Japan. Progress report on cetacean research, May 2006 to March 2007, with statistical data for the *calendar year* 2006 or the season 2006/07

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This report summarises information obtained from the following organizations.

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NATIONAL RESEARCH INSTITUTE OF FAR SEAS FISHERIES (NRIFSF)

1. SPECIES AND STOCKS STUDIED

IWC Common name	Scientific name	Area/stock(s)	Items referred to
Blue whale	*Balaenoptera musculus*	Southern Hemisphere, North Pacific	2.1.1
Fin whale	*B. physalus*	North Pacific, Southern Hemisphere.	2.1.1, 2.2, 4.1, 7
Sei whale	*B. borealis*	North Pacific, Southern Hemisphere	4.2, 6.3.2
Common minke whale	*B. acutorostrata*	North Pacific, Sea of Japan	2.1.1, 4.2, 6.3.2, 7,
Antarctic minke whale	*B. bonaerensis*	Southern Hemisphere	2.1.1
Bryde's whale	*B. edeni*	North Pacific, coastal waters off Kochi and off Kasasa (south west Japan), North Atlantic off Africa, Southern Hemisphere	2.1.1, 3.1.1, 3.1.3, 3.2, 7
Humpback whale	*Megaptera novaeangliae*	North Pacific, Southern Hemisphere	2.1.1, 3.1.1, 4.1, 6.3.2, 7
Sperm whale	*Physeter macrocephalus*	North Pacific off Ogasawara Is., South Pacific, North Atlantic off Africa, Southern Hemisphere	2.1.1, 6.3.2, 7

2. SIGHTINGS DATA

2.1 Field work

2.1.1 Systematic

The NRIFSF and Fisheries Agency of the Government of Japan (FAJ) conducted a total of eight dedicated shipboard sighting surveys using research vessels and one sighting survey using airplane in the North Pacific, in cooperation with other scientific organizations such as ICR. All of the vessels are equipped with a top barrel.

The Russian Federation granted the permission to survey in its EEZ in the northern Sea of Japan, and the IO passing mode sighting survey was conducted in spring 2006 using the research vessel *Kaiko-maru.* (see SC/59/NPM3).

The IWC/SOWER (Southern Ocean Whale and Ecosystem Research) Antarctic sighting cruise was conducted in the western part of Area III from 21 December 2006 to 23 February 2007. The Government of Japan offered a research vessel (*Shonan-maru No.2*) as in the past. The main objectives were to: (1) carry out a series of survey experiments designed to improve and interpret estimates of Antarctic minke whale abundance from previous cruises; (2) undertake fin whales research in waters north of 60°S, involving a sighting survey and biopsy skin sampling; (3) continue research on blue whales; and (4) continue research on humpback whales. The study for fin whale research was conducted in the area bounded by latitudes 55°00'S and 61°00'S and longitudes 000°00' and 005°00'E for seven days. Research on Antarctic minke and blue whales was conducted in the vicinity of the ice edge for 41 days. Paul Ensor (cruise leader, New Zealand), Kazuki Fukutome (Japan), Paula Olson (USA) and Isabel Beasley (New Zealand) participated in the survey as scientists. The details of the cruise and results are reported as Document SC/59/IA1.

During the sighting surveys in the North Pacific, the following provisional numbers of sightings of large cetaceans were obtained:

Target species	Date	Area	No. of sightings	Contact person/institute and references
Fin whale	18-28/06/06	Sea of Japan	14	T. Miyashita (NRIFSF), SC/59/NPM3
	21/07/06-13/10/06	Western North Pacific	1	H. Shimada (NRIFSF)
Bryde's whale	21/07/06-13/10/06	Western North Pacific	3	H. Shimada
Humpback whale	18-28/06/06	Sea of Japan	2	T.Miyashita, SC/59/NPM3
Common minke whale	18-28/06/06	Sea of Japan	59	T.Miyashita, SC/59/NPM3
	21/07/06-13/10/06	Western North Pacific	5	H. Shimada
Sperm whale	21/07/06-13/10/06	Western North Pacific	67	H. Shimada
	18-28/03/07	Western North Pacific	4	H. Shimada

A sighting survey using passing mode was conducted under the 48th Japanese Antarctic Research Expedition (JARE48) in the austral summer season 2006/2007. The objective of the survey was to explore the Antarctic minke whales distribution density within the pack ice. The primary observers and the researcher used binoculars with reticules and angle board. During the sighting survey, ice information was monitored using an automated system.

In cooperation with Kochi Prefecture Government and the Whale Watching Association in Tosa Bay (WATB), the NRIFSF conducted a sighting surveys on Bryde's whales in the coastal waters off Kochi in July and August 2006, using a total of 30 whale watching boats belong to the WATB. The survey lasted ten days in July and August, and T. Kishiro (NRIFSF), nine research assistants and 30 fishermen members of WATB acted as the researchers on board. A total of 16 schools (18 individuals) of Bryde's whales were sighted in July and 14 schools (17 individuals) in August.

Aerial sighting surveys using small airplanes (Cessna 172P) were conducted to obtain further information on distribution and abundance of cetaceans inhabiting central and eastern part of Inland Sea, Japan. Yoshida (NRIFSF) and Minamikawa (NRIFSF) carried out the surveys under collaboration with Miyajima Public Aquarium. N. Ogawa (TUMST) also joined the survey. Surveys were conducted on 4 days with good weather condition in a period from 29 November to 5 December. During the flight of 987.6 n. miles, no sightings of large cetaceans were recorded.

2.1.2 Opportunistic, platforms of opportunity
Opportunistic sighting data have been collected during operations of the Small Type Whaling and dolphin fisheries. The results will be released on the website of FAJ/MAFF/GJPN.

2.2 Analyses/development of techniques
Okamura (NRIFSF) and Kitakado (TUMST) conducted some simulation tests in relation to IDCR/SOWER sighting data (see SC/59/IA15). The simulation results showed that the model used is robust.
Shimada (NRIFSF) and his colleagues re-analyzed the sighting data for Bryde's whales in the western North Pacific to get information on abundance required for RMP/IST (see SC/59/PFI3).

Using the sighting data collected in the Okhotsk Sea, abundance of fin whales was estimated by the line transect method and the relationship between the distribution and the environmental factors was examined (Kato *et al*., 2007).

3. MARKING DATA

3.1 Field work

3.1.1 Natural marking data

Species	Feature	Area/stock	No. photo-id'd	Catalogue (Y/N)	Catalogue total	Contact person/institute; refs
Humpback whale	Tail back	Sea of Japan	1	Y	31 including off the Kamchatka Peninsula	T.Miyashita /NRIFSF
Bryde's whales	Dorsal fin	Kochi/ East China Sea stock and Kagoshima/ East China Sea Stock	2(Kochi), and 0(Kagoshima)	Y	46(Kochi), and 25(Kagoshima)	T,Kishiro/NRIFSF

Photographs were collected from local sighting cruises for the coastal Bryde's whales off Kochi and Kasasa. A cumulative total of 46 Bryde's whales (Kochi) and 25 Bryde's whales (Kasasa) have been individually identified mainly by the shape of dorsal fin. Photographs have been deposited in the NRIFSF. Kishiro and co-workers are examining these photographs to study possible site fidelity.

During the sighting survey in the Sea of Japan, one humpback whale was successfully photo identified and added to the catalogue.

3.1.2. Artificial marking data
None.

3.1.3 Telemetry data

Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute; refs
Bryde's whale	Satellite	3	7 days	T. Kishiro/NRIFSF

3.2 Analyses/development of techniques
Kishiro and Minamikawa continued the development of the attachment system for satellite tags using handy air gun on Bryde's whales off Kochi.

4. TISSUE/BIOLOGICAL SAMPLES COLLECTED

4.1 Biopsy samples (summary only)

Species	Area/stock	Calendar year/ season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Blue whale	Antarctic	72	Y	0	72	NRIFSF
Fin whale	Antarctic	15	Y	0	15	NRIFSF
Humpback whale	Antarctic	72	Y	0	72	NRIFSF

Skin biopsy sampling was conducted on an opportunistic basis during the sighting survey cruises in the North Pacific and the Southern Hemisphere as mentioned in Section 2.1.1. Furthermore, one biopsy/marking cruise was conducted off the Pacific coast of the Main Island of Japan from July 21 – Sep. 2, 2006. The main target for the cruise was small cetaceans, but large cetaceans were also targeted on an opportunistic basis. S. Noji (Temporary technical staff (TS/NRIFSF), H. Hiruda (TS/NRIFSF) were on board *Kurosaki-maru.*

4.2 Samples from directed catches (commercial, aboriginal and scientific permits) or bycatches

From 11 September to 31 October 2006, the JARPN II coastal component was conducted off Kushiro, Hokkaido, northeastern Japan, using four small-type whaling catcher boats, one echo sounder-trawl survey vessel (see below), and one dedicated sighting survey vessel (see the part of ICR in this report). Kato (TUMST), Yoshida, Kishiro, Miyashita, Iwasaki, and Minamikawa conducted the sampling survey. Sampling was carried out in the coastal waters within 50 nautical miles from Kushiro, and all the animals collected were landed at the Kushiro port for biological examination. A total of 10,399.5 n. miles (958.0 hours) was searched, and 84 schools (85 individuals) of common minke whales were detected and the 35 common minke whales (25 males and 10 females) were collected. Further information can be found in SC/59/O7 and the part of ICR in this report.

In 2006 two prey surveys were conducted in the coastal regions of Pacific side of Japan in cooperation with the minke whale sampling surveys by small-type whaling catcher boats. The prey survey in the offshore region was not conducted due to logistic reasons.

The first prey survey was conducted off Ayukawa in April 2006 by two trawler-type research vessels; *Takuyo-maru* (120GT: Miyagi Prefecture Fisheries Research and Development Center; MPFRDC) and *Shunyo-maru* (887GT: Fisheries Research Agency). Nagashima (MPFRDC), Yonezaki (NRIFSF), Murase (ICR), Matsukura (Hokkaido University), Minami (Hokkaido University) and Kohyama (Izu Mito Sea Paradise) joined the survey. The species and size compositions detected by the echo-sound survey were identified with the samples taken with mid-water trawls, MOCNESS and Bongo net. Related oceanographic data were collected and preliminary sighting survey was conducted for marine mammals. Further details are given in Appendices of the SC/59/O6.

