

JAPAN PROGRESS REPORT ON CETACEAN RESEARCH May 2002 to March 2003

(compiled by)

Hidehiro Kato

*National Research Institute of Far Seas Fisheries,
5-7-1, Orido, Shimizu, Shizuoka 424, Japan*

This report summarizes cetacean researches conducted during the period from May 2002 to March 2003 by the National Research Institute of Far Seas Fisheries / Fisheries Research Agency (hereafter NRIFS) and the Fisheries Agency of the Ministry of Agriculture, Forestry and Fisheries, the Government of Japan (hereafter FAJ) with cooperation of other related organizations. Hidehiyoshi Yoshida joined the NRIFS on 1st of April 2002. Hiroshi Ohizumi left the NRIFS on 31st March 2003.

In accordance with the statement made by the Japanese representative at the 52nd Commission meeting of IWC in June 2000 on the small cetaceans, information on small cetaceans was not included in the progress report for also this year. Thus the report covers cetacean species belong in the competence of IWC. The information on small cetaceans will be made available to interested parties through methods and by timing to be decided by the Government of Japan.

1. Species and stocks studied

Following species and stocks were studied by NRIFS and FAJ in cooperation with other organizations (excluding small cetaceans):

Common name	Scientific name	Area/stock(s)	Items referred to
Blue whale	<i>Balaenoptera musculus musculus</i>	North Pacific	2.1.1
True Blue whale	<i>B. m. intermedia</i>	Southern Hemisphere,	2.1.1, 2.2, 4.1
Pygmy blue whale	<i>B. m. brevicauda</i>	Southern Hemisphere	2.1.1, 2.2
Fin whale	<i>B. physalus</i>	Sea of Okhotsk, North Pacific, Southern Hemisphere.	2.1.1, 4.1, 7
Sei whale	<i>B. borealis</i>	North Pacific, Southern Hemisphere	2.1.1, 4.2, 4.3, 6.1
Minke whale	<i>B. acutorostrata</i>	North Pacific, Sea of Japan, Sea of Okhotsk	2.1.1, 4.1, 4.2, 4.3, 4.4, 6.1, 6.2, 7, 8
Common minke whale			
Antarctic minke whale	<i>B. bonaerensis</i>	Southern Hemisphere	2.1.1, 2.2, 4.2, 4.5, 6.1
Bryde's whale	<i>B. edeni</i>	North Pacific, coastal waters off Kochi and off	2.1.1, 2.2, 3.1.1, 3.2, 4.2, 4.3, 6.1,

Bryde's whale cont.		Kasasa (south west Japan), North Atlantic, Southern Hemisphere	7
Humpback whale	<i>Megaptera novaeangliae</i>	North Pacific, Southern Hemisphere	2.1.1, 6.2, 7
Gray whale	<i>Escherichius robustus</i>	North Pacific	4.4
Right whale	<i>Eubalaena glacialis</i>	North Pacific	7
Sperm whale	<i>Physeter macrocephalus</i>	North Pacific, off Ogasawara Is., South Pacific, North Atlantic, Southern Hemisphere	2.1.1, 3.1.2, 3.2, 4.2, 4.4, 6.1, 7
Southern bottlenose whale	<i>Hyperoodon planifrons</i>	Southern Hemisphere	2.1.1

2. Sighting data

2.1 Field work

2.1.1 Systematic

The NRIFS and FAJ conducted a total of eleven sighting and related surveys from April 2002 to March 2003 in the North Pacific and the Southern Hemisphere, in cooperation with other scientific organizations such as Institute of Cetacean Research (ICR) etc. Nine cruises were conducted in the former water and two in the latter. All of the vessels except one vessel (*Kanou-maru*) are equipped with a top barrel. Names of the vessels, scientists on board, and period of each cruise are given in Table 1.

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 from April 2002 to March 2003.

Name of vessel	Main objective	Period and region	Scientists on board*
[North Pacific]			
<i>Kurosaki</i> (Japan-Korea joint survey)	Sighting survey for mainly minke whales	April 10 – May 9, Western Sea of Japan	Saito, T. (TS/NRIFS), Sato, H. (TS/NRIFS), Okumura, T. (TS/NRIFS), Tanaka, Y. (TS/NRIFS)
<i>Shonan-maru No.2</i> (Japan-Korea joint survey)	Sighting survey for mainly minke whales	May 13 – July 1, Sea of Japan	Yoshida, H. (NRIFS; June 8–July 1), Saito, T. (TS/NRIFS; May 13 – June 7), Hirata, Y. (TS/NRIFS), Sohn, H. (R. of Korea; June 8 – July 1)
<i>Kurosaki</i>	Sighting survey for mainly Baird's beaked whale and sperm whales	July 1 – Aug. 10, Off the Pacific coast of the northern Japan	Saito, T. (TS/NRIFS), Hayashi, T. (TS/NRIFS), Morino, K. (TS/NRIFS), Tanaka, Y. (TS/NRIFS)
<i>Kurosaki</i>	Sighting survey	Dec. 1–23, Around Iki and Goto Islands	Miyashita, T. (NRIFS), Sato, H. (TS/NRIFS), Tanaka, Y. (TS/NRIFS), Okumura, T. (TS/NRIFS)

