Biological Investigation on the Whales Caught by the Japanese Antarctic Whaling Fleets, Season 1950/51

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CONTENTS

Introduction

This report is a compilation of the results of the biological investigation on whales caught by the Japanese two whaling fleets during 1950/51 Antarctic season.

The Hashidatemaru fleet left Japan for the Antarctic on 29th October and the Nisshinmaru fleet left on 1st November to participate in sperm whaling prior to the commencement of the baleen whaling season. During 26th November to 21st December they caught respectively

243 and 166 sperm whales between 95° and 150°E., Long. Both fleets bagan baleen whaling on 22nd December 1950, the first day of the season authorized by International Agreement, and operated in the sector south of Latitude 63°S., between Longitude 96°E. and 162°W. They ceased operations on 9th March 1951. The catch during this season is shown as in the appended table. In the "Ross Area", more than 10 fleets gathered and their whaling ground also extended wide longitudinally. For convenience of comparison, the whaling ground is classified into the following three sections, section I (west of 135°E.), section II (135°–175°W.), and section III (east of 175°W.) in this report. Data on products are also appended at the end of this report.

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I. Biological composition of catch

1. *Number of whales by species*

The catch composition during this season differs notably from those of preceding seasons in a point that both fleets caught very small number of blue whales and on the contrary many fin whales. (Cf. Table 1, Fig. 1 and Fig. 2) This trend was remarkably seen especially in section I. (Cf. Fig. 5) Comparing this with catch by foreign fleets during this season, however, it is safely said that Japanese catch was quite exceptional. Catch of humpback whales was also very small; the Hashidatemaru fleet only caught 9 whales, between 1st Feb. and 9th Feb., 1951. (Cf. Fig. 6) As seen in Fig. 6, catch of sperm whales in the Antarctic has been gradually increased since 1935/36 season. The Japanese catch of sperm whales during 1950/51 season was also larger than that of last season.

2. *Sex ratio*

In Fig. 7, sex ratio of blue, fin and humback whales caught by Japanese fleets after the War is compared with that by foreign fleets. This figure shows wider fluctuation of the former than the latter. This would be caused by difference of the whaling grounds and time lag of seasonal migration between male and female through these three species.

In blue and fin whales male decreased its percentage in sex ratio. In Fig. 7 is shown post-war monthly change of sex ratio. According to this, blue male whales during the preceding four seasons occupied larger percentage than female as season advanced. On the contrary, in this season, blue male decreased its percentage with the maximum of 54.3% in January. In fin whales seasonal migration would be rather complicated. Different from the result of the preceding four seasons, percentage of male whales increased in January in this season. This problem is so much related to migration that it is mentioned later again.

3. Body length

Length frequency of whales caught is shown in Fig. 1 (blue whales), Fig. 2 (fin whales), Fig. 3 (humpback whales), and Fig. 4 (sperm whales) in comparison between this season and post-war four seasons. According to these figures, there is not so large difference in size distribution among these seasons, excepting female of blue whales and male and female of humpback whales, which were so small in number of catch. Average body length is shown in Fig. 6. Blue male whales retained barely the top of last season. Average length of blue female whales went down remarkably from that of last season. Small number of catch in blue whales may not represent the real trend. In fin whales, both male and female decreased their average body length. As for size distribution in each section of whaling ground, smaller fin whales were seen more often in Section I than in other two sections. (See Table 4)

4. Maturity

Seasonal catch ratio of immature whales is shown in Figs. 10, 11 and 12. (Cf. Table 13) This classification is based solely on the body length by Mackintosh and Wheeler. The catch of immature whales both in blue and fin whales, has gradually increased since 1947/48 season, with the minimum catch in it. Both in blue and fin whales, male and female, the catch ratio of immature whales was the largest in Section I: 20.8% in blue male and 53.5% in blue female, (See Table 5), 18.3% in Section I, 11.6% in Section II in fin male whales: 20.6% in Section I, twice as large as in Section II and III in fin female whales. These figures indicate that catch of immature whales, both in blue and fin whales, got smaller as whaling fleets moved eastward, namely whaling season advanced.

There were very few immature humpback whales in Japanese catch. For the present, the standard of maturity determination on sperm whales is not so decisive as on baleen whales, and mention thereupon is omitted.

