

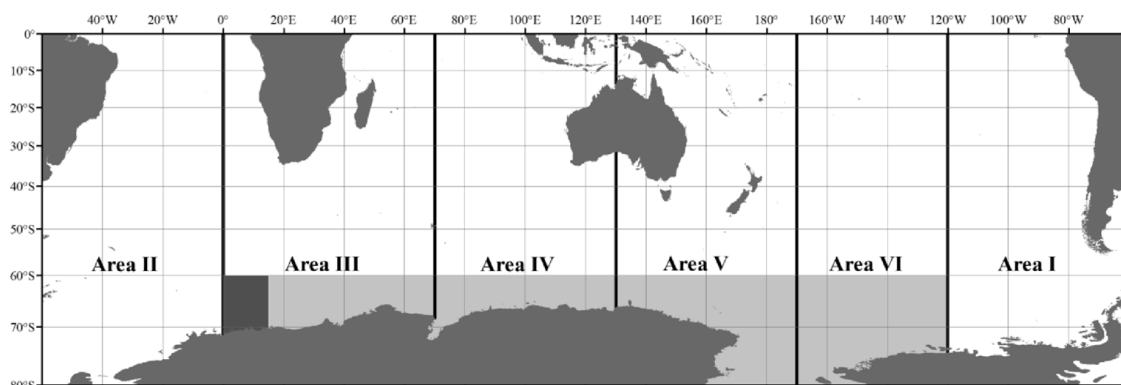
Japan. Progress report on large cetacean research, April 2019 to March 2020

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This document summarizes the data and samples of large cetacean, which were collected by the Institute of Cetacean Research (ICR), National Research Institute of Far Seas Fisheries (NRIFSF) and Fisheries Agency of Japan (FAJ) from April 2019 to March 2020 and austral summer season 2019/20. Sighting data for abundance estimates of large cetaceans were collected in the western North Pacific, the Gulf of Alaska and the Antarctic during systematic sighting surveys. During the surveys, photo-id, biopsy and satellite tracking experiments on large cetaceans were also conducted. A large number of biological data and samples were collected during the last surveys of the New Scientific Whale Research Program in the western North Pacific (NEWREP-NP) and commercial whaling in Japan's Exclusive Economic Zone (EEZ). Species and figures of bycatch and stranding of large cetaceans are based on the reports of prefecture governments to the FAJ, which compile reports from individual fishermen, fishery cooperative associations and the general public. Data and samples collected are being analyzed for contributing to the stock assessment and management of large cetaceans in the North Pacific.