<i>Kurosaki cont.</i>			Okumura, T. (TS/NRIFS)
<i>Shonan-maru</i>	Sighting survey for mainly Bryde's whales	July 23-Sep 20, Eastern North Pacific	Shimada, H. (NRIFS), Takei, J (TS/NRIFS)
<i>Shonan-maru No.2</i>	Sighting survey for mainly Bryde's whales	July 23-Sep 20, Eastern North Pacific	Kitazawa, T. (TS/NRIFS) Tomizawa, Y. (TS/NRIFS)
<i>Shunyo-maru</i>	Acoustic and sighting survey for sperm whales	Oct. 7-16, Off the Pacific coast of Japan	Shimada, H. (NRIFS), Takei, J. (TS/NRIFS), Arai, Y. (TS/NRIFS), Okumura, T. (TS/NRIFS), Endo, K. (TS/NRIFS)
<i>Kurosaki</i>	Cetacean sightings, biopsy and marking	Oct. 16 – Nov. 28, Off the Pacific coast of Japan	Iwasaki, T.(NRIFS) , Minamikawa, S. (NRIFS), Noji, S. (TS/NRIFS), Sato, H. (TS/NRIFS)
<i>Seiwa - maru</i>	Diving time for Baird's beaked and sperm whale	July 18 – 31, Off the coast of Chiba prefecture	Minamikawa, S. (NRIFS)
[Southern Hemisphere]			
<i>Kanou-maru</i>	Sighting survey for mainly Bryde's whales	Jan.24-Mar.17, 2003 Lower latitudinal waters in the Pacific	Shimada, H. (NRIFS; Feb 22 - Mar.18), Noji, S. (TS/NRIFS), Kijima, N. (TS/NRIFS), Okumura, T. (TS/NRIFS), Endo, K. (TS/NRIFS)
<i>Shonan-maru (IWC/SOWER)</i>	Sighting SOWER/Blue & Antarctic	Dec.17-Mar.3, 2003, Area V-east in the Antarctic	Ensor, P. (New Zealand), Tsunekawa, M.(Japan), Olson, P. (USA), Ljungblad, D.(USA)
<i>Shonan-maru No.2 (IWC/SOWER)</i>	Sighting SOWER/Blue & Antarctic	Dec.17-Mar.3, 2003, Area V-east in the Antarctic	Matsuoka, K. (Japan), Ugarte, F. (Mexico), Stevick, P. (USA), Rankin, S. (USA)

The IWC/SOWER Antarctic sighting cruise was conducted under auspices of the IWC/SOWER (Southern Ocean Whale and Ecosystem Research) program from 17 December 2002 to 3 March 2003. This cruise consisted of the blue whale research component and the minke whale assessment component. The main purpose of the 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. brevicauda*). For this purpose, acoustic survey, biopsy skin sampling, digital video taking 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 in the case for the last 25 years. H. Kato (NRIFS) acted as an organizer of the cruise and as a member of the steering group of the program. Though a research area planned in Area VE (170°E-170°W) including Ross

Sea for 61 days, the survey was covered only northern stratum (165°E-170°W). eight sightings (24 animals) of blue whale were encountered during the survey. P. Ensor (New Zealand) acted as a cruise leader. K. Matsuoka (Japan) participated in the cruise as a senior scientist, Ljungblad (USA), Olsen (USA), Rankin (USA), Stevick (USA), Tsunekawa (Japan) and Ugarte (Mexico), as researchers. The details of the cruise and results will be separately reported at the 55th IWC/SC meeting.

Table 2. Large cetaceans sighted by Japanese dedicated sighting surveys (<i>Shonan-maru</i> and <i>Shonan-maru No.2</i>) in the Southern Hemisphere in the 2002/2003 austral summer season (including SOWER/Blue whale cruises, SOWER/Antarctic cruises and those before and after the cruises). The number is given by 10°square based on the noon position of vessels. Species code: B = blue, F = fin, H = humpback, Se = sei, MiA = Antarctic minke, Sp = sperm, Bo = southern bottlenose whale								
10° square	Distance (n.miles)	B	F	H	Se	MiA	Sp	Bo
A 22	34	-	-	-	8	-	-	-
23	32	-	-	-	-	-	-	-
B 22	1,007	5	179	62	-	195	32	18
23	1,484	13	2	174	-	229	26	9
24	1,204	1	2	22	-	70	23	4
25	1,254	-	5	27	-	90	8	46
D21	213	-	-	-	17	-	-	-
22	127	-	-	-	13	-	1	-
Total	5,355	19	188	285	38	584	90	77

In the North Pacific, of a total of nine cruises, six cruises were mainly engaged in sighting survey with biopsy skin sampling at an opportunistic base. T. Miyashita (NRIFS) and Shimada worked in planning, track designs, and searching methods of all the above cruises.

Total searching distances made during the sighting cruises were 6,537 n. miles and 13,218 n.miles for the Southern Hemisphere and the North Pacific, respectively. During these cruises, Bryde's whale sighting survey was led and oversighted by H. Shimada. In addition, systematic sighting data were also obtained during the biopsy and marking survey.

Miyashita took part in the Korean sighting surveys in May and September in the coastal waters off Korea for oversight task requested from the IWC/SC. The survey was conducted using *R/V Tamgu 3* to get the information on the distribution and density of common minke whales.

Under the cooperation among the NRIFS, 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 August 2002, using 18 whale watching boats that belong to the WATB. The survey lasted 6 days and T. Kishiro (NRIFS), 5 research assistants (Kochi University and Kasasa Ebisu Maritime Museum) and the total of 25 members of WATB acted as the researchers on board. A total of 7 schools (17 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 August 2002, under the cooperation among the NRIFS, Kagoshima

prefecture government (KAPG), and Nomaiki Fishery Cooperative Union (NFCU). A total of 11 whale watching boats (belong to the NFCU) was used as the research vessels. The surveys lasted 6 days. Kishiro and 11 research assistants (Kasasa Ebisu Maritime Museum and Kagoshima University) acted as the researchers on board. A total of 16 schools (28 individuals) of Bryde's whales were detected during the surveys.