5. Pregnant ratio

In Fig. 9 is shown the pregnant ratio of whales caught by Japanese fleets during the post-war five seasons. Pregnant ratio for 1950/51 season was 67.0% in fin whales, and 83.3% in humpback whales, both of which were nearly same as that of 1949/50 season. In blue whales, pregnant ratio for this season was 47.5%; smaller by 10% than that of last season. Fig. 8 indicates semi-monthly fluctuation of pregnant ratio. The general trend is that pregnant ratio decreases as season advances. In blue whales it is rather complicate through the course of the season. For this fact there is a probable explanation that pregnant ratio lags behind the birth ratio.[1] From Fig. 13 (cited from Discovery Reports, Mackintosh & Wheeler) showing that birth season of both blue and fin whales covers about 4–5 months, it is thought that among pregnant whales migrating to the Antarctic there are some whales which leave the Antarctic comparatively earlier for warm water suitable to breeding. Namely, it seems probable that the decrease of pregnant ratio is caused by earlier departure of some whales for warm waters.

II. Some items related to migration

1. Blubber thickness

The trend is that blubber increases its thickness gradually after whales have migrated to the Antarctic, which is rich in their food. In Fig. 14 also, showing weekly fluctuation of average blubber thickness of baleen whales caught by Japanese fleets during post-war five seasons, it is seen. That of sperm whales for 1950/51 season only is shown in Fig. 17. Very few blue whales were caught this season, showing large fluctuation of blubber thickness. In addition, there was a sudden decrease of blubber thickness in the course of season. Probable explanation is that this may be caused by arrival of some whales from warm waters. Details on this question are mentioned in the following paragraph.

Fig. 15 indicates comparison of blubber thickness among male, female and pregnant whales. The result is same as in the preceding seasons:

1) Biological Investigation of whales caught by Japanese Antarctic whaling fleets seasons 1946/50 (in Japanese)

blubber of female is thicker than that of male and that of female in resting stage is thicker than that of pregnant female whales.

2. Parasites

By the same method as during the previous seasons, Cyamus, Coronula, Conchoderma, Pennella and Diatom film were investigated on their infection density and position. Table 7 indicates the result of the investigation during the post-war five seasons.

Infection rate of Cyamus and Diatom film for this season, fluctuates as wide as in the previous seasons. Other than the above two species, however, were very rare and varied little. So, as an index to migration of whales, here are taken Cyamus and Diatom film. Fig. 16 shows the weekly fluctuation of infection rate of them on male and female of blue and fin whales.

In the early stage of the season, female fin whales show lower infection rate of Diatom film than male. As the season advances, the former comes close to the latter in infection rate. This fact may endorse safely the conception that male whales arrive at the Antarctic earlier than female. This trend can be seen in blue whales also, which were so small in number of catch.

Between Cyamus and Diatom film, there is a relation that as the season advances, the former decreases its infection rate and the latter increases its rate. This corresponds to the results of investigation during the previous seasons.

Seasonal change of infection rate and blubber thickness might have a relation with migration of whales. In sperm whales (Fig. 17) Diatom film decreased its infection rate with the top in the second week and rather turned upward in the fourth week. On the contrary, Cyamus increased its upward trend of infection rate and turned downward in the fourth week. From these facts, it might be deduced that more sperm whales migrate newly to the whaling ground in the third week to fourth week. Change of blubber thickness is also helpful to understand this conjecture. While, in fin whales, for this season it is rather difficult to see the clear relation among these factors. It is too small in number of blue whales to get any conclusion upon blue whales.

3. White scars

Number and curing stage of white scars, which are likely to be caused by some kinds of protozoa, were investigated. The number is thought to have some relation with ages. Still more important is the curing stage of them and this is one of the items to be taken into

consideration to learn the migrating season of whales to the Antarctic, as well as Diatom film infection rate and change of blubber thickness. In this season curing stage of white scars was investigated for the first time. The result showed that most of white scars had been already cured or nearly cured.