Another prey survey was conducted off Kushiro in September 2006 using a trawler-type research vessel, *Kaikou-maru* (860.25 GT). Watanabe (NRIFSF), Kiwada (ICR), Murase (ICR) and Kumagai (ICR) joined the survey. The species and size compositions detected by the echo-sound survey were identified by examining the samples taken by mid-water trawl net and IKMT. Another type of trawl survey was conducted at pre-determined stations that are unsuitable to the acoustic survey, mainly for Pacific saury and common squid. Further details are given in Appendices of the SC/59/O7.

4.3 Samples from stranded animals

See the part of ICR in this report.

4.4 Analyses/development of techniques

5. POLLUTION STUDIES

See the part of ICR in this report.

6. STATISTICS FOR LARGE CETACEANS

6.1 Corrections to earlier years' statistics for large whales

None

6.2 Direct catches of large whales (commercial, aboriginal and scientific permits) for the calendar year 2006 and the season 2006/07

See the part of ICR in this report for scientific permit catches.

6.3 Anthropogenic mortality of large whales for the calendar year 2006

6.3.1 Observed or reported ship strikes of large whales (including non-fatal events)

No established system is available in Japan (at least by FAJ and NRIFSF) to collect information on ship strike. However the FAJ has continuously exchanged information on this with the Ministry of Land Infrastructure and Transport, which is responsible for the control and monitoring of vessel navigations and safety.

6.3.2 Fishery bycatch of large whales

Provisional figures for non-natural mortality of large cetaceans (bycatch) by Japanese fisheries, by Prefecture in January-December 2006, is shown below. Species and figures are based on the reports of prefecture governments to the Fisheries Agency, which are reports from individual fishermen or fishery cooperative unions.

Whale species	No.	Location	Fate	Target fish species	Gear	How observed	Source or contact
Common minke whale	14	Hokkaido	K	NA	FPN	F	FAJ
	4	Aomori					
	17	Iwate					
	4	Miyagi					
	2	Chiba					
	3	Kanagawa					
	3	Niigata					
	9	Toyama					
	16	Ishikawa					
	4	Fukui					
	1		D		MIS		
	3	Mie	K		FPN		
	13	Kyoto					
	3	Wakayama					
	4	Shimane					
	3	Yamaguchi					
	10	Kochi					
	1	Fukuoka					
	20	Nagasaki					
	2	Miyazaki					
	3	Kagoshima					
	1				GN		
	1	Okinawa	R		FPN		Released alive
Humpback whale	1	Chiba	K	NA	FPN	F	Post mortem
	1	Wakayama					
	1	Miyazaki					
	1	Kochi	R				Released alive
Sei whale	1	Kyoto	K	NA	FPN	F	Post mortem
Sperm whale	1	Nagasaki	K	NA	FPN	F	Post mortem

Gear: FPN=Stationary uncovered pounds nets, GNS= Set gillnets, MIS= miscellaneous gear

How observed: M = dedicated marine mammal observer, F = Fishery onboard observer, V = vessel logbook, A = anecdotal, DA = documented anecdotal, photos, etc.

Target fish species : NA=not available

Fate of whale: R = released alive, D = discarded dead or seriously injured, K = kept for sale or specimen

7. STRANDINGS

The provisional number of large whale strandings in Japan, for the period January-December 2006, is shown below. 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.

Species	No. strandings	No. post mortems	Contact person(s)/ Institute(s)	Contact email address(es)
Common minke whales	10	10	FAJ	-
Fin whales	2	2	FAJ	-
Bryde's whales	2	2	FAJ	-
Humpback whales	3	3	FAJ	-
Sperm whales	4	4	FAJ	-

Information on stranded cetaceans has been officially collected by the Far Seas Fisheries Division of the FAJ, 1-2-1, Kasumigaseki, Tokyo 100-8597, Japan. NRIFSF assisted FAJ to compiling the data and necessary sampling. In addition, ICR and the National Science Museum (3-23-1, Hyakunin-cho, Shinjuku-ku, Tokyo 169-0073, Japan) voluntarily collected relevant information on strandings (see the part of ICR in this report).

8. OTHER STUDIES AND ANALYSES

Three approaches are in progress for ecosystem modelling in the western North Pacific. First one is Ecopath with Ecosim (EwE) for the offshore region. While basic analyses were conducted using EwE (Okamura *et al*., 2001), EwE has been improved (http://www.ecopath.org/) and the information on cetaceans and fisheries resources is accumulated afterwards. Second one is the Multspec-type model for the offshore region. Following the basic model of Kawahara and Hosho (2004) a more practical model is under construction using a system thinking software (STELLA). For the coastal region, Okamura and his colleagues developed a Bayesian model to assess the impact of the fur seal on the sandlances in the western North Pacific to estimate the effects of top predator consumption off Sanriku. Further details are given in the SC/59/O11, SC/59/O12, SC/59/O13 and SC/59/O14.

9. LITERATURE CITED

Kato, K., Miyashita, T., Suzuki, N. and Sakuramoto, K. 2007. Abundance estimate of fin whales in the Okhotsk Sea and relationship between distribution and environmental factors. The 2007 Spring Meeting of Japanese Society of Fisheries Science, Tokyo, Japan, March 2007.

Kawahara, S. and Hosho T. 2004. Improvement and test runs of Multspec-type ecosystem model for the western North Pacific. Paper IWC/SC/56/O24; 7 pp.

Okamura, H., Yatsu, A. Miyashita, T.and Kawahara, S. 2001. The development of the ecosystem model for the western North Pacific area off Japan. Paper SC/53/O9; 36 pp.

10 PUBLICATIONS

11.1 Published or 'In Press' papers only

Hayashi, K., Yoshida, H., Nishida, S., Goto, M., Pastene, L. A., Kanda, N., Baba, Y., and Koike, H. 2006. Genetic variation of the MHC *DQB* locus in the finless porpoise. *Zoological Science* 23: 147-153.

Iwasaki,T. 2007 Satellite tracking of large marine animals, with special reference to the technological development. *Enyo Research and Topics* 2: 5-6 (available from the author, in Japanese).

Okamura, H., Minamikawa, S., and Kitakado, T. 2006. Effect of surfacing patterns on abundance estimates of long-diving animals. *Fisheries Science* 72(3): 631-638.

Watanabe, N., Hatano, J., Asahina, K., Iwasaki, T. and Hayakawa, S. 2007. Molecular cloning and histological localization of LH-like substances in abottlenose dolphin (*Tursiops truncatus*) placenta. *Comparative Biochemistry and Physiology*, Part A 146:105-118

11.2 Unpublished literature

Iwasaki, T., and Minamikawa, S. 2006 Geographical migration pattern of small cetacean revealed by satellite tracking. Abstract for the 2nd symposium of the Japanese Society of Bio-logging Science. Tokyo. December 2006. P9-10. (Available from the authors. In Japanese).

Kishiro, T. 2006. For stock management of toothed whales - Stock identification of Baird's beaked whales. FRA News (7) p26. (In Japanese).

Kishiro, T. and Minamikawa, S. 2006. Satellite tracking of Bryde's whales in the coastal waters off southwest Japan. Abstract for the 2nd symposium of the Japanese Society of Bio-logging Science. Tokyo. December 2006. p11-13. (Available from the authors. In Japanese).

Minamikawa, S., Iwasaki, T. and Kishiro, T. 2006. Dive patterns of toothed whales (Baird' s beaked whales, striped dolphins, false killer whales) appeared in time-serial depth data. Abstract for the 2nd symposium of the Japanese Society of Bio-logging Science. Tokyo. December 2006. P9-10. (Available from the authors. In Japanese).

Shimada, H. and Kato, A. 2007. Sighting survey of whale within ice field in the Antarctic using Ice breaker, Shirase 2007 Spring Meeting of Japanese Society of Fisheries Science, Tokyo, Japan, March 2007.

Suzuki, M., Nakano, Y., Takai, N., Kishiro, T. and Asahina, K. 2007. Preliminary study on relationship between osmotic pressure of urine, kidney structure, distribution of AQP2 and prey species in cetacean. The 2007 Spring Meeting of Japanese Society of Fisheries Science, Tokyo, Japan, March 2007. (In Japanese).

Minamikawa, S., Iwasaki, T. and Kishiro, T. 2006. Dive patterns of toothed whales (Baird' s beaked whales, striped dolphins, false killer whales) appeared in time-serial depth data. Abstract for the 2nd symposium of the Japanese Society of Bio-logging Science. Tokyo. December 2006. P9-10. (Available from the author. In Japanese).

Miyashita, T. 2006. Large cetacean distribution and ecology in the North Pacific. Abstract for the symposium on the cetacean research collaboration in the western North Pacific, Cetacean Research Institute, National Fisheries Research and Development Institute, Ulsan, Korea, November 2006.

Miyashita, T. 2006. Japanese sighting survey activities and the results of surveys with special reference to the Sea of Okhotsk. Abstract for Symposium on the Cetacean Research Collaboration in the western North Pacific, National Fisheries Research and Development Institute, Ulsan, Korea, November 2006.

Yonezaki, S., Kiyota, M., Okamura, H. and Baba, N. 2006. Possibility of diet selection of northern fur seals in the Northwestern Pacific. North Pacific Marine Science Organization (PICES) 15th Annual Meeting, 269-270.

Yoshida, H. 2006. Studies on stock structure of finless porpoises in coastal waters of Japan and recent works. The symposium on cetacean research collaboration in the western North Pacific, Cetacean Research Institute, National Fisheries Research and Development Institute, Ulsan, Korea, November 2006.

Watanabe, A., Ohizumi, H., Morita, Y. and Kishiro, T. 2006. Feeding habits of short-finned pilot whales (*Globicephala macrorhynchus*), caught off Sanriku coast northern Japan, in autumn. The 2006 meeting of Mammalogical Society of Japan, Kyoto, Japan, September 2006. (In Japanese).