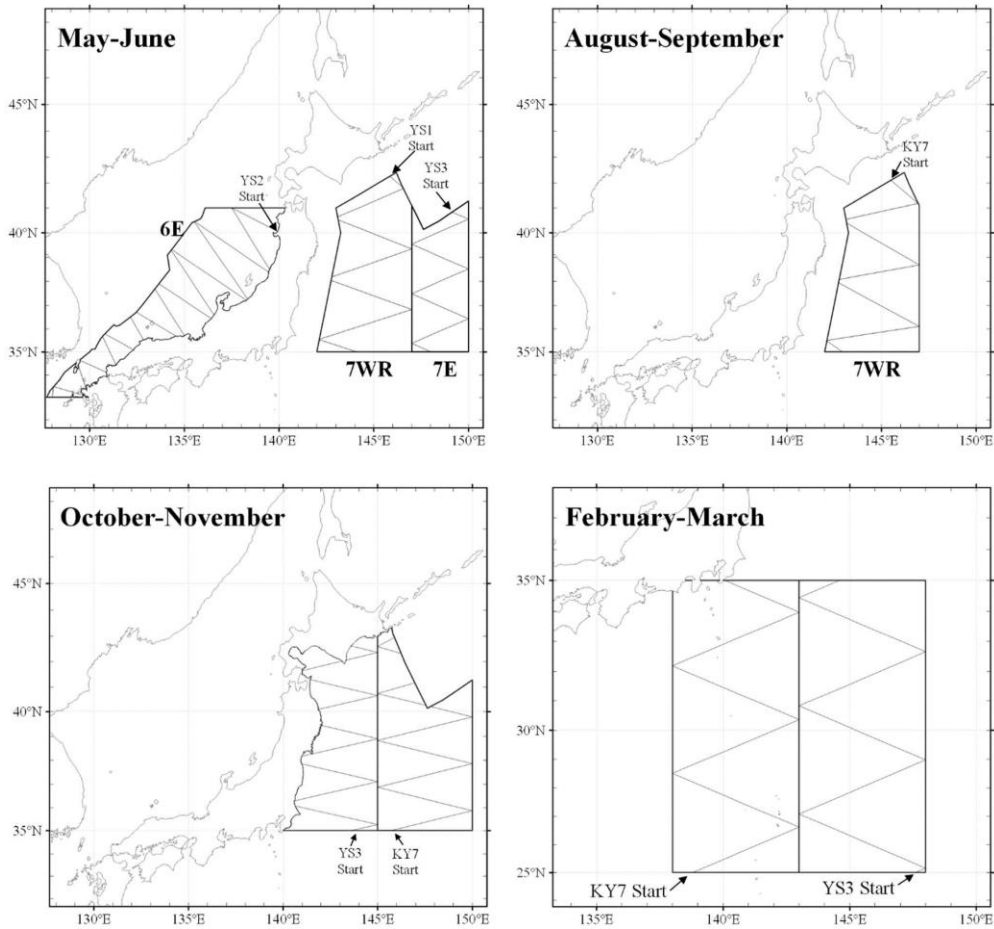
1. SIGHTING DATA

Dedicated sighting survey under the program Japanese Abundance and Stock structure Surveys in the Antarctic (JASS-A) in the Southern Ocean in the austral summer season 2019/20 (vessel: *Yushin-Maru No.2*).



Species	Date (research period)	Local area	No. of schools/No. of individuals	Contact person
Blue whale	19 Dec/19 – 1 Mar/20	Area IIIW + Transit	22/24	T. Isoda (ICR) isoda@cetacean.jp
Fin whale		Area IIIW + Transit	81/150	
Sei whale		Transit	1/1	
Antarctic minke whale		Area IIIW + Transit	124/211	
Humpback whale		Area IIIW + Transit	102/191	
Sperm whale		Area IIIW + Transit	14/15	
Southern bottlenose whale		Area IIIW + Transit	9/30	

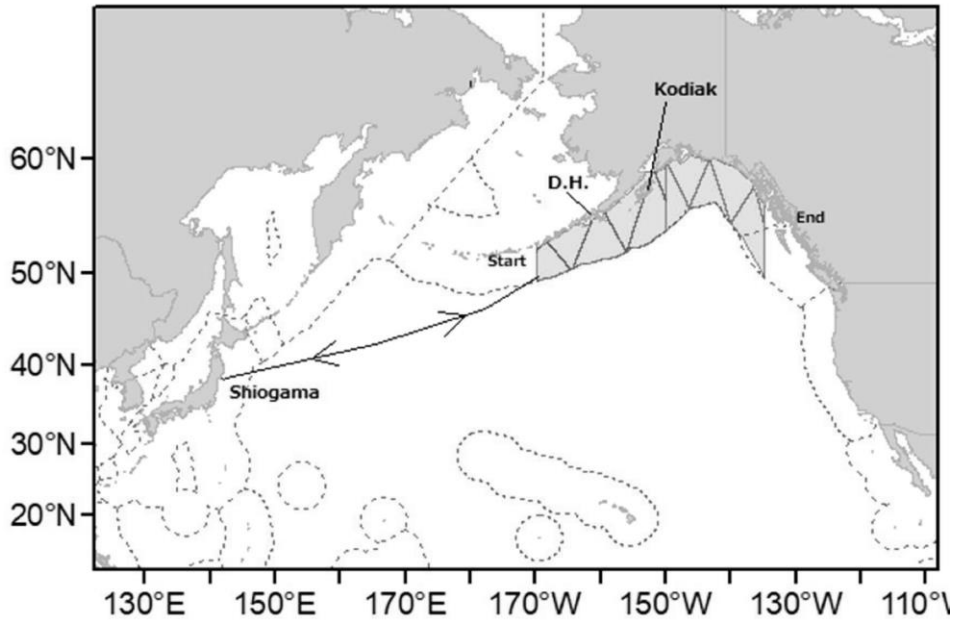
Dedicated sighting surveys under national program in the western North Pacific in 2019 and 2020 (vessels: *Yushin-Maru*, *Yushin-Maru No.2*, *Yushin-Maru No.3* and *Kaiyo-Maru No.7*).