III. Some items related to age of whales

1. *Number of corpora lutea*

In order to learn the relation between body length and age of whales, it is more desirable to use total number of corpora lutea of right and left ovaries than to use total weight of both ovaries. Figs. 18, 19 and 20 indicate the relation between body length and number of corpera lutea of blue, fin and humpback whales. (A) in Fig. 18 is for the entire ground and nearly same trend is seen between the average of four seasons, 1946/50 and this season. (B), (C) and (D) in Fig. 18 indicate the relation by sections in blue whales. It is to be regretted that blue whale caught was too small in number. (C), (D) and (E) in Fig. 19 show the relation in fin whales in each section and (E) is for comparison among them. According to them, number of corpora lutea in each body length seems a little larger in Section I than in Section III. From Fig. 24, which shows the maturity rate of fin whales in each body length, it is seen that maturity rate is lower in Section III than in Section 1, in body length of 65 feet or there about, body length at which fin whales are said to get maturity. It is presumed that this is because of larger body length at which fin whales get maturity in Section III than Section I.

For the present, there are no other items to endorse this fact in fin female whales. Similar trend in male whales is, however, seen from weight of testes as mentioned later. As the average of number of corpora lutea in these cases, arithmetical mean was adopted. Since a definite standard to discriminate genuine corpora lutea from so-called pseudo-corpora lutea, is not yet available, number of corpora lutea in this report may include number of pseudo-corpora lutea also. It might be, therefore, danger for the present, to determine age of whales with body length and number of corpora lutea.

2. *Weight of testes*

It has been previously mentioned[1] that both volume and weight of

1) See footnote page 128.

testes increase in the similar trend with body length. So in this season, volume measurement was omitted. Weight of testes cannot be combined with age so directly as number of corpora lutea in female, and yet don't lose importance on determination of body length of whales, at which maturity is gained. Figs. 21, 22 and 23 indicate the relation between body length and total weight of right and left testes of blue fin and sperm whales respectively. As the average of weight of testes, geometrical mean was used herein. In fin whales there is a considerably large difference of weight of testes between for this season and for average of preceding four seasons (Fig. 22, A). It is most likely that body length at which fin whales get maturity, is larger by two feet in Section I than in Section III.

During the post-war four seasons, the principal whaling ground was the so-called "Ross Area", Section III in our classification. It is quite natural, therefore, that curve of the average weight of testes for four seasons and curve for this season in Section III are very similar. Although in Section II, catch was so small and weight of testes deviates so much, it shows the value between Section I and III. As mentioned above, body length at which fin whales get maturity in both male and female, shows difference between in Section I and in Section III. This might suggest fin whales which migrate to "Area IV" are of different group from those which migrate to "Area V". As for blue whale, small catch of them cannot lead the definite result.. Table 8 indicates number and percentage of sperm whales in each body length, of which testes were under 3, 4, 5 and 6 kgs in weight. The standard weight of testes enough to determine the sexual maturity of sperm whales is not yet found. In the above table there are considerable number of sperm whales of which testes are very light. This means that an opinion that sexually mature male sperm whales only migrate to the Antarctic is open to discussion. There is a difference of average curve of weight of testes between baleen whales and sperm whales in the adjacent waters of Japan, according to Mr. Ohmura. The same may hold for whales in the Antarctic. Histological study would be helpful largely to this question.

IV. Seasonal change of length of foetuses and Malformed foetuses

Foetuses we got during this season are tabulated as follows.

Species		Male	Female	Unknown	Total	Multiformed
Blue	number	20	18	—	38	0
	%	52.6	47.4	—	100	0
Fin	number	271	259	3	533	5 twins and 1 quadruplet
	%	51.0	48.9	0.1	100	
Humpback	number	2	3	0	5	0
	%	40.0	60.0	0	100	0

Among five fin whales with twin, four whales had 1 functional corpus luteum, viz. these foetuses were monooviparous, two groups of males and two groups of females, and the rest had two functional corpora lutea: this was dioviparous, one was male and the other female. One quadruplet was of one male, two females and 1 sex unknown foetus, all of which were malformed and found rotten on the way of development.

Fig. 25 indicates the seasonal change of length of foetus. As the average of lengths, arithmetical mean was adopted. The growth curve of both male and female foetus corresponds well to that of Discovery Reports Vol. 1 and to that of last season by Japanese fleets.