Table 3. Large cetacean sighted by Japanese dedicated surveys (Shonan-maru, Shonan-maru No.2 and Kurosaki) operated in the North Pacific during 2002 summer season (April to September 2002) in addition two local sighting surveys off Kochi and Kagoshima in August. The number is given by 10°square based on the noon position of the vessels. Species code: Br = Bryde's, MiC = common minke, F=fin, Se=sei and Sp = sperm whale.

10° square	Distance (n.miles)	Number of whales sighted					
		Br	•	Se	MiC	Sp	
L 24	251	-	-	-	-	-	
25	646	1	-	-	-	20	
26	423	3	-	-	-	13	
27	669	5	-	-	-	80	
M 19	135	-	-	-	1	-	
20	2,079	45	-	2	14	4	
21	1,702	5	-	-	-	56	
22	951	9	-	-	-	79	
23	321	4	-	-	-	6	
24	433	3	-	-	-	-	
25	1,103	15	-	-	-	33	
26	522	6	-	1	-	6	
27	625	1	-	-	-	31	
N 20	825	-	9	-	41	-	
21	386	-	-	-	8	-	
26	122	-	1	-	-	2	
	11,193	97	10	3	64	330	

The NRIFS and ICR supported to conduct the sighting survey with the Guinean scientists in coastal waters from Guinea to Senegal, western North Africa, from 7 to 20 December 2002, using the research vessel "ITAF DEME" of Senegal. Scientists of other 5 countries of western Africa (Cap Verde, Senegal, Guinea Bissau, Benin, and Gabon) were also on board and they search cetaceans from the upper deck of the vessel. H. Yoshida (NRIFS) joined to coordinate the survey. A total of 901.6nm track line was searched and all the 71 schools of cetaceans including 3 of the sperm whale (6 animals) and 1 of the Bryde's whale (1 animal) were detected. These sightings are not included in Table 3. It is expected that cruise reports of this survey will be submitted by respective countries through appropriate way.

2.1.2 Opportunistic, platforms of opportunity

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

Table 4. Large cetacean sighted by Japanese dedicated sighting surveys (Kurosaki, Kanou-maru and transit cruises of the SOWER by Shonan-maru and Shonan-maru No.2) in the North Pacific in 2002/2003 autumn-winter season (November 2002-March 2003). Species code; Br=Bryde's, F=fin, H= humpback, Sp=sperm.

10• square	Distance (n.miles)	Number of whales sighted			
		Br	F	H	Sp
G 22	203	-	-	-	-
23	298	-	-	-	-
H 22	511	12	-	-	28
23	659	17	-	-	-
J 21	144	-	-	-	-
22	343	4	-	-	6
23	37	-	-	-	-
K 20	64	-	-	-	-
21	45	-	-	-	-
L 20	235	-	-	-	-
21	441	4	-	26	7
M 19	378	-	-	-	-
21	1,097	-	1	-	122
Total	4,455	37	1	26	163

2.2 Analyses/development of techniques

Kato and his coworkers further developed on ID-keys to discriminate sub-species of blue whales from the shipboard survey documented by SC/54/IA8 in which authors conclude nose-whole type (classified three types based on relative position of anterior tip of bristles and central groove) and the relative body proportion (so called *tadpole* or *torpedo* shape) are promising key to discriminate two sub-species of blue whales during shipboard or aerial sighting survey. This was also endorsed by Scientific Committee at 54th meeting. They now completed their analyses and it will be available in some journal in near future.

Okamura and co-workers improved a hazard probability model for estimating abundance of Antarctic minke whales. It includes correction of school size bias. The method was applied to some of IDCR/SOWER data set on Antarctic minke whales so that it seemed to be promising.

Shimada and J. Takei (University of Nihon) modified photogrammetric system for measurement of whale body length using laser device, digital angle meter and digital video camera. After experiments to calibrate its accuracy using some targets known length, they tried to estimate length of sperm whales and Bryde's whales from top barrel on *Shunyo-maru*, *Shonan-maru* and *Kano-maru*.

Shimada, and H. Murase (ICR) analyzed relationship between distribution of minke whales and Antarctic sea ice coverage in the austral summer using metrological satellite data for 2nd and 3rd IDCR/SOWER circumpolar survey in Area IV. Un-surveyed area in waters south of the ice-edge line was recalculated. They suggested large proportion of minke whales penetrated into the pack ice region.

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) and 36 Bryde's whales (Kasasa) have been individually identified by mainly shape of dorsal fin, which has been deposited in NRIFS under the cooperative program. Kishiro and co-workers continued to examine these data with respect to the relationship between areas and re-sighting.

3.1.2 Artificial marking

Minamikawa and Iwasaki have been developing the system of attaching archival tags and satellite tags on the large cetaceans using air guns. It will have a longer range than a crossbow and enable to attach the device to cetaceans which are difficult to approach.

Minamikawa and coworkers attached data-loggers recording depth and swim speed to three sperm whales and succeeded in retrieving from two animals. One was in the water near Bousou peninsula in July and the other was North Pacific sea in October. Dive parameters such as dive depth, dive duration, surface intervals of each dives were calculated and they will be used for precise estimation of $g(0)$.

3. 2 Analyses/development of techniques

Kishiro and K. Ohata (Kasasa Ebisu Maritime Museum, Kagoshima) further examined the natural marking data (photographs of dorsal fin) of the coastal Bryde's whales off Kochi and Kasasa deposited in 1998 to 2002, and confirmed that re-sighting rate of individually identified whales between 2001 and 2002 in the same areas were 28.6% for Kochi and 50.0% for Kasasa, respectively.

Minamikawa, Kishiro and Iwasaki developed the data logger system for large cetaceans. Loggers were attached by hand harpoon and detached by a plaster joint, which is expected to be melted away after 12-24h. Actually it took 9.5 h until release. And loggers with radio transmitter were retrieved using direction finder.