INSTITUTE OF CETACEAN RESEARCH (ICR)

1. SPECIES AND STOCKS STUDIED

IWC common name	IWC recommended scientific name	Area/stock(s)	Items referred to
Southern right whale	*Eubalaena australis*	Antarctic	3.1; 4.1
North Pacific right whale	*Eubalaena japonica*	W. North Pacific	2.1; 3.1; 4.1
Bowhead whale	*Balaena mysticetus*	B-C-B	9
Common minke whale	*Balaenoptera acutorostrata*	Antarctic	2.1
Common minke whale	*Balaenoptera acutorostrata*	W. North Pacific	2.1; 4.2; 4.4; 6.2
Antarctic minke whale	*Balaenoptera bonaerensis*	Antarctic	2.1; 2.2; 4.2; 4.4;6.2
Sei whale	*Balaenoptera borealis*	Antarctic	4.1
Sei whale	*Balaenoptera borealis*	W. North Pacific	2.1; 4.1; 4.2; 4.4; 6.2
Bryde's whale	*Balaenoptera edeni*	W. North Pacific	2.1; 3.1; 4.2; 4.4; 6.2; 9
Blue whale	*Balaenoptera musculus*	Antarctic	2.1; 2.2; 3.1; 4.1; 4.4
Blue whale	*Balaenoptera musculus*	W. North Pacific	2.1; 3.1; 4.1
Fin whale	*Balaenoptera physalus*	Antarctic	2.1; 2.2; 3.1; 4.1; 4.2; 4.4
Fin whale	*Balaenoptera physalus*	W. North Pacific	2.1; 4.1
Humpback whale	*Megaptera novaeangliae*	Antarctic	2.1; 2.2; 3.1; 4.1; 4.4
Humpback whale	*Megaptera novaeangliae*	W. North Pacific	2.1; 3.1; 4.1
Sperm whale	*Physeter macrocephalus*	Antarctic	2.1
Sperm whale	*Physeter macrocephalus*	W. North Pacific	2.1; 4.2; 4.4
Southern bottlenose whale	*Hyperoodon planifrons*	Antarctic	2.1

2. SIGHTINGS DATA

2.1 Field work

2.1.1 Systematic

The Institute of Cetacean Research (ICR) conducts systematic sighting surveys along their primary research programs JARPA II (Japanese Whale Research Program under Special Permit in the Antarctic-Phase II) and JARPN II (Japanese Whale Research Program under Special Permit in the North Pacific-Phase II). Below is a summary of the sighting data obtained during the 2006/07 austral summer season in the Antarctic Areas VIW and V and during year 2006 in the North Pacific. Details of the sighting component of those surveys are given in the cruise reports: SC/59/O4 for JARPA II and SC/59/O5 for JARPN II-offshore component and SC/59/O6, SC/59/O7 for JARPN II-coastal component.

Sighting surveys in transit from Japan to SOWER home port and from SOWER home port to Japan are conducted by ICR scientists. These data are being examined and will be summarized in future.

JARPA II

Target species	Date	Area	School /Animal of sightings	Contact person/institute and references
Antarctic minke whale	15/Dec/06-28/Feb/07	Area V, Area VI	1,023/2,340	S. Nishiwaki (ICR); SC/59/O4
Dwarf minke whale	15/Dec/06-28/Feb/07	Area V, Area VI	1/1	S. Nishiwaki (ICR); SC/59/O4
Blue whale	15/Dec/06-28/Feb/07	Area V, Area VI	8/15	S. Nishiwaki (ICR); SC/59/O4
Fin whale	15/Dec/06-28/Feb/07	Area V, Area VI	41/267	S. Nishiwaki (ICR); SC/59/O4
Humpback whale	15/Dec/06-28/Feb/07	Area V, Area VI	171/308	S. Nishiwaki (ICR); SC/59/O4
Sperm whale	15/Dec/06-28/Feb/07	Area V, Area VI	63/63	S. Nishiwaki (ICR); SC/59/O4
Southern bottlenose whale	15/Dec/06-28/Feb/07	Area V, Area VI	52/81	S. Nishiwaki (ICR); SC/59/O4

JARPN II-Offshore component

Target species	Date	Area	School /Animal of sightings	Contact person/institute and references
Common minke whale	16May-29Aug./06	W. North Pacific	177 / 188	T. Tamura (ICR); SC/59/O5
Sei whale	16May-29Aug./06	W. North Pacific	346 / 570	T. Tamura (ICR); SC/59/O5
Bryde's whale	16May-29Aug./06	W. North Pacific	143 / 187	T. Tamura (ICR); SC/59/O5
Blue whale	16May-29Aug./06	W. North Pacific	54 /75	T. Tamura (ICR); SC/59/O5
Fin whale	16May-29Aug./06	W. North Pacific	106 / 139	T. Tamura (ICR); SC/59/O5
Humpback whale	16May-29Aug./06	W. North Pacific	74 / 92	T. Tamura (ICR); SC/59/O5
NP right whale	16May-29Aug./06	W. North Pacific	10 / 14	T. Tamura (ICR); SC/59/O5
Sperm whale	16May-29Aug./06	W. North Pacific	299 / 550	T. Tamura (ICR); SC/59/O5

JARPN II-Coastal component

Target species	Date	Area	School /Animal of sightings	Contact person/institute and references
Common minke whale	20Apr.-3May/06	W. North Pacific (off Sanriku, Japan)	28 / 28	S. Nishiwaki (ICR); SC/59/O5
Fin whale	20Apr.-3May/06	W. North Pacific (off Sanriku, Japan)	1 / 1	S. Nishiwaki (ICR); SC/59/O5
Common minke whale	2Sept.-27Sept./06	W. North Pacific (off Kushiro, Japan)	13 / 13	S. Nishiwaki (ICR); SC/59/O5
Sei whale	2Sept.-27Sept./06	W. North Pacific (off Kushiro, Japan)	3 / 4	S. Nishiwaki (ICR); SC/59/O5
Bryde's whale	2Sept.-27Sept./06	W. North Pacific (off Kushiro, Japan)	1 / 1	S. Nishiwaki (ICR); SC/59/O5
Fin whale	2Sept.-27Sept./06	W. North Pacific (off Kushiro, Japan)	1 / 1	S. Nishiwaki (ICR); SC/59/O5
Sperm whale	2Sept.-27Sept./06	W. North Pacific (off Kushiro, Japan)	18 / 31	S. Nishiwaki (ICR); SC/59/O5

2.1.2 Opportunistic, platforms of opportunity
None

2.2 Analyses/development of techniques
Analyses on distribution and abundance have been conducted using data obtained systematically during the sighting surveys of the JARPA. Estimation of the abundance has involved standard methodology. Results were presented and discussed at the JARPA review meeting carried out by the Scientific Committee (SC) of the IWC (IWC, 2006).

Target species	Date	Area	Methods/effort	Parameters/ factors measured	Contact person/institute; refs
Antarctic Minke whale	31/12/89-8/3/2005	Antarctic	Line transect survey. Standard methodology	Distribution; Abundance	T. Hakamada, ICR; SC/D06/J6
Humpback whale	31/12/89-8/3/2005	Antarctic	Line transect survey. Standard methodology	Distribution; Abundance	K. Matsuoka, ICR; SC/D06/J7
Fin whale	31/12/89-8/3/2005	Antarctic	Line transect survey. Standard methodology	Distribution; Abundance	K. Matsuoka, ICR; SC/D06/J7

Blue whale	31/12/89-8/3/2005	Antarctic	Line transect survey. Standard methodology	Distribution; Abundance	K. Matsuoka, ICR; SC/D06/J7

3. MARKING DATA

3.1 Field work

3.1.1 Natural marking data

JARPA II

Species	Feature	Area/stock	No. photo-id'd	Catalogue (Y/N)*	Catalogue total**	Contact person/institute; refs
Humpback whale	Fluke	Area V	3			ICR;SC/59/O4
Humpback whale	Dorsal fin	Area V	17			ICR;SC/59/O4
Humpback whale	Fluke	Area VI	1			ICR;SC/59/O4
Humpback whale	Dorsal fin	Area VI	6			ICR;SC/59/O4
Blue whale	Dorsal fin	Area V	2			ICR;SC/59/O4
Fin whale	Dorsal fin	Area V	6			ICR;SC/59/O4

*= These pictures will be incorporated into the catalogue after further examination.

**= Till 2004/05 austral summer season the catalogue includes 502, 243 and 153 photo-id pictures of the humpback, right and blue whales, respectively.

JARPN II

Species	Feature	Area/stock	No. photo-id'd	Catalogue (Y/N)*	Catalogue total*	Contact person/institute; refs
Blue whale	Fluke	W. North Pacific	18			ICR; SC/59/O5
Blue whale	Dorsal fin	W. North Pacific	19			ICR; SC/59/O5
Blue whale	Head	W. North Pacific	18			ICR; SC/59/O5
Blue whale	Body	W. North Pacific	17			ICR; SC/59/O5
Blue whale	Other	W. North Pacific	6			ICR; SC/59/O5
Humpback whale	Fluke	W. North Pacific	1			ICR; SC/59/O5
Humpback whale	Dorsal fin	W. North Pacific	6			ICR; SC/59/O5
Humpback whale	Head	W. North Pacific	2			ICR; SC/59/O5
Humpback whale	Body	W. North Pacific	5			ICR; SC/59/O5
Humpback whale	Other	W. North Pacific	5			ICR; SC/59/O5
NP right whale	Fluke	W. North Pacific	2			ICR; SC/59/O5
NP right whale	Head	W. North Pacific	13			ICR; SC/59/O5
NP right whale	Body	W. North Pacific	4			ICR; SC/59/O5
NP right whale	Other	W. North Pacific	2			ICR; SC/59/O5

*= Catalogue under construction

3.1.2. Artificial marking data
None.

3.1.3 Telemetry data

Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute; refs
Bryde's whale	Satellite	1	11 days	T. Tamura, ICR, Tokyo

One Bryde's whale was successfully tracked for 11 days in the western North Pacific during the JARPN II.

3.2 Analyses/development of techniques

Satellite tag data are under analysis currently.