In Fig. 25, fin whales, mean curve of growth of fin whale foetuses which would be conceived in Dec.–Nov. was cited from Discovery Reports Vol. 1, page 425. Foetuses A and B which were gained during this season are dotted under this curve. Foetus A was found in the mother whale of 70 feet long caught at 64°25′S. Lat., 119°20′E. Long., on January 6th. Foetus B was found in the mother of same length caught at 64°35′S. Lat., 130°44′E. Long., on January 10th, 1951. Both of these foetuses were so small under 1 inch in length that their sex could not be determined. These seem to have been conceived in the latter half of December, taking from the above curve of growth of foetus cited from Discovery Reports. By reference to curve of frequency of pairing of fin whales, Discovery Reports Vol. 1, p. 426, there are some whales pairing in the latter half of December and foetuses A and B are not exceptional. It is, however, noteworthy that these were found in waters of so high latitude as 64° South Latitude.

For the reference, data of mother whales of foetuses A and B are as follows: they were both 70 feet long and not infected with external parasites. Respectively, 0.40% and 0.45% in percentage of blubber thickness to body length, are larger than 0.39% these of pregnant whales for 3–4th weeks. It will be inconclusive from these data only that it was not long before they got to the Antarctic.

V. Others

1. Body colour

Body colour of sperm whales and humpback whales was investigated by the same method as in the previous seasons. Fig. 27 indicates comparison of frequency of body colour between sperm whales caught in the adjacent waters of Japan[1] and those which were caught in the Antarctic. Classification and degree of body colour are as follows:

I. Body colour.
   - A. uniform dark grey all over the body.
   - B. lighter on the under surface of the head and lower jaw.
   - C. light whitish all over the body.
   - D. light whitish all over the body.

II. Slight coloured spiral marking on the head.
   - a. very clear
   - b. clear
   - c. not clear
   - d. none

III. Light grey flecking.
   - 0. none
   - 1. few
   - 2. moderate
   - 3. many
   - 4. very numerous

IV. White splash.
   - 0. none
   - 1. normal
   - 2. remarkable

Such a classification of colouration often depends upon the subject of observers, so that detailed comparative study would not have much significance. It corresponds approximately to the results of Matthews and Ohmura that in item I, uniform dark grey whales over the body occupied 65.5% of total whales. It may be noteworthy that rather high percentage of whales with white splash in the Antarctic is seen in contrast with high percentage of normal whales in item IV, in the adjacent waters of Japan. Four items on colouration of humpback whales are not inconclusive, because of small catch of them.

Fin whales were investigated only in the following point: persence or absence of tongue of pigmentation behind anus. The result is as follows:

1) Whales in the adjacent waters of Japan by H. Ohmura, Scientific Reports of the Whales Research Inst. No. 4, 1950

Sex	Number of whales investigated	Number of whales presence	absence	In percentage presence	absence
Male	1087	784	303	72.1%	27.9%
Female	941	661	280	70.2%	29.8%

2. Mammary gland

3. Ossification of vertebrae

4. Teeth of sperm whales

Colour and thickness of mammary gland, ossification of vertebrae in four classes at two points, thoracic and lumbar, and number of rudimentary exposed teeth of sperm whales were also investigated but no special results enough to show herein were gained.

5. Foods

Size, quantity and freshness of squid in the stomach of sperm whales and of *Euphausia superba* in the stomach of baleen whales were investigated. Sometimes fish were found in the mass of *Euphausia*. The comparison of size of *Euphausia superba* among sections is shown in Table 9. It is seen from this table that % of M which occupied the largest part in Section I, decreased gradually as whaling ground moved to II and III. S shows the largest percentage in Section III, this figure being larger than in last season. Something peculiar on the food seems to be seen in the "Ross Area" this season.

6. Lactating whales

In the Japanese catch there were two lactating whales found.