4. Tissue/biological samples collected

4.1 Biopsy samples

Skin biopsy was conducted at an opportunistic base during the sighting survey cruises in the North/South Pacific and the Southern Hemisphere as mentioned in Section 2.1.1. Furthermore, one biopsy/marketing cruise was conducted, in which Iwasaki, Minamikawa, S. Noji (Temporary technical staff (TS)/ NRIFS), H. Sato (TS/NRIFS), Y. Tanaka (TS/NRIFS) and A. Ryono (TS/NRIFS) were on board *Kurosaki* sailing off the Pacific coast of the Main Island of Japan from

16 October to 28 November 2002 (the ship also conducted line transect sighting survey along the predetermined track line). All of biopsy samples collected during the cruises is listed in Table 5.

Table 5. Large cetacean biopsy samples collected through Japanese research, May 2002 – March 2003. In addition, some samples were obtained through JARPA and JARPNII as referred in 55/SC/O5.

Species	Area	No. collected	Archived (Y/N)	No. analyzed	Total holdings	Contact Institute
Blue whale (true)*	Antarctic	4	Y	0	4	NRIFS
Bryde's whale	N.Pacific	1	Y	0	1	NRIFS
Bryde's whale	S. Pacific	3	Y	0	3	NRIFS
Common Minke whale	Sea of Japan	1	Y	0	1	NRIFS
Fin whale	Sea of Japan	2	Y	0	2	NRIFS
Sperm whale	Antarctic	1	Y	0	1	NRIFS

*) provisional subspecies ID based on morphological feature

4.2 Samples from direct catches or bycatch

As detailed in Table 7, under the scientific permits, 440 Antarctic minke whales were taken in the Antarctic (under the 2002/03 JARPA program) and 100 common minke whales, 50 Bryde's whales, 39 sei whales and 5 sperm whales in the western North Pacific (under the 2003 JARPN II program, offshore components) respectively. In addition, 50 minke whales were separately caught under coastal component of the JARPN II program as below. Extensive biological materials were collected from the sampled whales. Details of such materials are described in the cruise reports (SC/55/O6, O7, O8) and the progress report of the ICR, Tokyo (SC/55/O5).

NRIFS took charge to conduct scientific work of coastal component of the program, then Kato, Kishiro, Ohizumi, Yoshida and their colleagues joined the scientific operation there. Under the coastal program, the sampling of 50 minke whales in the coastal areas by small-type whaling catcher boats was planned to cover the temporal and spatial gap of the research, and to check the logistic feasibility in the first two years (2002 and 2003). The first survey was conducted from 10 September to 12 October 2002 in the coastal waters off Kushiro, northeast Japan (northern part of the sub-area 7; 43N-144.30E), using three small-type whaling catcher boats. The whale sampling was conducted in the coastal waters within the 30-50 nautical miles from the Kushiro port, and all whales sampled were landed on the land station in the Kushiro port for biological research. During the period, a total of 3,522.8 n. miles (330.4 hours) was surveyed for whale sampling, 171 schools/ 177 individuals of minke whales were sighted and 50 minke whales (32 males, 18 females) were sampled. Major prey species found in the forestomach contents were Japanese anchovy *Engraulis japonicus*, walleye pollock *Theragra chalcogramma*, Pacific saury *Cololabis saira*, Japanese common squid *Todarodes pacificus* and Krill. Dedicated sighting survey was also conducted in waters off Kushiro by *R/V Kyoshin-maru* #2 and a total of 56 common minke was sighted during her 681.5 effective searching distance. Further details are given in SC/55/O8.

4.3 Prey survey for special permit program

The full-scale JARPN II started in 2002 after the successful two-year feasibility study. S. Kawahara (NRIFS) acted as one of seniors for the planning of the project. One of the main

objectives was to estimate the prey preference of cetaceans. The method to estimate the prey preference is almost the same as in the feasibility study. The concurrent whale and prey surveys were conducted in the offshore area in the western North Pacific. The whale survey was conducted by Nisshin-maru with three sighting/sampling vessels and one dedicated sighting vessel as in the past (see SC/55/O7). A new vessel belonging to the Fisheries Research Center, *Shunyo-maru* (887GT), joined to the prey survey. She is a trawler-type research vessel with a sophisticated acoustic device (EK60). Kawahara organized the cruise as cruise leader, K. Uchikawa (Oceanic squid section, NRIFS), H. Murase (ICR) and M. Ichihara (Hokkaido University) joined the prey survey. The survey consisted of two terms, the first from 14 to 30 July and the second from 1 to 12 August. The survey were conducted in two blocks, a block of 40°00'–45°30'N and 156°00'–159°00'E in the first term, the other of 38°00'–41°00'N and 144°00'–147°00'E in the second term. The species and size compositions of echoes on EK60 were identified with the samples taken by mid-water trawl net (mouth opening: 30mx30m), Isaacs-kidd Midwater Trawl (IKMT) and Bongo nets. Trawl operations at pre-determined stations were also made for the prey species that are unsuitable to the acoustic survey. The oceanographic data were collected with CTD on board *Shunyo-maru*. In the first term, information on abundance and distribution of Japanese anchovy, Pacific saury, krills, copepods found in the stomachs of minke whales and/or sei whales sampled was obtained. In the second term, prey species of Bryde's whales were investigated. Japanese anchovy and krills were dominant and the distribution of each prey reflected the oceanographic conditions. Further details are given in Appendix 1 of the SC/55/O7.