Species	Date (research period)	Local area	No. of schools/No. of individuals	Contact person
Blue whale	10 May – 4 Jun/19	Western North Pacific	4/5	K. Matsuoka (ICR) matsuoka@cetacean.jp
	18 Aug – 21 Sep/19	Western North Pacific	1/1	
	8 Oct – 17 Nov/19	Western North Pacific	2/2	
Fin whale	10 May – 4 Jun/19	Western North Pacific	11/16	
	11 May – 25 Jun/19	Sea of Japan	12/21	
	18 Aug – 21 Sep/19	Western North Pacific	2/2	
	8 Oct – 17 Nov/19	Western North Pacific	22/38	
	11 Feb – 13 Mar/20	Western North Pacific + Transit	4/4	
Sei whale	10 May – 4 Jun/19	Western North Pacific	8/13	
	18 Aug – 21 Sep/19	Transit	1/1	
	8 Oct – 17 Nov/19	Western North Pacific	28/38	
	11 Feb – 13 Mar/20	Western North Pacific	7/14	
Bryde's whale	10 May – 4 Jun/19	Western North Pacific	48/61	
	18 Aug – 21 Sep/19	Western North Pacific + Transit	68/93	
	8 Oct – 17 Nov/19	Western North Pacific	37/42	
	11 Feb – 13 Mar/20	Western North Pacific + Transit	8/8	
Common minke whale	10 May – 4 Jun/19	Western North Pacific + Transit	3/3	
	11 May – 25 Jun/19	Sea of Japan + Transit	39/45	
	8 Oct – 17 Nov/19	Western North Pacific	1/1	
Humpback whale	10 May – 4 Jun/19	Western North Pacific + Transit	40/55	
	11 May – 25 Jun/19	Sea of Japan	1/1	

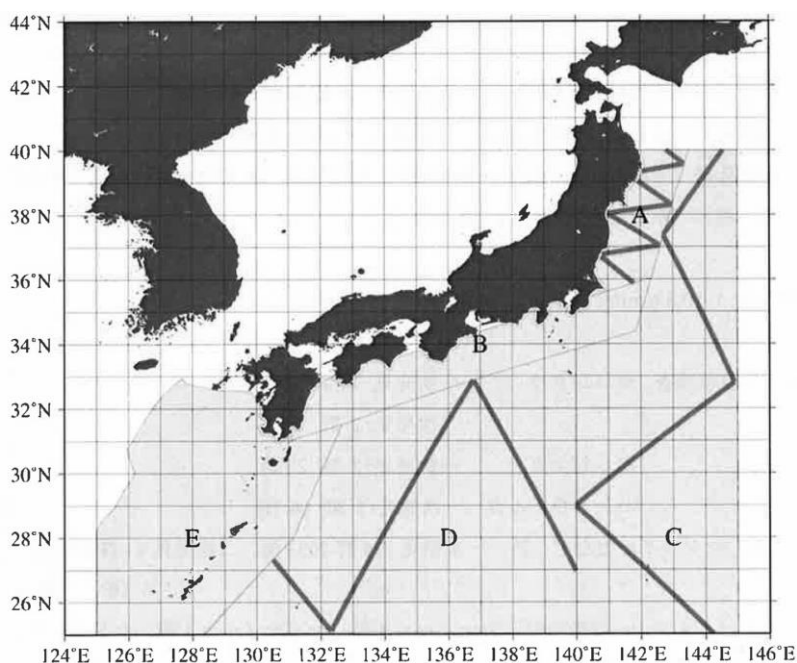
	8 Oct – 17 Nov/19	Western North Pacific	26/42	
	11 Feb – 13 Mar/20	Western North Pacific + Transit	19/32	
Sperm whale	10 May – 4 Jun/19	Western North Pacific + Transit	95/259	
	18 Aug – 21 Sep/19	Western North Pacific + Transit	35/100	
	8 Oct – 17 Nov/19	Western North Pacific	41/107	
	11 Feb – 13 Mar/20	Western North Pacific + Transit	11/15	