4. TISSUE/BIOLOGICAL SAMPLES COLLECTED

Tissue and biological samples (lethal and non-lethal sampling) were obtained during the surveys of the JARPA II in the 2006/07 austral summer season in Areas VIW and V and during the JARPN II surveys in 2006 in the North Pacific. The second feasibility survey of JARPA II was carried out between 15 December 2006 and 28 February 2007. The total searching distance was 11,968.87 n.miles. Out of 443 schools (1,043 individuals) of primarily sighted Antarctic minke whales by the sighting/sampling vessels, 438 schools (1,027 individuals) were targeted for sampling, and a total of 505 animals were sampled. Out of 19 schools (156 individuals) of primarily sighted of fin whales, three schools (nine individuals) were targeted for sampling, and a total of three animals were sampled. The 2006 JARPN II offshore survey was conducted from 16 May to 29 August in sub-areas 7, 8 and 9 of western North Pacific. The total searching distance was 17,787.00 n.miles. Out of 134 common minke whales sighted by the sighting/sampling vessels, 100 animals were sampled; out of 172 Bryde's whales sighted, 50 animals were sampled; out of 326 sei whales sighted, 100 were sampled; out of 330 sperm whales sighted, six were sampled. The 2006 JARPN II coastal survey of Sanriku was conducted between 12 April and 24 May. The total searching distance was 6,340.00 n.miles. Out of 139 schools (143 individuals) sighted, 60 animals were sampled. The 2006 JARPN II coastal survey of Kushiro was conducted from 11 September to 31 October. A total of 10,399.5 n.miles was searched. Out of 84 schools (85 individuals) of common minke whales sighted, 35 animals were sampled. The prey species survey components of these two coastal surveys are described in the part of the NRIFSF in this report. Details of these surveys are given in the cruise reports: SC/59/O4 for JARPA II and SC/59/O5 for JARPN II-offshore component, SC/59/O6 for JARPN II-coastal component (Ayukawa) and SC/59/O7 for JARPN II-coastal component (Kushiro).

A summary of the samples and data obtained are given in 4.1 and 4.2 below.

4.1 Biopsy samples (summary only)

JARPA II

Species	Area/stock	Calendar year/ season - no. collected	Archived (Y/N)	No. analysed *	Total holdings**	Contact person/institute
Blue whale	Area V	1	Y			ICR
Fin whale	Area V	3	Y			ICR
Humpback whale	Area V	11	Y			ICR
Humpback whale	Area VI	2	Y			ICR

*=Under analysis

**=Till the 2004/05 austral summer season a total of 22, 28, 342, 1 and 36 biopsy samples of blue, fin, humpback, sei and right whale were collected and analyzed.

JARPN II

Species	Area/stock	Calendar year/ season - no. collected	Archived (Y/N)	No. analysed *	Total holdings	Contact person/institute
Humpback whale	W. North Pacific	3	Y		9	ICR
Blue whale	W. North Pacific	6	Y		13	ICR
Fin whale	W. North Pacific	1	Y		3	ICR
Sei whale	W. North Pacific	5	Y		12	ICR
NP right whale	W. North Pacific	2	Y		7	ICR

*=Under analysis

4.2 Samples from directed catches (scientific permits)

JARPA II

Species	Area/stock	Samples and Data	No. collected	Archived (Y/N)	No. analysed *	Contact person/institute
Antarctic minke whale	Antarctic	Photographic record of external character	505	Y		ICR
Antarctic minke whale	Antarctic	Body length and sex identification	503	Y		ICR
Antarctic minke whale	Antarctic	Measurement of external body proportion	505	Y		ICR
Antarctic minke whale	Antarctic	Body weight	119	Y		ICR
Antarctic minke whale	Antarctic	Body weight by total weight of parts	28	Y		ICR
Antarctic minke whale	Antarctic	Skull measurement (length and breadth)	497	Y		ICR
Antarctic minke whale	Antarctic	Standard measurement of blubber thickness (two points)	505	Y		ICR
Antarctic minke whale	Antarctic	Lactation status	351	Y		ICR
Antarctic minke whale	Antarctic	Measurement of mammary gland	350	Y		ICR
Antarctic minke whale	Antarctic	Testis weight	154	Y		ICR
Antarctic minke whale	Antarctic	Weight of stomach content	469	Y		ICR
Antarctic minke whale	Antarctic	Photographic record of fetus	257	Y		ICR
Antarctic minke whale	Antarctic	Fetal length and weight	255	Y		ICR
Antarctic minke whale	Antarctic	Diatom film observation	502	Y		ICR
Antarctic minke whale	Antarctic	Blood plasma for physiological study	500	Y		ICR
Antarctic minke whale	Antarctic	Earplug for age determination	505	Y		ICR
Antarctic minke whale	Antarctic	Ocular lens for age determination	180	Y		ICR
Antarctic minke whale	Antarctic	Tympanic bone for chemical analysis	46	Y		ICR
Antarctic minke whale	Antarctic	Largest baleen plate for chemical analysis	505	Y		ICR
Antarctic minke whale	Antarctic	Vertebral epiphyses sample	466	Y		ICR
Antarctic minke whale	Antarctic	Collection of ovary	351	Y		ICR
Antarctic minke whale	Antarctic	Histological sample of endometrium	29	Y		ICR

Antarctic minke whale	Antarctic	Histological sample of mammary gland	351	Y		ICR
Antarctic minke whale	Antarctic	Histological sample of testis	154	Y		ICR
Antarctic minke whale	Antarctic	Skin and liver tissues for genetic study	505	Y		ICR
Antarctic minke whale	Antarctic	Blubber, muscle and liver tissues for environmental monitoring	505	Y		ICR
Antarctic minke whale	Antarctic	Lung and liver tissues for air monitoring	47	Y		ICR
Antarctic minke whale	Antarctic	Macro pathological observation (thyroid, lung, stomach, gonad and liver)	505	Y		ICR
Antarctic minke whale	Antarctic	Tissues for histopathological study	242	Y		ICR
Antarctic minke whale	Antarctic	Tissues for various studies (muscle, blubber)	6	Y		ICR
Antarctic minke whale	Antarctic	Stomach contents for food and feeding study	90	Y		ICR
Antarctic minke whale	Antarctic	Stomach contents for environmental monitoring	24	Y		ICR
Antarctic minke whale	Antarctic	Collection of external parasites	1	Y		ICR
Antarctic minke whale	Antarctic	Collection of internal parasites	7	Y		ICR
Antarctic minke whale	Antarctic	Collection of fetus	7	Y		ICR
Antarctic minke whale	Antarctic	Fetus ocular lens for age determination	109	Y		ICR
Antarctic minke whale	Antarctic	Fetal skin for genetic study	252	Y		ICR
Antarctic minke whale	Antarctic	Spermatogenic cell for round spermatid injection	1	Y		ICR
Antarctic minke whale	Antarctic	Blood samples for genetic study	10	Y		ICR
Fin whale	Antarctic	Photographic record of external character	2	Y		ICR
Fin whale	Antarctic	Body length and sex identification	2	Y		ICR
Fin whale	Antarctic	Measurement of external body proportion	3	Y		ICR
Fin whale	Antarctic	Body weight by total weight of parts	2	Y		ICR
Fin whale	Antarctic	Skull measurement (length and breadth)	2	Y		ICR
Fin whale	Antarctic	Detailed measurement of blubber thickness (fourteen points)	2	Y		ICR
Fin whale	Antarctic	Lactation status	1	Y		ICR
Fin whale	Antarctic	Measurement of mammary gland	1	Y		ICR
Fin whale	Antarctic	Breadth measurement of uterine horn	1	Y		ICR
Fin whale	Antarctic	Testis weight	1	Y		ICR
Fin whale	Antarctic	Epididymis weight	1	Y		ICR
Fin whale	Antarctic	Weight of stomach content	2	Y		ICR
Fin whale	Antarctic	Photographic record of fetus	1	Y		ICR
Fin whale	Antarctic	Fetal length and weight	1	Y		ICR
Fin whale	Antarctic	External measurements of fetus	1	Y		ICR
Fin whale	Antarctic	Number of ribs	2	Y		ICR
Fin whale	Antarctic	Number of vertebrae	2	Y		ICR
Fin whale	Antarctic	Diatom film observation	2	Y		ICR

Fin whale	Antarctic	Diatom film sample	2	Y		ICR
Fin whale	Antarctic	Blood plasma for physiological study	2	Y		ICR
Fin whale	Antarctic	Earplug for age determination	2	Y		ICR
Fin whale	Antarctic	Ocular lens for age determination	2	Y		ICR
Fin whale	Antarctic	Tympanic bone for chemical analysis	2	Y		ICR
Fin whale	Antarctic	Largest baleen plate for chemical analysis	2	Y		ICR
Fin whale	Antarctic	Number and length of baleen plates	2	Y		ICR
Fin whale	Antarctic	Palate length	2	Y		ICR
Fin whale	Antarctic	Vertebral epiphyses sample	3	Y		ICR
Fin whale	Antarctic	Collection of ovary	1	Y		ICR
Fin whale	Antarctic	Histological sample of endometrium	1	Y		ICR
Fin whale	Antarctic	Histological sample of mammary gland	1	Y		ICR
Fin whale	Antarctic	Histological sample of testis	1	Y		ICR
Fin whale	Antarctic	Histological sample of epididymis	1	Y		ICR
Fin whale	Antarctic	Skin and liver tissues for genetic study	3	Y		ICR
Fin whale	Antarctic	Blubber, muscle and liver tissues for environmental monitoring	3	Y		ICR
Fin whale	Antarctic	Lung and liver tissues for air monitoring	2	Y		ICR
Fin whale	Antarctic	Macro pathological observation (thyroid, lung, stomach, gonad and liver)	2	Y		ICR
Fin whale	Antarctic	Tissues for histopathological study	2	Y		ICR
Fin whale	Antarctic	Tissues for lipid analysis(muscle, liver, kidney, lumbar, blubber)	3	Y		ICR
Fin whale	Antarctic	Tissues for chemical study (muscle, liver, kidney)	3	Y		ICR
Fin whale	Antarctic	Tissues for various studies (muscle, blubber)	1	Y		ICR
Fin whale	Antarctic	Tissues for nutritional study (muscle, blubber)	3	Y		ICR
Fin whale	Antarctic	Stomach contents for food and feeding study	2	Y		ICR
Fin whale	Antarctic	Stomach contents for environmental monitoring	1	Y		ICR
Fin whale	Antarctic	Stomach contents for lipid analysis	1	Y		ICR
Fin whale	Antarctic	Fetus ocular lens for age determination	1	Y		ICR
Fin whale	Antarctic	Fetal skin for genetic study	1	Y		ICR
Fin whale	Antarctic	Blood samples for genetic study	1	Y		ICR
Fin whale	Antarctic	Pelvis bone for educational exhibition	1	Y		ICR