Concurrently with the coastal components of the JARPN II whale survey, prey survey was conducted by *Kaiyo-maru* # 3 (473.65GT). Kawahara acted as cruise leader of prey survey and K. Kiwada (ICR) joined as senior scientist. One of the major objectives was to estimate the prey preference of cetaceans as in the case of the offshore survey. *Kaiyo-maru* #3 is a trawler-type research vessel with a sophisticated acoustic device (EK500). The survey area was from Cape Erimo (143°15'E) to Cape Nosappu (about 146°00'E) at 41°00'N and the north of the latitude, excluding the waters shallower than 50m in the coastal zone. Zigzag track lines were set to cover the whole survey area. The prey survey consisted of three terms, the first from 10 to 20 Sep., the second from 20 to 30 Sep. and the third from 30 Sep. to 5 Oct. The species and size compositions of echoes on EK500 were identified with the samples taken by mid-water trawl net (mouth opening: 30mx30m) and Isaacs-kidd Midwater Trawl (IKMT). Another type of trawl survey was conducted at pre-determined stations mainly for Pacific saury and common squid that are unsuitable to the acoustic survey. The oceanographic data were collected with CTD on board *Kyoshin Maru* #2. Further details are given in Appendix 1 and 2 of SC/55/O8

4.4 Samples from stranded animals

Kato and R. Zenitani (ICR), in cooperation with T. Sueyoshi (Miyazaki Prefectural Museum of Nature and History) made skeletal measurements of a gray whale found from Miyazaki beach in March 2002. Several tissues of stranded minke whales and other whales were collected by ICR and the details are given in the ICR progress report (SC/55/O5). Hara and H. Sato examined a sperm whale stranded in Wakayama and collected tooth and skin samples.

4.5 Analyses/development of techniques

Kato, in cooperation with Zenitani (ICR) and T. Bando (ICR), examined baleen plates of 215 Antarctic minke whales collected 2000/01 and 2001/02 JARPA operations respectively. Kishiro and Kato examined reproductive status of 32 male and 18 female common minke whales collected

under coastal survey program of the 2002 JARPN II. Yoshida examined *mtDNA* control region sequence of 12 sperm whales stranded on the Ohura beach of Kagoshima in March 2002.

5. Pollution studies

ICR conducted further pollution study under the leadership of Y. Fujise (ICR), and results are summarized in SC/55/O5.

6. Statistics for large cetaceans

6.1 Direct catches

The government of Japan issued the Institute of Cetacean Research, Tokyo (ICR) permits to take Southern Hemisphere minke whales of no more than 440 individuals for 2002/03 JARPA. (Special permit research program in the Antarctic, based on Article 8 of ICWR). In addition, the government also issued the sampling limits of 150 minke whales (including 50 minke whales for coastal program), 50 Bryde's whales, 50 sei whales and 10 sperm whales in the North Pacific for research purpose under the 2002 JARPN II (Special permit research program in the western North Pacific, based on Article 8 of ICWR).

Under the scientific permits, 440 minke whales were taken in the Antarctic (under JARPA program) and 150 minke whales, 50 Bryde's whales, 39 sei whales and 5 sperm whales in the western North Pacific (under JARPN II program), respectively (Table 6). Extensive biological materials were collected from the sampled whales. Details of such materials are described in the cruise reports (SC/55/O6, O7, O8) and the progress report of the ICR (SC/55/O5).

Table 6. Direct catch of large cetaceans by Japan, May 2002-March 2003.

Species	Type of catch	Area/stock	Male	Female	Total holdings
Antarctic minke whale	Special permit	Antarctic	235	205	440
Common minke whale	Special permit	N. Pacific	117	33	150
Sei whale	Special permit	N. Pacific	15	24	39
Bryde's whale	Special permit	N. Pacific	25	25	50
Sperm whale	Special permit	N. Pacific	2	3	5

6.2 Other non-natural mortality for the calendar year 2002

All of information relevant to this item is given in Tables 7 and 8.

Table 7. Other non-natural mortality of large cetaceans (bycatch) by Japanese fisheries, by Prefecture in January-December 2002. Species and figures are based on reports of prefecture governments to the Fisheries Agency which are reports from individual fishermen or fishery cooperative unions (provisional figures).

Species	Prefecture ¹⁾	Type of fishery	No. of individuals
Minke whale	Hokkaido	Trap net	16
	Aomori	Trap net	5
	Iwate	Trap net	13
	Miyagi	Trap net	4
	Chiba	Trap net	4
	Toyama	Trap net	6

Table 7 cont.

SC/55/ProgRep. Japan

Species	Prefecture	Type of Fishery	No. of individuals
Humpback whale	Ishikawa	Trap net	18
	Fukui	Trap net	4
	Kyoto	Trap net	7
	Wakayama	Trap net	3
	Shimane	Trap net	3
	Yamaguchi	Trap net	2
	Tokushima	Trap net	1
	Kochi	Trap net	9
	Nagasaki	Trap net	9
	Miyazaki	Trap net	2
	Kagoshima	Trap net	3
	Total		109
	Chiba	Trap net	1
	Kyoto	Trap net	1
	Kagoshima	Trap net	1
	Total		3
Total			112

1) Recorded to the place where fishing gears are registered.

Table 8. Summary of large cetacean bycatch and strandings in January – December 2001, by species and type of fisheries. For further details see Tables 7 and 9. [I]= incidental take. (provisional figures).

Species	Trap net [I]	Strandings	Total
Minke whale	109	7	116
Bryde's whale	0	1	1
Fin whale	0	2	2
Humpback whale	3	1	4
Right whale	0	1	1
Sperm whale	0	22	22
Total	112	34	146

7. Stranding

Information of stranded cetaceans has been officially collected by the Far Seas Fisheries Division of the FAJ, 1-2-1, Kasumigaseki, Tokyo 100, Japan. The information is summarized in Tables 9. NRIFS assisted FAJ to compiling the data and necessary sampling. In addition, the Institute of Cetacean Research, Tokyo Suisan Building, 4-18 Toyomi, Chuo-ku, Tokyo 104, Japan and T. Yamada (National Science Museum; Hyakunin-cho, Shinjuku-ku, Tokyo 164, Japan) voluntarily collected relevant information of the stranding.