Dedicated sighting survey under the program International Whaling Commission-Pacific Ocean Whale and Ecosystem Research (IWC-POWER) in the North Pacific (vessel: *Yushin-Maru No.2*).



Species	Date (research period)	Local area	No. of schools/No. of individuals	Contact person
Gray whale	6 Jul – 26 Sep/19	Gulf of Alaska	6/15	K. Matsuoka (ICR) matsuoka@cetacean.jp
Blue whale		Gulf of Alaska + Transit	19/21	
Fin whale		Gulf of Alaska + Transit	266/458	
Sei whale		Gulf of Alaska + Transit	26/43	
Common minke whale		Gulf of Alaska + Transit	6/6	
Humpback whale		Gulf of Alaska + Transit	173/402	
Sperm whale		Gulf of Alaska + Transit	50/61	

Dedicated sighting survey on small cetacean in the western North Pacific in 2019 (vessel: *Kaiyo-Maru No. 7*).



Species	Date (research period)	Local area	No. of schools/No. of individuals	Contact person
N. P. right whale	22 May – 8 Jul/19	Western North Pacific	1/1	H. Yoshida (NRIFSF) hideka@affrc.go.jp
Bryde's whale			18/26	
Sperm whale			6/15	

2. MARKING DATA

2.1. Natural marking data

JASS-A survey-Antarctic in 2019/20

Species	Feature	Local area	No. of individuals photo identified	Contact person
Blue whale	Head, dorsal, lateral marking	Area IIIW + Transit	20	T. Isoda (ICR) isoda@cetacean.jp
Humpback whale	Fluke, dorsal marking		14	

National dedicated sighting-western North Pacific in 2019 and 2020

Species	Feature	Local area	No. of individuals photo identified	Contact person
Blue whale	Head, dorsal, lateral marking	Western North Pacific	8	K. Matsuoka (ICR) matsuoka@cetacean.jp
Humpback whale	Fluke, dorsal fin	Western North Pacific	25	
		Sea of Japan	1	

IWC-POWER dedicated sighting-North Pacific in 2019

Species	Feature	Local area	No. of individuals photo identified	Contact person
Gray whale	Lateral marking	Gulf of Alaska	6	K. Matsuoka (ICR) matsuoka@cetacean.jp
Blue whale	Head, dorsal, lateral marking		16	

Fin whale	Lateral marking		51	
Humpback whale	Fluke, dorsal fin		30	

2.2. Telemetry data

JASS-A survey-Antarctic in 2019/20

Species	Tag type	Local area	No. of individuals tagged	Contact person
Fin whale	Satellite	Area IIIW	10	K. Konishi (ICR) konishi@cetacean.jp
Antarctic minke whale	Satellite		8	

National dedicated sighting-western North Pacific in 2019 and 2020

Species	Tag type	Local area	No. of individuals tagged	Contact person
Blue whale	Satellite	Western North Pacific	1	K. Konishi (ICR) konishi@cetacean.jp
Fin whale	Satellite		6	
Sei whale	Satellite		14	
Bryde's whale	Satellite		1	