JARPN II-Pelagic

Species	Area/stock	Samples and Data	No. collected	Archived (Y/N)	No. analysed *	Contact person/institute
Common minke whale	Western North Pacific	Body length and sex	100	Y		ICR
Common minke whale	Western North Pacific	External body proportion	100	Y		ICR

Common minke whale	Western North Pacific	Photographic record and external character	100	Y		ICR
Common minke whale	Western North Pacific	Diatom film record	100	Y		ICR
Common minke whale	Western North Pacific	Standard measurements of blubber thickness (five points)	100	Y		ICR
Common minke whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	18	Y		ICR
Common minke whale	Western North Pacific	Body weight	100	Y		ICR
Common minke whale	Western North Pacific	Body weight by parts	18	Y		ICR
Common minke whale	Western North Pacific	Blubber tissues (DNA)	100	Y		ICR
Common minke whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	100	Y		ICR
Common minke whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	100	Y		ICR
Common minke whale	Western North Pacific	Tissues for lipid analysis	100	Y		ICR
Common minke whale	Western North Pacific	Tissues for various analysis	100	Y		ICR
Common minke whale	Western North Pacific	Tissues for virus test	100	Y		ICR
Common minke whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	7	Y		ICR
Common minke whale	Western North Pacific	Uterine horn; measurement and endometrium sample	7	Y		ICR
Common minke whale	Western North Pacific	Collection of ovary	7	Y		ICR
Common minke whale	Western North Pacific	Photographic record of foetus	4	Y		ICR
Common minke whale	Western North Pacific	Foetal sex (identified by visual observation)	4	Y		ICR
Common minke whale	Western North Pacific	Foetal length and weight	4	Y		ICR
Common minke whale	Western North Pacific	External measurements of foetus	4	Y		ICR
Common minke whale	Western North Pacific	Foetal tissues for various analysis	4	Y		ICR
Common minke whale	Western North Pacific	Testis and epididymis; weight and histological sample	93	Y		ICR
Common minke whale	Western North Pacific	Collection of blood plasma sample	100	Y		ICR
Common minke whale	Western North Pacific	Collection of whole blood sample	90	Y		ICR
Common minke whale	Western North Pacific	Stomach content, conventional record	100	Y		ICR
Common minke whale	Western North Pacific	Volume and weight of stomach content in each compartment	100	Y		ICR
Common minke whale	Western North Pacific	Stomach contents for feeding study	100	Y		ICR
Common minke whale	Western North Pacific	Record of external parasites	100	Y		ICR
Common minke whale	Western North Pacific	Collection of external parasites	1	Y		ICR
Common minke whale	Western North Pacific	Record of internal parasites	100	Y		ICR
Common minke whale	Western North Pacific	Earplug for age determination	100	Y		ICR
Common minke whale	Western North Pacific	Tympanic bulla for age determination	100	Y		ICR
Common minke whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	100	Y		ICR
Common minke whale	Western North Pacific	Baleen plate measurements (length and breadth)	99	Y		ICR
Common minke whale	Western North Pacific	Length of each baleen plate series	98	Y		ICR
Common minke whale	Western North Pacific	Vertebral epiphyses sample	100	Y		ICR
Common minke whale	Western North Pacific	Number of vertebrae	18	Y		ICR

Common minke whale	Western North Pacific	Number of ribs	100	Y		ICR
Common minke whale	Western North Pacific	Brain weight	18	Y		ICR
Common minke whale	Western North Pacific	Skull measurement (length and breadth)	100	Y		ICR
Sei whale	Western North Pacific	Body length and sex	100	Y		ICR
Sei whale	Western North Pacific	External body proportion	100	Y		ICR
Sei whale	Western North Pacific	Photographic record and external character	100	Y		ICR
Sei whale	Western North Pacific	Diatom film record	100	Y		ICR
Sei whale	Western North Pacific	Standard measurements of blubber thickness (five points)	100	Y		ICR
Sei whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	20	Y		ICR
Sei whale	Western North Pacific	Body weight	100	Y		ICR
Sei whale	Western North Pacific	Body weight by parts	20	Y		ICR
Sei whale	Western North Pacific	Blubber tissues (DNA)	100	Y		ICR
Sei whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	100	Y		ICR
Sei whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	100	Y		ICR
Sei whale	Western North Pacific	Tissues for lipid analysis	100	Y		ICR
Sei whale	Western North Pacific	Tissues for various analysis	100	Y		ICR
Sei whale	Western North Pacific	Tissues for virus test	100	Y		ICR
Sei whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	52	Y		ICR
Sei whale	Western North Pacific	Collection of maternal milk sample	6	Y		ICR
Sei whale	Western North Pacific	Uterine horn; measurement and endometrium sample	52	Y		ICR
Sei whale	Western North Pacific	Collection of ovary	52	Y		ICR
Sei whale	Western North Pacific	Photographic record of foetus	26	Y		ICR
Sei whale	Western North Pacific	Foetal sex (identified by visual observation)	26	Y		ICR
Sei whale	Western North Pacific	Foetal length and weight	26	Y		ICR
Sei whale	Western North Pacific	External measurements of foetus	26	Y		ICR
Sei whale	Western North Pacific	Foetal tissues for various analysis	26	Y		ICR
Sei whale	Western North Pacific	Testis and epididymis; weight and histological sample	48	Y		ICR
Sei whale	Western North Pacific	Collection of blood plasma sample	99	Y		ICR
Sei whale	Western North Pacific	Collection of whole blood sample	99	Y		ICR
Sei whale	Western North Pacific	Whole blood samples from umbilical cord	21	Y		ICR
Sei whale	Western North Pacific	Stomach content, conventional record	100	Y		ICR
Sei whale	Western North Pacific	Volume and weight of stomach content in each compartment	100	Y		ICR
Sei whale	Western North Pacific	Stomach contents for feeding study	100	Y		ICR
Sei whale	Western North Pacific	Record of external parasites	100	Y		ICR
Sei whale	Western North Pacific	Collection of external parasites	5	Y		ICR
Sei whale	Western North Pacific	Record of internal parasites	100	Y		ICR

Sei whale	Western North Pacific	Collection of internal parasites	1	Y		ICR
Sei whale	Western North Pacific	Earplug for age determination	100	Y		ICR
Sei whale	Western North Pacific	Tympanic bulla for age determination	100	Y		ICR
Sei whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	100	Y		ICR
Sei whale	Western North Pacific	Baleen plate measurements (length and breadth)	100	Y		ICR
Sei whale	Western North Pacific	Length of each baleen plate series	100	Y		ICR
Sei whale	Western North Pacific	Vertebral epiphyses sample	100	Y		ICR
Sei whale	Western North Pacific	Number of vertebrae	20	Y		ICR
Sei whale	Western North Pacific	Number of ribs	100	Y		ICR
Sei whale	Western North Pacific	Brain weight	20	Y		ICR
Sei whale	Western North Pacific	Skull measurement (length and breadth)	100	Y		ICR
Sei whale	Western North Pacific	Body length and sex	100	Y		ICR
Sei whale	Western North Pacific	External body proportion	100	Y		ICR
Sei whale	Western North Pacific	Photographic record and external character	100	Y		ICR
Sei whale	Western North Pacific	Diatom film record	100	Y		ICR
Sei whale	Western North Pacific	Standard measurements of blubber thickness (five points)	100	Y		ICR
Sei whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	20	Y		ICR
Sei whale	Western North Pacific	Body weight	100	Y		ICR
Sei whale	Western North Pacific	Body weight by parts	20	Y		ICR
Sei whale	Western North Pacific	Blubber tissues (DNA)	100	Y		ICR
Sei whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	100	Y		ICR
Sei whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	100	Y		ICR
Sei whale	Western North Pacific	Tissues for lipid analysis	100	Y		ICR
Sei whale	Western North Pacific	Tissues for various analysis	100	Y		ICR
Sei whale	Western North Pacific	Tissues for virus test	100	Y		ICR
Sei whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	52	Y		ICR
Sei whale	Western North Pacific	Collection of maternal milk sample	6	Y		ICR
Sei whale	Western North Pacific	Uterine horn; measurement and endometrium sample	52	Y		ICR
Sei whale	Western North Pacific	Collection of ovary	52	Y		ICR
Sei whale	Western North Pacific	Photographic record of foetus	26	Y		ICR
Sei whale	Western North Pacific	Foetal sex (identified by visual observation)	26	Y		ICR
Sei whale	Western North Pacific	Foetal length and weight	26	Y		ICR
Sei whale	Western North Pacific	External measurements of foetus	26	Y		ICR
Sei whale	Western North Pacific	Foetal tissues for various analysis	26	Y		ICR
Sei whale	Western North Pacific	Testis and epididymis; weight and histological sample	48	Y		ICR
Sei whale	Western North Pacific	Collection of blood plasma sample	99	Y		ICR

Sei whale	Western North Pacific	Collection of whole blood sample	99	Y		ICR
Sei whale	Western North Pacific	Whole blood samples from umbilical cord	21	Y		ICR
Sei whale	Western North Pacific	Stomach content, conventional record	100	Y		ICR
Sei whale	Western North Pacific	Volume and weight of stomach content in each compartment	100	Y		ICR
Sei whale	Western North Pacific	Stomach contents for feeding study	100	Y		ICR
Sei whale	Western North Pacific	Record of external parasites	100	Y		ICR
Sei whale	Western North Pacific	Collection of external parasites	5	Y		ICR
Sei whale	Western North Pacific	Record of internal parasites	100	Y		ICR
Sei whale	Western North Pacific	Collection of internal parasites	1	Y		ICR
Sei whale	Western North Pacific	Earplug for age determination	100	Y		ICR
Sei whale	Western North Pacific	Tympanic bulla for age determination	100	Y		ICR
Sei whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	100	Y		ICR
Sei whale	Western North Pacific	Baleen plate measurements (length and breadth)	100	Y		ICR
Sei whale	Western North Pacific	Length of each baleen plate series	100	Y		ICR
Sei whale	Western North Pacific	Vertebral epiphyses sample	100	Y		ICR
Sei whale	Western North Pacific	Number of vertebrae	20	Y		ICR
Sei whale	Western North Pacific	Number of ribs	100	Y		ICR
Sei whale	Western North Pacific	Brain weight	20	Y		ICR
Sei whale	Western North Pacific	Skull measurement (length and breadth)	100	Y		ICR
Bryde's whale	Western North Pacific	Body length and sex	50	Y		ICR
Bryde's whale	Western North Pacific	External body proportion	50	Y		ICR
Bryde's whale	Western North Pacific	Photographic record and external character	50	Y		ICR
Bryde's whale	Western North Pacific	Diatom film record	50	Y		ICR
Bryde's whale	Western North Pacific	Standard measurements of blubber thickness (five points)	50	Y		ICR
Bryde's whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	12	Y		ICR
Bryde's whale	Western North Pacific	Body weight	50	Y		ICR
Bryde's whale	Western North Pacific	Body weight by parts	12	Y		ICR
Bryde's whale	Western North Pacific	Blubber tissues (DNA)	50	Y		ICR
Bryde's whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	50	Y		ICR
Bryde's whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	50	Y		ICR
Bryde's whale	Western North Pacific	Tissues for lipid analysis	50	Y		ICR
Bryde's whale	Western North Pacific	Tissues for various analysis	50	Y		ICR
Bryde's whale	Western North Pacific	Tissues for virus test	50	Y		ICR
Bryde's whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	29	Y		ICR
Bryde's whale	Western North Pacific	Collection of maternal milk sample	3	Y		ICR
Bryde's whale	Western North Pacific	Uterine horn; measurement and endometrium sample	29	Y		ICR