Table 9. Large cetacean strandings in Japan, January - December 2002. Species and figures are based on reports of prefecture governments from the Fisheries Agency which are reports of individual fishermen, fishery cooperative unions, or the general public (provisional figures)

Species	Prefecture	No. of individuals
Minke whale	Hokkaido	5
	Aomori	1
	Fukushima	1
	Total	7
Bryde's whale	Miyagi	1
Fin whale	Mie	1
	Kagawa	1
	Total	2
Humpback whale	Ibaraki	1
Right whale	Tokyo	1
Sperm whale	Hokkaido	3
	Tokyo	1
	Chiba	4
	Wakayama	1
	Kagoshima	13²⁾
	Total	22
Total		34

1) The prefecture where strandings occurred.

2) Another sperm whale was stranded and released alive.

8. Other studies and analyses

Kawahara and his co-workers are developing a Multispec-type model for the future multi-species management, using additional data provided by the researchers responsible to the management of domestic fisheries resources.

Shimada and Takei conducted again a tentative cruise to detect locations and estimated body length of sperm whales under water using a passive sonar and hydrophone system on *Shunyo-maru* (887GT).

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

Fujise, Y., Tamura, T., Ohizumi, H., Kishiro, T., Konishi, K. and Kato, H. 2003. Feeding habits and its change of the western North Pacific minke whales. Abstracts for annual meeting of the Japanese Society of Fisheries Science. (in Japanese)

Hiramatsu, K. and Okamura, H. 2002. Evaluation of bootstrap confidence intervals under the small sample size. Abstract for the annual meeting of the Japanese Society of Fisheries Science p21 Nara, April 2002

Iwasaki, T. 2002. It took six years to take the first class licenses for radio operator. *Denpa-jukenkai* 50 (9) p12-17 September 2002

Iwasaki, T. 2002. To advance from "sampling" to "attaching". *Enyo* 111 p12-13 (in Japanese)

Iwasaki, T. 2003. Surfacing time budget of the bottlenose dolphin. Abstract for International Symposium on Bio-logging Science, Tokyo p33-34 March 2003

Iwasaki, T. 2003. Dall's porpoise. 230-234. In: *Current status of the international fishery resources*. 330pp. Fisheries Agency of Japan and Fisheries Research Agency of Japan. Tokyo. Yokohama. (in Japanese)

Iwasaki, T. 2003. Japan progress report on small cetacean researches, June 2001 to April 2002. <http://www.jfa.maff.go.jp/whale/document/2001progressreport.pdf>

- Iwasaki, T., Kohyama, K., Suzuki, N., Maejima, K., Kato, H. and Morishita, J. 2002. Effect of satellite tag attachment on blood characteristics of the bottlenose dolphin (*Tursiops truncatus*) Abstract for 8th Conference of Society for wildlife medicine p77 (in Japanese)
- Iwasaki, T., Tsutsui, M., Onodera, K., Goto, T. and Nonaka, K. 2002. Biology of Dall's porpoise, the results of research on commercial catch. Abstract for the presentation of the research results on Dall's porpoise stocks harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. p8-9. (in Japanese)
- Iwasaki, T., Tsutsui, M., Onodera, K., Goto, T., Takasugi, S. and Nonaka, K. 2003. Biology of Dall's porpoise, the results of research on commercial catch. (In: *Biology and stock of Dall's porpoise in the western North Pacific*, National Research Institute of Far Seas Fisheries, 26pp) p11-13 (in Japanese, with English summary)
- Kanda, N., Goto, M., Kato, H., Pastene, L. 2004. Genetic stock structure of Bryde's whale based on micro-satellite DNA (459). p89. Abstract for annual meeting of the Japanese Society of Fisheries Science. (in Japanese)
- Kato, H. 2002. Surprising behavior of sperm whales. Abstract. 10 years anniversary symposium of Yamada Town Museum of Whales and Oceans. July 2002 (in Japanese).
- Kato, H. 2002. Cetaceans. *Newton* 22(11) :24-55 October 2002 (in Japanese)
- Kato, H. 2002. Acoustic hunting by sperm whale. *Newton* (Special volume November 2002):54-55. (in Japanese)
- Kato, H. 2002. Cetaceans. *Newton*(Special volume November 2002):118-147. (in Japanese)
- Kato, H. 2002. Biology and its diversity of Cetaceans. *NSUGAF* 69(2):248-9. (in Japanese)
- Kato, H. 2002. Overview on current small cetacean stock studies and a dispute over the international interaction on small cetacean fisheries. Abstract for the presentation of the research results on Dall's porpoise stocks harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. p3-4 (in Japanese)
- Kato, H. 2002. Overview of Cetacean researches in Japan. Abstract. Joint Symposium of FRA, Kagoshima University and Kagoshima City Aquarium for cetacean survey. Kagoshima December 2002 (in Japanese)
- Kato, H. 2002. Mass Stranding of sperm whales occurred in Ohura, Kagoshima, in February 2002. Abstract. Joint Symposium of FRA, Kagoshima University and Kagoshima City Aquarium for cetacean survey. Kagoshima December 2002 (in Japanese)
- Kato, H. 2002. Life history and mass stranding of sperm whales. Abstract. Memorial symposium of sperm whale mass stranding in Ohura town in February 2002. Ohura town, Kagoshima. February 2003 (in Japanese)
- Kato, H. 2002. Report of the 54th IWC meeting in Shimonoseki. *Newsletter of Fisheries Research Agency of Japan*. 3:20-23 (in Japanese)
- Kato, H. 2003. Overview on current small cetacean stock studies and a dispute over the international interaction on small cetacean fisheries. p4-6. (In: *Biology and stock and of Dall's porpoise in the western North Pacific*, National Research Institute of Far Sea Fisheries, 26pp) (in Japanese, with English summary)
- Kato, H. 2003. Blue whales. 257-259. In: *Current status of the international fishery resources*. 330pp. Fisheries Agency of Japan and Fisheries Research Agency of Japan. Tokyo. Yokohama. (in Japanese)
- Kato, H. 2003. Overview on Current Cetacean Research Activities in Japan. Abstract for the Korea-Japan Symposium on Cetacean Research, Pusan, Korea. p2. Pusan, February 2003
- Kato, H. 2003. Cetacean surveys in the Hoppou Yontou (southern Kril Islands). Abstract. The Hoppou Yontou Symposium. Sapporo, March 2003 (in Japanese)
- Kato, H. and Kasuya, T. 2002. Some analyses on the modern whaling catch history of the western North Pacific stock of gray whales (*Eschrichtius robustus*), with special reference to the Ulsan whaling ground1. *J. Cetacean Res. Manage.* 4(3):277-282