3. BIOPSY SAMPLES

JASS-A survey-Antarctic in 2019/20

Species	Local area	No. of individuals photo identified	Contact person
Blue whale	Area IIIW	10	T. Isoda (ICR) isoda@cetacean.jp
Humpback whale		11	
Antarctic minke whale		8	

National dedicated sighting-western North Pacific in 2019 and 2020

Species	Local area	No. of individuals photo identified	Contact person
Blue whale	Western North Pacific	5	K. Matsuoka (ICR) matsuoka@cetacean.jp
Fin whale		7	
Sei whale		5	
Common minke whale		1	
Humpback whale		3	

IWC-POWER dedicated sighting-western North Pacific in 2019

Species	Local area	No. of individuals photo identified	Contact person
Gray whale	Western North Pacific	2	K. Matsuoka (ICR) matsuoka@cetacean.jp
Blue whale		12	
Fin whale		45	
Sei whale		4	
Humpback whale		12	

Dedicated sighting survey on small cetacean-western North Pacific in 2019

Species	Local area	No. of individuals photo identified	Contact person
N. P. right whale	Western North Pacific	1	H. Yoshida (NRIFSF) hideka@affrc.go.jp

4. DIRECT CATCHES OF CETACEANS

4.1. Biological samples from scientific permits

NEWREP-NP coastal component (Ayukawa in spring) (2019)

Species	Area	Samples and data	No. of individuals	Contact person
Common minke whale	Western North Pacific	Body length and sex	20	T. Isoda (ICR) isoda@cetacean.jp
		External body proportion	20	
		Photographic record and external character	20	
		Diatom film record	20	
		Body scar record	20	
		Record of external parasites	20	
		Measurements of blubber thickness (five points)	20	
		Body weight	20	
		Skin tissues for DNA analysis	20	
		Muscle, liver, kidney and blubber for heavy metal analysis	20	
		Muscle, liver, kidney and blubber for organochlorine analysis	20	
		Muscle, liver, kidney, spleen, blubber, heart and ventral groove for various analysis	20	
		Urine for various analysis	4	
		Collection of blood plasma	13	
		Mammary gland; lactation status, measurement and histological sample	9	
		Uterine horn; measurements and endometrium sample	9	
		Collection of ovary	9	
		Testis and epididymis; weight and histological sample	11	
		Stomach contents and convenient record	20	
		Volume and weight of stomach content in each compartment	20	
		Observation of marine debris in stomach	20	
		Collection of stomach contents for feeding study	18	
		Earplug for age determination	20	
		Eye lens for age determination	20	
		Baleen plate measurements (length and breadth)	20	
		Photographic record of baleen plate series	20	
		Length of baleen series	20	
Collection of baleen plate	20			
Vertebral epiphyses sample	4			
Number of ribs	20			
Skull measurement (length and breadth)	20			

NEWREP-NP coastal component (Hachinohe in spring) (2019)

Species	Area	Samples and data	No. of individuals	Contact person
Common minke whale	Western North Pacific	Body length and sex	27	T. Isoda (ICR) isoda@cetacean.jp
		External body proportion	27	
		Photographic record and external character	27	
		Diatom film record	27	
		Body scar record	27	
		Record of external parasites	27	
		Measurements of blubber thickness (five points)	27	
		Body weight	27	
		Skin tissues for DNA analysis	27	

