygmy killer whale	Yamaguchi	6 2)
	Fukuoka	6 2)
	Total	12
Melon-headed whale	Kagoshima	48
Killer whale	Aichi	1
Short-finned pilot whale (southern form)	Ishikawa	1
Baird's beaked whale	Hokkaido	6
Stejneger's beaked whale	Aomori	5
	Akita	9
	Niigata	2
	Ishikawa	3
	Yamaguchi	1
	Fukuoka	1
	Total	21
Species and stocks	Prefecture <sup>1)</sup>	No. of individuals

Dwarf sperm whale	Hokkaido	1
Pygmy sperm whale	Ibaraki	1
	Kanagawa	1
	Wakayama	1
	Total	3
Unidentified dolphin	Toyama	3
	Tottori	1
	Kagoshima	2
	Total	6
Unidentified cetacean	Hokkaido	4
	Aomori	2
	Chiba	1
	Niigata	1
	Yamaguchi	1
	Total	9

- 1) Recorded to the prefecture where strandings occurred.
- 2) Two in Yamaguchi and four in Fukuoka were rescued and sent to aquaria.
- 3) Besides above records, following cetaceans were stranded or accidentally entered the harbor but were safely driven to the sea, one finless porpoise in Kumamoto, one bottlenose dolphin in Okinawa, three Risso's dolphins (one in Shimane, one in Fukuoka and one in Okinawa, respectively), 126 Melon-headed whales, one killer whale in Aichi, one false killer whale in Kumamoto, one dwarf sperm whale in Fukushima and one unidentified cetacean in Chiba.