Bryde's whale	Western North Pacific	Collection of ovary	29	Y		ICR
Bryde's whale	Western North Pacific	Photographic record of foetus	13	Y		ICR
Bryde's whale	Western North Pacific	Foetal sex (identified by visual observation)	12	Y		ICR
Bryde's whale	Western North Pacific	Foetal length and weight	13	Y		ICR
Bryde's whale	Western North Pacific	External measurements of foetus	12	Y		ICR
Bryde's whale	Western North Pacific	Foetal tissues for various analysis	12	Y		ICR
Bryde's whale	Western North Pacific	Testis and epididymis; weight and histological sample	21	Y		ICR
Bryde's whale	Western North Pacific	Collection of blood plasma sample	50	Y		ICR
Bryde's whale	Western North Pacific	Collection of whole blood sample	50	Y		ICR
Bryde's whale	Western North Pacific	Whole blood samples from umbilical cord	4	Y		ICR
Bryde's whale	Western North Pacific	Stomach content, conventional record	50	Y		ICR
Bryde's whale	Western North Pacific	Volume and weight of stomach content in each compartment	50	Y		ICR
Bryde's whale	Western North Pacific	Stomach contents for feeding study	50	Y		ICR
Bryde's whale	Western North Pacific	Record of external parasites	50	Y		ICR
Bryde's whale	Western North Pacific	Collection of external parasites	5	Y		ICR
Bryde's whale	Western North Pacific	Record of internal parasites	50	Y		ICR
Bryde's whale	Western North Pacific	Collection of internal parasites	1	Y		ICR
Bryde's whale	Western North Pacific	Earplug for age determination	50	Y		ICR
Bryde's whale	Western North Pacific	Tympanic bulla for age determination	50	Y		ICR
Bryde's whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	50	Y		ICR
Bryde's whale	Western North Pacific	Baleen plate measurements (length and breadth)	50	Y		ICR
Bryde's whale	Western North Pacific	Length of each baleen plate series	49	Y		ICR
Bryde's whale	Western North Pacific	Vertebral epiphyses sample	50	Y		ICR
Bryde's whale	Western North Pacific	Number of vertebrae	20	Y		ICR
Bryde's whale	Western North Pacific	Number of ribs	50	Y		ICR
Bryde's whale	Western North Pacific	Brain weight	12	Y		ICR
Bryde's whale	Western North Pacific	Skull measurement (length and breadth)	50	Y		ICR
Sperm whale	Western North Pacific	Body length and sex	6	Y		ICR
Sperm whale	Western North Pacific	External body proportion	6	Y		ICR
Sperm whale	Western North Pacific	Photographic record and external character	6	Y		ICR
Sperm whale	Western North Pacific	Diatom film record	6	Y		ICR
Sperm whale	Western North Pacific	Standard measurements of blubber thickness (five points)	6	Y		ICR
Sperm whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	6	Y		ICR
Sperm whale	Western North Pacific	Body weight	6	Y		ICR
Sperm whale	Western North Pacific	Body weight by parts	4	Y		ICR
Sperm whale	Western North Pacific	Blubber tissues (DNA)	6	Y		ICR

Sperm whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	6	Y		ICR
Sperm whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	6	Y		ICR
Sperm whale	Western North Pacific	Tissues for lipid analysis	6	Y		ICR
Sperm whale	Western North Pacific	Tissues for various analysis	6	Y		ICR
Sperm whale	Western North Pacific	Tissues for virus test	6	Y		ICR
Sperm whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	4	Y		ICR
Sperm whale	Western North Pacific	Collection of maternal milk sample	2	Y		ICR
Sperm whale	Western North Pacific	Uterine horn; measurement and endometrium sample	4	Y		ICR
Sperm whale	Western North Pacific	Collection of ovary	4	Y		ICR
Sperm whale	Western North Pacific	Testis and epididymis; weight and histological sample	2	Y		ICR
Sperm whale	Western North Pacific	Collection of blood plasma sample	6	Y		ICR
Sperm whale	Western North Pacific	Collection of whole blood sample	5	Y		ICR
Sperm whale	Western North Pacific	Stomach content, conventional record	6	Y		ICR
Sperm whale	Western North Pacific	Volume and weight of stomach content in each compartment	6	Y		ICR
Sperm whale	Western North Pacific	Stomach contents for feeding study	6	Y		ICR
Sperm whale	Western North Pacific	Record of external parasites	6	Y		ICR
Sperm whale	Western North Pacific	Collection of external parasites	2	Y		ICR
Sperm whale	Western North Pacific	Record of internal parasites	6	Y		ICR
Sperm whale	Western North Pacific	Collection of internal parasites	6	Y		ICR
Sperm whale	Western North Pacific	Tympanic bulla for age determination	6	Y		ICR
Sperm whale	Western North Pacific	Maxillally teeth for age determination	6	Y		ICR
Sperm whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	6	Y		ICR
Sperm whale	Western North Pacific	Baleen plate measurements (length and breadth)	6	Y		ICR
Sperm whale	Western North Pacific	Length of each baleen plate series	6	Y		ICR
Sperm whale	Western North Pacific	Vertebral epiphyses sample	6	Y		ICR
Sperm whale	Western North Pacific	Number of vertebrae	6	Y		ICR
Sperm whale	Western North Pacific	Number of ribs	6	Y		ICR
Sperm whale	Western North Pacific	Brain weight	4	Y		ICR
Sperm whale	Western North Pacific	Skull measurement (length and breadth)	6	Y		ICR

JARPN II-Coastal (Sanriku)

Species	Area/stock	Samples and Data	No. collected	Archived (Y/N)	No. analysed *	Contact person/institute
Common minke whale	Western North Pacific	Body length and sex	60	Y		ICR
Common minke whale	Western North Pacific	External body proportion	60	Y		ICR
Common minke whale	Western North Pacific	Photographic record and external character	60	Y		ICR

Common minke whale	Western North Pacific	Diatom film record	60	Y		ICR
Common minke whale	Western North Pacific	Standard measurements of blubber thickness (five points)	60	Y		ICR
Common minke whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	3	Y		ICR
Common minke whale	Western North Pacific	Body weight	60	Y		ICR
Common minke whale	Western North Pacific	Body weight by parts	3	Y		ICR
Common minke whale	Western North Pacific	Blubber tissues (DNA)	60	Y		ICR
Common minke whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	60	Y		ICR
Common minke whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	60	Y		ICR
Common minke whale	Western North Pacific	Tissues for various analysis	60	Y		ICR
Common minke whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	34	Y		ICR
Common minke whale	Western North Pacific	Uterine horn; measurement and endometrium sample	34	Y		ICR
Common minke whale	Western North Pacific	Collection of ovary	34	Y		ICR
Common minke whale	Western North Pacific	Photographic record of foetus	3	Y		ICR
Common minke whale	Western North Pacific	Foetal sex (identified by visual observation)	3	Y		ICR
Common minke whale	Western North Pacific	Foetal length and weight	3	Y		ICR
Common minke whale	Western North Pacific	External measurements of foetus	3	Y		ICR
Common minke whale	Western North Pacific	Foetal tissues for various analysis	3	Y		ICR
Common minke whale	Western North Pacific	Testis and epididymis; weight and histological sample	24	Y		ICR
Common minke whale	Western North Pacific	Collection of blood plasma sample	43	Y		ICR
Common minke whale	Western North Pacific	Stomach content, conventional record	60	Y		ICR
Common minke whale	Western North Pacific	Volume and weight of stomach content in each compartment	56	Y		ICR
Common minke whale	Western North Pacific	Stomach contents for feeding study	59	Y		ICR
Common minke whale	Western North Pacific	Record of external parasites	60	Y		ICR
Common minke whale	Western North Pacific	Earplug for age determination	60	Y		ICR
Common minke whale	Western North Pacific	Tympanic bulla for age determination	59	Y		ICR
Common minke whale	Western North Pacific	Eye lens for age determination	58	Y		ICR
Common minke whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	60	Y		ICR
Common minke whale	Western North Pacific	Baleen plate measurements (length and breadth)	60	Y		ICR
Common minke whale	Western North Pacific	Length of each baleen plate series	60	Y		ICR
Common minke whale	Western North Pacific	Photographic record of baleen plate series	60	Y		ICR
Common minke whale	Western North Pacific	Vertebral epiphyses sample	60	Y		ICR
Common minke whale	Western North Pacific	Number of ribs	60	Y		ICR
Common minke whale	Western North Pacific	Brain weight	3	Y		ICR
Common minke whale	Western North Pacific	Skull measurement (length and breadth)	60	Y		ICR

JARPN II-Coastal (Kushiro)