		Muscle, liver, kidney and blubber for heavy metal analysis	27	
		Muscle, liver, kidney and blubber for organochlorine analysis	27	
		Muscle, liver, kidney, spleen, blubber, heart and ventral groove for various analysis	27	
		Urine for various analysis	13	
		Collection of blood plasma	23	
		Mammary gland; lactation status, measurement and histological sample	11	
		Uterine horn; measurements and endometrium sample	11	
		Collection of ovary	11	
		Foetal sex (identified by visual observation)	1	
		Photographic record of foetus	1	
		Foetal length and weight	1	
		Foetal skin tissues for DNA analysis	1	
		Collection of whole body of foetus	1	
		Testis and epididymis; weight and histological sample	16	
		Stomach contents and convenient record	27	
		Volume and weight of stomach content in each compartment	27	
		Observation of marine debris in stomach	27	
		Collection of stomach contents for feeding study	21	
		Earplug for age determination	27	
		Eye lens for age determination	27	
		Baleen plate measurements (length and breadth)	27	
		Photographic record of baleen plate series	27	
		Length of baleen series	27	
		Collection of baleen plate	27	
		Vertebral epiphyses sample	13	
		Number of ribs	27	
		Skull measurement (length and breadth)	27	

NEWREP-NP coastal component (Abashiri in summer) (2019)

Species	Area	Samples and data	No. of individuals	Contact person
Common minke whale	Southern Okhotsk Sea	Body length and sex	32	H. Yoshida (NRIFSF) hideka@affrc.go.jp
		External body proportion	32	
		Photographic record and external character	32	
		Diatom film record	32	
		Body scar record	32	
		Record of external parasites	32	
		Measurements of blubber thickness (five points)	30	
		Body weight	32	
		Skin tissues for DNA analysis	32	
		Muscle, liver, kidney and blubber for heavy metal analysis	32	
		Muscle, liver, kidney and blubber for organochlorine analysis	32	
		Muscle, liver, kidney, spleen, blubber, heart and ventral groove for various analysis	31	
		Urine for various analysis	7	
		Collection of blood plasma	24	
		Mammary gland; lactation status, measurement and histological sample	27	
		Uterine horn; measurements and endometrium sample	26	

	Collection of ovary	27	
	Foetal sex (identified by visual observation)	16	
	Photographic record of foetus	16	
	Foetal length and weight	11	
	Foetal skin tissues for DNA analysis	15	
	Muscle, liver, kidney, spleen, blubber, heart and ventral groove of foetus for various analysis	6	
	Eye lens of foetus for age determination	6	
	Collection of whole body of foetus	2	
	Testis and epididymis; weight and histological sample	5	
	Stomach contents and convenient record	32	
	Volume and weight of stomach content in each compartment	29	
	Observation of marine debris in stomach	32	
	Collection of stomach contents for feeding study	31	
	Earplug for age determination	32	
	Eye lens for age determination	32	
	Baleen plate with V-shape notch on its outer edge for age determination	1	
	Baleen plate measurements (length and breadth)	32	
	Photographic record of baleen plate series	32	
	Length of baleen series	32	
	Collection of baleen plate	32	
	Vertebral epiphyses sample	32	
	Number of ribs	32	
	Skull measurement (length and breadth)	31	

4.2. Biological samples from commercial whaling

Offshore component (2019)

Species	Area	Samples and data	No. of individuals	Contact person/institute	
Sei whale	Western North Pacific	Body length and sex	25	T. Tamura (ICR) tamura@cetacean.jp	
		Photographic record and external character	25		
		Record of external parasites	25	H. Yoshida (NRIFSF) hideka@affrc.go.jp	
		Measurements of blubber thickness (two points)	25		
		Body weight	25		
		Skin tissues for DNA analysis	25		
		Muscle, liver and blubber for various analysis	25		
		Collection of blood plasma	25		
		Mammary gland; lactation status, measurement and histological sample	20		
		Collection of ovary	20		
		Foetal sex (identified by visual observation)	7		FAJ
		Photographic record of foetus	7		
		Foetal length and weight	7		
		Foetal skin tissues for DNA analysis	7		
		Eye lens of foetus for age determination	4		
		Testis; weight and histological sample	5		
		Stomach contents and convenient record	25		
		Observation of marine debris in stomach	25		
		Earplug for age determination	25		
		Eye lens for age determination	25		
Bryde's whale		Body length and sex	187		
		Photographic record and external character	187		
		Record of external parasites	187		