- Kato, H. and Fujise, Y. 2003. Antarctic minke whales. pp244-249. In: *Current status of the international fishery resources*. 330pp. Fisheries Agency of Japan and Fisheries Research Agency of Japan. Tokyo. Yokohama. (in Japanese)
- Kishiro, T. 2002. Migration route of Bryde's whales in the coastal waters – the relationship between the waters off Kochi and Nomaie. Abstract for the joint lecture meeting of the Fisheries Research Agency, Kagoshima University and Kagoshima Aquarium. Kagoshima, December 15. p3.
- Kishiro, T. 2003. Baird's beaked whale. 235-238. In: *Current status of the international fishery resources*. 330pp. Fisheries Agency of Japan and Fisheries Research Agency of Japan. Tokyo. Yokohama. (in Japanese)
- Minamikawa, S. 2002. How different is the effect of buoyancy on optimal descent speed among the diving animals? Abstracts of XXV Symposium on Polar Biology, p57, Tokyo, December 2002
- Minamikawa, S. 2003. How is descent speed of diving animals determined? *Science Journal KAGAKU* 73 (1) p54-55
- Minamikawa, S., Iwasaki, T., Tanaka, Y., Ryono, A., Noji, S., Sato, H., Kurosawa, S. and Kato, H. 2003. Diurnal pattern of diving behavior in striped dolphins, *Stenella coeruleoalba* Abstract for International Symposium on Bio-logging Science p33 Tokyo, March 2003
- Minamikawa, S., Shaughnessy, P., Gale, N. and Naito, Y. 2003. Foraging dives of Australian sea lions: Theoretical prediction of swimming speed and predictability of target depth. Abstracts for the International symposium on bio-logging science, p34 Tokyo, March 2003
- Minamikawa, S. 2003. How different is the effect of buoyancy on optimal descent speed among the diving animals? Abstracts for the International symposium on bio-logging science, p49, Tokyo, March 2003
- Miyashita, T. 2002. How to identify the cetacean species. Symposium on Cetacean Research Activity during the public open of R/V Kurosaki. Yamada, August 2002 (in Japanese).
- Miyashita, T. 2002. Current situation of Dall's porpoise stocks -results of sighting surveys- Abstract for the presentation of the research results on Dall's porpoise stocks) harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. p5-7 (in Japanese)
- Miyashita, T. 2003. Current situation of Dall's porpoise stocks -results of sighting surveys- p7-10. (In: *Biology and stock and of Dall's porpoise in the western North Pacific*, National Research Institute of Far Sea Fisheries, 26pp) (in Japanese, with English summary)
- Miyashita, T. 2003. Results and plan of Japan-Korea joint sighting survey – Japanese vessel in 2002 and 2003 -. Abstract for the Korea-Japan Symposium on Cetacean Research, Busan, Korea. p8-11. Busan, February 2003.
- Miyashita, T., Furuta, M., Hasegawa, S. and Okamura, H. 2002. Sighting surveys for finless porpoises in the Ise Bay and the Mikawa Bay. Abstract for the Symposium on ecology and conservation of finless porpoises, Tokyo University, p13, Tokyo, Japan, November 2002 (in Japanese).
- Ohizumi, H. 2002 Dietary studies of toothed whales: A review of technical issues and new topics. *Fisheries Science* 68 (1) p264-267.
- Ohizumi, H. 2002. Stomach contents of Dall's porpoises. Abstract for the presentation of the research results on Dall's porpoise stocks harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. p13-14 (in Japanese)
- Ohizumi, H. 2002. Process and techniques of stomach content analysis for fine scale dietary study of toothed whales. *Aquabiology*. 139. p161-165. (in Japanese)
- Ohizumi, H. 2002. Dietary studies of toothed whales: A review of technical issues and new topics. *Fisheries Science*, 68, supplement I: p264-267.
- Ohizumi, H., Isoda, T., Kishiro, T., and Kato, H. 2002. Feeding habits of Baird's beaked whale, *Berardius bairdii*, in the western North Pacific and Sea of Okhotsk off Japan. Abstracts for annual meeting of the Japanese Society of Fisheries Science. p68. (in Japanese)
- Ohizumi, H., Isoda, T., Kishiro, T., and Kato, H. 2003. Feeding habits of Baird's beaked whale, *Berardius bairdii*, in the western North Pacific and Sea of Okhotsk off Japan. *Fisheries Science*. 69, p11-20.
- Ohizumi, H. and Kato, H. 2003. Stomach contents of Dall's porpoises. Abstract for the presentation of the research results on Dall's porpoise stocks harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. (in Japanese)