Species	Area/stock	Samples and Data	No. collected	Archived (Y/N)	No. analysed *	Contact person/institute
Common minke whale	Western North Pacific	Body length and sex	35	Y		NRIFSF
Common minke whale	Western North Pacific	External body proportion	35	Y		NRIFSF
Common minke whale	Western North Pacific	Photographic record and external character	35	Y		NRIFSF
Common minke whale	Western North Pacific	Diatom film record	35	Y		NRIFSF
Common minke whale	Western North Pacific	Standard measurements of blubber thickness (five points)	35	Y		NRIFSF
Common minke whale	Western North Pacific	Detailed measurements of blubber thickness (eleven points)	5	Y		NRIFSF
Common minke whale	Western North Pacific	Body weight	35	Y		NRIFSF
Common minke whale	Western North Pacific	Body weight by parts	5	Y		NRIFSF
Common minke whale	Western North Pacific	Blubber tissues (DNA)	35	Y		NRIFSF
Common minke whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Heavy metal analysis)	35	Y		NRIFSF
Common minke whale	Western North Pacific	Blubber, muscle, liver and kidney tissues (Organochlorines analysis)	35	Y		NRIFSF
Common minke whale	Western North Pacific	Tissues for various analysis	35	Y		NRIFSF
Common minke whale	Western North Pacific	Mammary grand; lactation status, measurement and histological sample	10	Y		NRIFSF
Common minke whale	Western North Pacific	Uterine horn; measurement and endometrium sample	10	Y		NRIFSF
Common minke whale	Western North Pacific	Collection of ovary	10	Y		NRIFSF
Common minke whale	Western North Pacific	Photographic record of foetus	1	Y		NRIFSF
Common minke whale	Western North Pacific	Foetal sex (identified by visual observation)	1	Y		NRIFSF
Common minke whale	Western North Pacific	Foetal length and weight	1	Y		NRIFSF
Common minke whale	Western North Pacific	External measurements of foetus	1	Y		NRIFSF
Common minke whale	Western North Pacific	Foetal tissues for various analysis	1	Y		NRIFSF
Common minke whale	Western North Pacific	Testis and epididymis; weight and histological sample	25	Y		NRIFSF
Common minke whale	Western North Pacific	Collection of blood plasma sample	25	Y		NRIFSF
Common minke whale	Western North Pacific	Stomach content, conventional record	35	Y		NRIFSF
Common minke whale	Western North Pacific	Volume and weight of stomach content in each compartment	35	Y		NRIFSF
Common minke whale	Western North Pacific	Stomach contents for feeding study	35	Y		NRIFSF
Common minke whale	Western North Pacific	Record of external parasites	35	Y		NRIFSF
Common minke whale	Western North Pacific	Earplug for age determination	35	Y		NRIFSF
Common minke whale	Western North Pacific	Tympanic bulla for age determination	35	Y		NRIFSF
Common minke whale	Western North Pacific	Eye lens for age determination	35	Y		NRIFSF
Common minke whale	Western North Pacific	Largest baleen plate for morphologic study and age determination	35	Y		NRIFSF
Common minke whale	Western North Pacific	Baleen plate measurements (length and breadth)	35	Y		NRIFSF
Common minke whale	Western North Pacific	Length of each baleen plate series	35	Y		NRIFSF
Common minke whale	Western North Pacific	Photographic record of baleen plate series	35	Y		NRIFSF
Common minke whale	Western North Pacific	Vertebral epiphyses sample	35	Y		NRIFSF

Common minke whale	Western North Pacific	Number of ribs	35	Y		NRIFSF
Common minke whale	Western North Pacific	Brain weight	5	Y		NRIFSF
Common minke whale	Western North Pacific	Skull measurement (length and breadth)	34	Y		NRIFSF

*= Samples and data are currently under analyses.

4.3 Samples from stranded animals

Species	Area/stock	Tissue type(s)	No. collected	Archived (Y/N)	No. analysed	Contact person/institute
Common minke whale	Western North Pacific	Sample for DNA analysis*	4	Y	4	ICR
Common minke whale	Sea of Japan	Sample for DNA analysis*	1	Y	1	ICR
Common minke whale	Okhotsk Sea	Sample for DNA analysis*	3	Y	3	ICR
Bryde's whale	Western North Pacific	Sample for DNA analysis*	2	Y	2	ICR
Bryde's whale	East China Sea	Sample for DNA analysis*	1	Y	1	ICR
NP Right whale	Sea of Japan	Sample for DNA analysis*	1	Y	1	ICR
Humpback whale	Western North Pacific	Sample for DNA analysis*, baleen plates	1	Y	1	ICR
Sperm whale	Western North Pacific	Sample for DNA analysis*	2	Y	2	ICR

*Muscle or Skin

4.4 Analyses/development of techniques

Analyses related to the main objective of the JARPA

The IWC Scientific Committee carried out a review of the JARPA in a meeting conducted between 4 and 8 December 2006 (JRM) (IWC, 2006). Here a brief summary of the analyses presented at that meeting as well as other subsequent analyses are given.

Sightings and abundance estimation of Antarctic minke whale

A general outline of JARPA, including sighting and sampling protocols, was described (see SC/D06/J2). This outline was made as a response to the request from the Scientific Committee. See details of this paper and discussion in IWC (2006).

The possibility of correcting for the effect of skip in JARPA surveys was examined (see SC/D06/J3). Corrected abundance estimates in Areas IV and V were made using SSV (sighting and sampling vessels) data. A further correction was made by using Haw's method (Haw, 1991) to calibrate the difference between survey vessels. The estimated abundance series were used to estimate annual increase rates and their CV's. See details of this paper and discussion in IWC (2006).

An update of the abundance estimates for Antarctic minke whale based on JARPA sighting data was made using the IWC 'standard' methodology and the inter-mode calibration method of Haw (1991) (SC/D06/J6). All estimates assumed $g(0)=1$. Several adjustment and sensitivity tests were conducted to address some of the recommendations and comments made at the 2006 SC meeting. A new analysis was conducted to respond some of the recommendations derived from the JRM (see SC/59/IA11).

Abundance estimation of Antarctic minke whales using two-stage GAM analysis for school and school size densities, was carried out (see SC/59/IA12).

Stock structure of the Antarctic minke whale

An analysis on stock structure of Antarctic minke whales in the feeding grounds using mitochondrial DNA (mtDNA) restriction fragment length polymorphism (RFLP, six restriction enzymes) and microsatellites (six loci), was conducted. Samples used were obtained during JARPA surveys from 1987/88 to 2004/05 austral summer seasons in Areas IIIE, IV, V and VIW (see SC/D06/J09).

A comparison of morphology based on 10 external measurements from 2,629 male and 1,803 female mature Antarctic minke whales undertaken across the JARPA research area was conducted (see SC/D06/J10).

An investigation on stock structure in the Antarctic minke whale in the feeding grounds was conducted by examining body length of physically mature whales based on samples collected during JARPA surveys from 1987/88 to 2004/05 (SC/D06/J11).

An overview of the studies on stock structure in the Antarctic minke whale with the purpose of establishing a plausible hypothesis for the stock structure of this species in the JARPA research area (Areas IIIE-Area VIW), was proposed (see SC/D06/J12).

Estimation of biological parameters of the Antarctic minke whale

An estimation of the average natural mortality rate of the 10+ population for the I and P stocks from JARPA abundance and age sample data, using the method originally proposed by Tanaka (1990), was made (see SC/D06/J13).

The ADAPT-VPA assessment methodology originally developed by Butterworth *et al*. (1999) was improved by taking into account various comments made during recent Scientific Committee discussions. It was applied here to abundance estimates (from both IDCR/SOWER and JARPA surveys) and catch-at-age data (both commercial and scientific) for the putative I and P-stocks of Antarctic minke whales (see SC/D06/J14). This document presented an integrated analysis of catch-at-age and abundance data, which provided estimation *inter alia* of the history of annual recruitment (production of aged 1 animals) to the stocks, and of the adult female stock sizes, and hence also *per capita* recruitment. The analysis also estimated the natural mortality rate. An update of the ADAP-VPA analysis was conducted to respond some of the suggestions derived from the JRM (see SC/59/IA13).

Estimations of growth curves from JARPA data, stratified by the putative I and P stocks, sex and cohort (grouped by decade) were conducted (see SC/D06/J17). This document also contained estimates of age at maturity based on the fraction mature by age (for both sexes), age at first ovulation and pregnancy rate data among mature females.

An updated analysis of the trend in age at sexual maturity, using transition phase (TP) and age readings from a total of 2,803 individuals collected during 1987/88 to 2004/05 under JARPA, was conducted (SC/D06/J15). The analyses were stratified by the putative I and P stock areas.

A model-based approach similar to that of Thomson *et al*. (1999) to the transition phase data obtained from JARPA surveys was applied to examine trends in the age at maturity for the putative I and P stocks of Antarctic minke whales (see SC/D06/J16).

An examination of historical changes in the Antarctic minke whale stocks based on various results obtained from JARPA including age at sexual maturity, growth curve, blubber thickness, prey consumption, and ADAPT-VPA analysis of the stocks as well as research on mercury accumulation etc., was conducted. (see SC/D06/J26).

Marine ecosystem

The feeding habits and prey consumption of Antarctic minke whales were examined using stomach content data collected in JARPA (SC/D06/J18). The annual trends in energy storage in the Antarctic minke whale were examined using data from JARPA (see SC/D06/J19). Updates of these analyses were conducted following suggestions derived from the JRM (see SC/59/O9; SC/59/O10).

A comparison between the length-frequency distribution of krill in the stomach contents of Antarctic minke whales and from net sampling using a multiple rectangular mid-water trawl (RMT(1+8)M), was made (see SC/D06/J20).

Results of krill biomass estimation using a quantitative echo sounder onboard *Kyoshin Maru 2* (KS2) since 1998/99 JARPA, were presented in SC/D06/J21. The magnitude of the interspecific competition among three baleen whale species, Antarctic minke, humpback and fin whales, for their major prey was assessed (SC/D06/J22). A study on distribution patterns and biomass of Antarctic and ice krill in the Ross Sea in 2004/05 using *Kaiyo Maru*-JARPA joint survey data, was conducted (SC/D06/J24). An examination of influential environmental factors on distribution patterns of Antarctic minke whales at a small scale was conducted (see SC/D06/J25).

Environmental changes

An examination of the concentrations of Mn, Fe, Ni, Cu, Zn, Cd, Hg and Pb in Antarctic krill collected from Areas III, IV, V and VI by JARPA surveys, as well as their temporal and spatial variations during the period 1989/90 to 1998/90, was carried out (SC/D06/J27). Furthermore concentrations of trace elements in the liver of 1,056 minke whales taken from Areas IIIE, IV, V and VIW during the period 1988/89 to 2004/2005 by JARPA

surveys, and their variations in the liver of Antarctic minke whales, were estimated (SC/D06/J28). Yearly changes in the concentrations of DDTs, PCBs, HCHs, HCB and chlordanes were determined on the blubber of minke whales collected by JARPA (see SC/D06/J29).