		Measurements of blubber thickness (two points)	187	
		Body weight	187	
		Skin tissues for DNA analysis	187	
		Muscle, liver and blubber for various analysis	187	
		Collection of blood plasma	170	
		Mammary gland; lactation status, measurement and histological sample	105	
		Collection of ovary	105	
		Foetal sex (identified by visual observation)	21	
		Photographic record of foetus	21	
		Foetal length and weight	21	
		Foetal skin tissues for DNA analysis	21	
		Eye lens of foetus for age determination	5	
		Testis; weight and histological sample	82	
		Stomach contents and convenient record	187	
		Observation of marine debris in stomach	187	
		Earplug for age determination	187	
		Eye lens for age determination	186	
Common minke whale		Body length and sex	11	
		Photographic record and external character	11	
		Record of external parasites	11	
		Measurements of blubber thickness (two points)	11	
		Body weight	11	
		Skin tissues for DNA analysis	11	
		Muscle, liver and blubber for various analysis	11	
		Collection of blood plasma	9	
		Mammary gland; lactation status, measurement and histological sample	1	
		Collection of ovary	1	
		Foetal sex (identified by visual observation)	0	
		Photographic record of foetus	0	
		Foetal length and weight	0	
		Foetal skin tissues for DNA analysis	0	
		Eye lens of foetus for age determination	0	
		Testis; weight and histological sample	10	
		Stomach contents and convenient record	11	
		Observation of marine debris in stomach	11	
		Earplug for age determination	11	
		Eye lens for age determination	11	

Coastal component (Kushiro) (2019)

Species	Area	Samples and data	No. of individuals	Contact person/institute
Common minke whale	Western North Pacific	Body length and sex	33	T. Tamura (ICR)
		External body proportion	21	tamura@cetacean.jp
		Photographic record and external character	33	H. Yoshida (NRIFSF)
		Body scar record	33	
		Measurements of blubber thickness (two points)	33	hideka@affrc.go.jp
		Skin tissues for DNA analysis	33	FAJ
		Muscle, liver and blubber for various analysis	33	
		Mammary gland; lactation status and measurement	9	
		Uterine horn; measurements and endometrium sample	2	
		Collection of ovary	6	
		Foetal sex (identified by visual observation)	2	
		Photographic record of foetus	2	
		Foetal length and weight	2	

	Foetal skin tissues for DNA analysis	2	
	Eye lens of foetus for age determination	1	
	Testis; weight and histological sample	24	
	Stomach contents and convenient record	33	
	Earplug for age determination	33	
	Eye lens for age determination	33	
	Baleen plate for age determination (body length ≤ 6 m)	2	

5. FISHERIES BYCATCHES OF CETACEANS

Species	No. of animals	Location ¹⁾	Fate ²⁾	Gear ³⁾	Target fish species ⁴⁾	Source or contact
Common minke whale	6	Hokkaido	K	FPN	NA	FAJ
	6	Aomori	K	FPN		
	14	Iwate	K	FPN		
	6	Miyagi	K	FPN		
	1	Akita	K	FPN		
	4	Chiba	K	FPN		
	3	Niigata	K	FPN		
	9	Toyama	K	FPN		
	20	Ishikawa	K	FPN		
	4	Fukui	K	FPN		
	1	Shizuoka	K	FPN		
	2	Mie	K	FPN		
	3	Kyoto	K	FPN		
	4	Wakayama	K	FPN		
	1	Shimane	K	FPN		
	5	Yamaguchi	K	FPN		
	2	Kochi	K	FPN		
10	Nagasaki	K	FPN			
2	Miyazaki	K	FPN			
1	Kagoshima	K	FPN			
Sei whale	1	Toyama	K	FPN		
Humpback whale	1	Chiba	R	FPN		
	1	Chiba	K	FPN		
	1	Mie	K	FPN		
	1	Yamaguchi	K	FPN		
	1	Kochi	K	FPN		
	2	Okinawa	R	FPN		
Unidentified baleen whale	1	Aomori	D	FPN		

1) Recorded at the place of fishing gears.