- Ohizumi, H. and Kato, H. 2003. Stomach contents of Dall's porpoises. (In: *Biology and stock and of Dall's porpoise in the western North Pacific*, National Research Institute of Far Seas Fisheries, 26pp) p18-21. (in Japanese, with English summary)
- Okamura, H. 2002. Toward the scientific management of Dall's porpoise. Abstract for the presentation of the research results on Dall's porpoise stocks harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. P22-26. (in Japanese)
- Okamura, H. 2003. Toward the scientific management of Dall's porpoise. p22-26. (In: *Biology and stock and of Dall's porpoise in the western North Pacific*, National Research Institute of Far Sea Fisheries, 26pp) (in Japanese, with English summary)
- Okamura, H. and Matsuda, H. 2002. Sustainable management of biological population. Ecosystem and Simulation Asakura-syoten Tokyo p46-61 (in Japanese)
- Okamura, H. and Hiramatsu, K. 2002. Sustainable management of biological population. Abstract for the annual meeting of the Japanese Society of Fisheries Science p21 Nara, April 2002 (in Japanese)
- Okamura, H. 2002. Planning abundance estimation surveys when detectability is <1.0 (T.D.Drummer) (Translation) p34-43 In: Shirakihara, K., Okamura, H., and Kasamatsu F. (Supervisor of translation), Marine mammal Survey and Assessment Methods, Library of The institute of cetacean research 9, The institute of cetacean research, Tokyo, September 2002 (in Japanese)
- Okamura, H. 2002. How to count whales in the sea. Symposium on Cetacean Research Activity during the public open of R/V Kurosaki. Yamada, August 2002 (in Japanese).
- Okamura, H. 2002. Application of Ecopath/Ecosim to the Tohoku area in Japan. Multispecies Management Feasibility Study Workshop December 19th-20th, 2002 Minami Aoyama Kaikan
- Okamura, H., Yatsu, A. and Hiramatsu, K. 2002 Fisheries management based on ecosystem models - A case study using Ecopath and Ecosim -. Proceedings of International Commemorative symposium 70th anniversary of the Japanese society of Fisheries Science 68(1) p154-157
- Okamura, H. and Miyasita, T. 2003. Common minke whales. pp239-243. In: *Current status of the international fishery resources*. 330pp. Fisheries Agency of Japan and Fisheries Research Agency of Japan. Tokyo. Yokohama. (in Japanese)
- Sakakibara, M., Ohizumi, H., Iwasaki, T. and Sakurai, Y. 2002. Study on food habit of Dall's porpoise, *Phocoenoides dalli* in the Sea of Japan off the western Hokkaido in the spring season. Abstract for 40th anniversary conference of the Japanese society for fisheries oceanography p190-191 (in Japanese)
- Shimada, H. 2002 The objective identification of duplicate sightings in aerial survey for porpoise (L.Hiby) (Translation) p134-147 In: Shirakihara, K., Okamura, H. and Kasamatsu F. (Supervisor of translation), Marine mammal Survey and Assessment Methods, Library of The institute of cetacean research 9, The institute of cetacean research, Tokyo, September 2002 (in Japanese)
- Shimada, H. and Miyashita, T. 2003. Bryde's whales. 250-256. In: *Current status of the international fishery resources*. 330pp, Fisheries Agency of Japan and Fisheries Research Agency of Japan. Tokyo. Yokohama. (in Japanese)
- Yoshida, H. 2002 Distance sampling with independent observers: Reducing bias from heterogeneity by weakening the conditional independence assumption (J.Laake) (Translation) 95-111 In: Shirakihara, K., Okamura, H., and Kasamatsu F. (Supervisor of translation), Marine mammal Survey and Assessment Methods, Library of The institute of cetacean research 9, The institute of cetacean research, Tokyo, September 2002
- Yoshida, H. 2002 Population structure of finless porpoise (*Neophocaena phocaenoides*) in coastal waters of Japan, *The Raffels Bulletin of Zoology, Supplement* 10. p35-42
- Yoshida, H., 2002 Aerial sighting survey using aircraft to estimate cetacean abundance-A case study for finless porpoises- *Aquabiology* 24 (4):335-340 (in Japanese with English summary)
- Yoshida, H. 2002. Stock structure of finless porpoises in Japanese waters based on mitochondrial DNA sequence analysis. Abstract for the Symposium on ecology and conservation of finless porpoises, Tokyo University, p1, Tokyo, Japan, November 2002 (in Japanese)

- Yoshida, H. 2002. Stock structure of Dall's porpoises (*phocoenoidesdalli*) ion coastal waters of Japan based on mitochondrial DNA sequences analyses. Abstract for the presentation of the research results on Dall's porpoise stocks harvested by the harpoon fishery in Iwate Prefecture, November 27, 2002, Kamaishi, Iwate, Japan. P10-12.(in Japanese)
- Yoshida, H. 2003. Stock structure of Dall's porpoises (*phocoenoidesdalli*) ion coastal waters of Japan based on mitochondrial DNA sequences analyses. p14-17. (In: Biology and stock and of Dall's porpoise in the western North Pacific, National Research Institute of Far Sea Fisheries, 26pp) (in Japanese, with English summary)
- Yoshida, H. 2003 Studies on Stock Structure of Finless Porpoises in Japanese Waters and recent works. Abstract for the Korea-Japan Symposium on Cetacean Research, Pusan, Korea. p16-18 Pusan, February 2003 (in Japanese)
- Zenitani, R., Fujise, Y., Bando, T., Kishiro, T. and Kato, H. 2003 Segregation of the western North Pacific minke whales (448). p86. Abstract for annual meeting of the Japanese Society of Fisheries Science. (in Japanese)