Other JARPA analysis

Current distribution, abundance and abundance trend of humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus)* and blue (*B. musculus intermedia*) whales in the Antarctic Areas IIIE, IV, V and VIW, south of 60°S were examined by using JARPA sighting data (see SC/D06/J7).

Using biopsy samples from 411 humpback whales obtained during JARPA and the IDCR/SOWER cruises, a genetic study was conducted to describe their genetic population structure in parts of the Antarctic feeding grounds. Samples were obtained from the IWC management Areas III (*n*=81), IV (*n*=172), V (*n*=97) and VI (*n*=61), and were examined for (i) sex determination; (ii) the sequence variation of the first 334bp nucleotides of the mtDNA control region; and (iii) genetic variation at the genotypes of six microsatellite loci (see SC/D06/J31).

A brief review of the genetic studies on southern dwarf minke whales based on JARPA samples was conducted (see SC/D06/J08).

An overview of JARPA results not related to the main objectives of the program was carried out (SC/D06/J32).

ICR conducts several other analyses in the field of oceanography, physiology and genetics of whales using JARPA sample and data, in co-operation with several other research organizations at both national and international levels.

In co-operation with scientists from the St. Andrews University, St. Andrews, UK, an investigation to obtain unbiased estimate of abundance from JARPA surveys was conducted. Results of the spatial model analyses were presented to the JRM (see SC/D06/J4).

In a co-operative research with Hokkaido University, Japan, development of estimation methods of g(0) and abundance of Antarctic minke whales were investigated. Results were presented to the JRM (see SC/D06/J5).

In order to clarify physical oceanographic conditions in the JARPA research area, which is necessary to understand the habitat environment of whales, XBT, XCTD and CTD surveys were conducted during the JARPA surveys. The analyses of oceanographic data are conducted in co-operation with the Tohoku University, Japan. Results were presented to the JRM (see SC/D06/J30).

An examination of the interaction between oceanography, krill and baleen whale in the Ross Sea and adjacent waters was conducted in a research co-operation between ICR scientists and the NRIFSF, Japan. Results were presented to the JRM (see SC/D06/J23).

A co-operative study with University of California, Davis, USA, is in progress to investigate the population structure of blue whales worldwide using molecular genetics markers, introns of nuclear genes. Main contribution of ICR to the project is to provide biopsy samples of the 16 blue whales obtained in Antarctic waters during JARPA in 1994-2001.

In a co-operative research with JAMSTEC, antibodies against *Brucella* in the serum samples from JARPA 2003/2004 (n=119) were examined by agglutination test using *B. abortus* as antigens. No antibody was detected in the 2003/04 JARPA samples examined. This strongly suggests that *Brucella* infection does not occur in whales inhabiting the Antarctic.

In a co-operative study with Obihiro University of Agriculture and Veterinary Medicine, Obihiro, Japan, an examination of the reproductive physiology in the Antarctic minke whale is being conducted. During the period of this report, the following research topics were investigated: i) developmental capacity of the Antarctic minke whale vitrified oocytes following in vitro maturation, and parthenogenetic activation or intracytoplasmic sperm injection, 2) the ability of whale haploid spermatogenic cells for inducing calcium oscillations and activating oocytes, 3) contribution of spaermatozoal centrosomes to microtubule-organizing center in Antarctic minke whales, 4) histological studies on the placenta and uterus in Antarctic minke whales, 5) studies on composition analysis and utilization as functional materials of sphingoid base lipids from skin of Antarctic minke whales. Some of these results have been already presented or published.

Analyses related to the main objective of JARPN II

Feeding ecology and ecosystem studies

The stomach contents of 100 common minke, 100 sei, 50 Bryde's, and 6 sperm whales sampled in sub-area 7, 8 and 9 from May to August during 2006 JARPN II survey, were analyzed. Furthermore, the stomach contents of

35 common minke whales sampled near Kushiro's coastal-area from September to October during 2006 JARPN II survey, were analyzed.

Prey species abundance estimations were conducted using data obtained during the coastal component of JARPN II in 2006. In the Ayukawa survey the distribution and abundance of the prey species were investigated with the quantitative echo-sounder (EK 500 and ER 60) on board *Takuyo Maru* (120 GT) and *Shunyo Maru* (887 GT). Acoustic data were acquired with operating frequency at 38, 120 and 200 kHz. Species/size compositions of echo signs were identified by targeting mid-water trawling (25 times).

In the Kushiro survey the prey species research was conducted using IKMT trawl samplings and echo-sounder on board the RV *Kaiko maru* (860GT).

A progress report on the work on the ecosystem modelling of the JARPN II survey area using Ecopath-with Ecosim was prepared (see SC/59/O13).

Environmental effects on cetaceans and marine ecosystem

Organochlorines and trace elements are being analyzed in organs and tissues of common minke, Bryde's, sei and sperm whales collected during the 2006 JARPN II survey.

Stock structure

Common minke whales sampled during the coastal (n=95) and pelagic (n=100) components of JARPN II in 2006 were analyzed for mtDNA control region sequencing. The same genetic marker was analyzed for Bryde's (n=50) and sei (n=100) whales sampled in 2006 by JARPN II.

Other JARPN II analyses

Same as in JARPA/JARPA II, ICR conducts several other analyses in the field of oceanography, physiology, genetics and health of whales in co-operation with several other research organizations at both national and international levels. These include both analyses related to JARPN II objectives as well as other objectives.

In order to estimate cetacean prey selectivity as an input to the ecosystem models, accurate abundance estimation of cetacean prey species is being investigated using hydro-acoustic data. This estimation is being made as a co-operative study with Hokkaido University, Japan. Methodology for TS estimation of copepods, krill and sand lance has been developed in this study.

Examination of parasitic fauna in Bryde's, sei and sperm whales collected during JARPN II surveys is being conducted in co-operation with the National Science Museum, Tokyo, Japan.

Organochlorines (PCBs, DDTs, CHLs, HCHs, HCB, etc.) and trace elements (Mn, Fe, Ni, Cu, Zn, Cd, Hg and Pb) are being analyzed in organs and tissues of common minke, Bryde's, sei and sperm whales collected during the 2006 JARPN II survey. This study is being conducted in co-operation with the Center for Marine Environmental Studies, Ehime University, Matsuyama, Japan. In another co-operative study with this Center, the relationships between organochlorine levels and sensitivity in the common minke whales in the western North Pacific, is being investigated using genetics techniques. Furthermore a method for a rapid measurement of PCB levels in blubber of common minke whales is being developed.

In a co-operative study with Kyushu University, Fukuoka, Japan, molecular genetic analysis of *MHC* gene was conducted in order to determine the level of polymorphism of the *DQB* alleles for the Antarctic minke, sei, Bryde's and the sperm whale, to develop the methodology for analyzing different MHC locus, MHC-DRB, in cetacean. In another co-operative study with this university, molecular genetic analysis of *Tbx4* gene in cetaceans is being conducted.

In a co-operative study with Tokai University and National Science Museum, Japan, stomach contents of sperm whales were analyzed in order to determine the feeding ecology of sperm whales. This study was useful to understand the impact of sperm whales on prey species of the surface ecosystem.

In a co-operative study with Hokkaido University, Japan, a molecular endocrinological study was conducted to investigate molecular basis of endocrine regulation in seawater adaptation of cetacean.

In a co-operative research with JAMSTEC, antibodies against *Brucella* in the serum samples of common minke, sei, Bryde's and sperm whales from 2005 JARPN II offshore and 2006 JARPN II coastal survey (common minke whale), are being examined by agglutination test using *B. abortus* as antigen.

In a co-operative study with University of Tsukuba, Tsukuba, Japan, physicochemical properties and molecular structures of oxygen-binding hemoproteins from cetaceans is being investigated.

5. POLLUTION STUDIES

See item 4.4

6. STATISTICS FOR LARGE CETACEANS

6.1 Corrections to earlier years' statistics for large whales

None.

6.2 Direct catches of large whales (commercial, aboriginal and scientific permits) for the calendar year 2006 (North Pacific) and the season 2006/07 (Antarctic)

Species	Type of catch	Area/stock	Males	Females	Total landed	Struck and lost
Antarctic minke whale	Scientific permit	Area V & VI	154	351	505	3
Fin whale	Scientific permit	Area V & VI	1	2	3	0
Common minke whale	Scientific permit	W. North Pacific	144	51	195	2
Sei whale	Scientific permit	W. North Pacific	48	52	100	1
Bryde's whale	Scientific permit	W. North Pacific	21	29	50	1
Sperm whale	Scientific permit	W. North Pacific	2	4	6	0

6.3 Anthropogenic mortality of large whales for the calendar year 2006 or the season 2006/07

6.3.1 Observed or reported ship strikes of large whales (including non-fatal events)
See the part of NRIFSF in this report.

6.3.2 Fishery bycatch of large whales
See the part of NRIFSF in this report.

7. STATISTICS FOR SMALL CETACEANS

Not applicable.

8. STRANDINGS

See the part of NRIFSF in this report.

9. OTHER STUDIES AND ANALYSES

A genetic analysis based on mtDNA control region sequences was conducted on samples of the B-C-B stock of bowhead whale collected from different villages engaged in aboriginal whaling. Results were presented to the Intersessional workshop in preparation for the Implementation Review of this species (SC/J07/AWMP4). An update of such analysis was conducted (see SC/59/BRG29). In collaboration with scientists at TUMST a genetic analysis on bowhead whale based on microsatellites was completed (see SC/59/BRG30).

In collaboration with scientists at NRIFSF a document on concepts for a research program focused to elucidate sub-stock structure in the western North Pacific Bryde's whale was prepared in the context of the RMP *Implementation* process for this species in this region (SC/59/PFI2).

A genetic analysis based on mtDNA control region sequencing and microsatellites was conducted to investigate stock structure of the J-stock of common minke whale in a collaboration between ICR and Korean scientists (see SC/59/NPM6).

A total of 300 samples of whale products obtained from the Japanese retail market during May and July in 2006 were examined genetically (mtDNA control region sequencing analysis) for determining species identity.

10. LITERATURE CITED

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