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

3) Described using "FAO FISHING DESCRIPTION AND CODES", that is, stationary uncovered pound nets (FPN), set gillnets (GNS) and miscellaneous gear (MIS).

4) Target fish species: NA = not available

6. STRANDING OF CETACEANS

Species	No. of stranding	Location (prefecture)	Source or contact
Common minke whale	5	Hokkaido	FAJ
	1	Toyama	
	1	Ishikawa	
	2	Yamaguchi	

	1	Miyazaki
Sei whale	1	Chiba
Bryde's whale	1	Tokyo
Humpback whale	1	Miyagi
	1	Kanagawa
	1	Shizuoka
	1	Mie
	1	Kochi
	1	Nagasaki
Gray whale	1	Kanagawa
Sperm whale	2	Hokkaido
	1	Iwate
	1	Miyagi
	1	Chiba
	4	Kagoshima
Unidentified baleen whale	1	Hokkaido

7. PUBLICATIONS (2019-2020)

- Cunen, C., Walløe, L. and Hjort, N.L. 2020. Focused model selection for linear mixed models with an application to whale ecology. *Ann. Appl. Stat.* 14 (2): 872–904.
- Goto, M., Kitakado, T. and Pastene, L.A. 2020. A preliminary study of epigenetic estimation of age of the Antarctic minke whale *Balaenoptera bonaerensis*. *Cetacean Population Studies* 2: 5–14.
- Inoue, S., Yasunaga, G. and Pastene, L.A. 2019. Comparison of progesterone concentrations in blubber and plasma among female Antarctic minke whales of known reproductive status. *Fish Sci* 85 (6): 971–977.
- Kawasaki, K., Mikami, M., Goto, M., Shindo, J., Amano, M. and Ishiyama, M. 2020. The evolution of unusually small amelogenin genes in cetaceans; Pseudogenization, X–Y gene conversion, and feeding strategy. *Journal of Molecular Evolution* 88 (2): 122–135.
- Konishi, K., Isoda, T., Bando, T., Minamikawa, S. and Kleivane, L. 2020. Antarctic minke whales find ice gaps along the ice edge in foraging grounds of the Indo-Pacific sector (60°E and 140°E) of the Southern Ocean. *Polar Biol* 43 (4): 343–357.
- Matsuoka, K. and Hakamada, T. 2020. Density distribution of several major whale species in the Indo-Pacific region of Antarctic using JARPA and JARPAII sighting data obtained through 1987/88–2008/09 seasons. *Cetacean Population Studies* 2: 15–38.
- Pastene, L.A., Acevedo, J. and Branch, T.A. 2020. Morphometric analysis of Chilean blue whales and implications for their taxonomy. *Marine Mammal Science* 36 (1): 116–135.
- Takahashi, M., Kato, H. and Kitakado, T. 2019. Sex prediction by machine learning methods for small sample sizes: a case study of cranial measurements of killer whales (*Orcinus orca*). *Mammalian Science* 59 (1): 67–78 (in Japanese).
- Tanabe, A., Shimizu, R., Osawa, Y., Suzuki, M., Ito, S., Goto, M., Pastene, L.A., Fujise, Y. and Sahara, H. 2020. Age estimation by DNA methylation in Antarctic minke whales. *Fish Sci* 86 (1): 35–41.
- Watari, S., Murase, H., Yonezaki, S., Okazaki, M., Kiyofuji, H., Tamura, T., Hakamada, T., Kanaji, Y. and Kitakado, T. 2019. Ecosystem modeling in the western North Pacific using Ecopath, with a focus on small pelagic fishes. *Mar Ecol Prog Ser* 617–618: 295–305.
- Yasunaga, G. and Fujise, Y. 2020. Concentration of persistent organic pollutants (POPs) in three species of baleen whales in the western North Pacific. *Cetacean Population Studies* 2: 39–53.