Date and time of catch	11 : 40, Jan. 10, 1951	10 : 45, Feb. 13, 1951
Date and time of treatment	13 : 50, Jan. 10, 1951	12 : 40, Feb. 13, 1951
Locality of catch	64°32′S, 129°45′E	65°05′S, 164°08′W
Species	Blue whale	Blue whale
Sex	Female	Female
Body length	79 ft.	86 ft.
Thickness of blubber	8.5 cm	10.0 cm
Stomach content	None	Small krill, half
Foetus	None	None
Amount of milk	under 1 L flowed	3-4 L flowed
Thickness of right mammary gland	14.5 cm	21.0 cm
Color of right mammary gland	Yellow	Pink
Greatest width of right uterus	21 cm	14 cm
Greatest width of left uterus	18 cm	17 cm
Color of inside of uterus	Normal	Yellowish grey

Weight of right ovary	1.3 kg	1.2 kg
Weight of left ovary	1.0 kg	1.8 kg
Number of functional corpora lutea	0	0
Number of old corpora lutea	2 in right and 1 in left ovary	4 in right and 6 in left ovary
Diameter of the largest corpora lutea	6.5 cm in right and 6.0 cm in left one	6.0 cm in right and 6.2 cm in left one

7. Dimensions and weight of whales

During this season also, measurement of bodily proportion and weight of whales, which have been made since 1947/48 season was continued. Data on dimensions and weight were collected on 5 fin, 2 blue, 1 humpback and 16 sperm whales. In addition to them, data on dimension only were collected on other 34 sperm whales. These data are appended at the end of this report. The method described in Discovery Reports vol. I and XVII was followed for the measurement of linear dimensions. These measurement were made with a taut steel tape while the whales lay on deck, prior to flensing.

The component parts of the body of each of these whales were weighed during flensing. Blubber, bone, meat and internal organs were removed from the carcass, cut into small pieces to weigh separately on platform scales of one half metric ton capacity. Weights were determined to one kilogram and added to give the total weight of the component parts. It is therefore probable that inaccuracies exist in the figures, and that the relative error is high for small organs and organs covered with a thick layer of fat or connective tissues.

Inconsistencies also result from the fact that flensing methods on two factories differ slightly, and sometimes vary on one vessel. For this reason, figures given for such items as ventral grooves, ventral meat, gums, head blubber, and dorsal fin are not always comparable. But figures given for the aggregate weight of blubber, meat, and bones and for the total weight of each whale are considered reliable.

All weights are expressed in kilograms; accuracy does not exceed three significant figures for the larger component parts (more than 1,000 kgs.) and two figures for the small organs.

The organs not listed in the tables and those for which no figure is given were not separated, and the weight is included in that of blubber, meat and bone. Blood and other body fluids were not weighed, and no attempt was made to estimate their weights.

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(The Whales Research Institute)

Appendix

Table 1. Catch by Japanese fleets, post-war five seasons

Season	Blue whale		Fin whale		Humpback whale		Baleen total	Sperm	Grand total
	No.	%	No.	%	No.	%	No.	No.	
1946/47	690	59.2	474	40.6	0	0	1164	1	1165
1947/48	710	53.9	608	46.1	0	0	1318	2	1320
1948/49	631	38.4	1012	61.6	0	0	1643	0	1643
1949/50	817	42.2	1056	54.4	67	3.4	1940	172	2112
1950/51	271	11.6	2050	88.0	9	0.4	2330	409	2739

Table 2. Comparison of catch, fin whales, by sections

	Operating days			Number of whales caught			Number of whales caught per day	Average body length (ft.)			Maturity ratio (%)			Pregnant ratio (%)
	Nisshin	Hashi-date	Total	Male	Female	Total		Male	Female	Total	Male	Female	Total	
Section I	26	26	52	448	396	844	16.2	65.8	68.9	67.3	81.7	76.8	79.3	75.7
Section II	8	12	20	69	61	130	6.5	65.6	70.5	67.9	88.4	88.5	88.5	55.6
Section III	44	40	84	580	496	1076	12.8	66.3	69.9	68.0	94.3	86.9	90.9	62.4
Entire ground	78	78	156	1097	953	2050	13.1	66.1	69.6	67.7	88.8	82.8	86.0	67.0

Table 3. Comparison of catch, blue whales, by sections

	Operating days			Number of whales caught			Number of whales caught per day	Average body length (ft.)			Maturity ratio (%)			Pregnant ratio (%)
	Nisshin	Hashi-date	Total	Male	Female	Total		Male	Female	Total	Male	Female	Total	
Section I	26	26	52	24	43	67	1.3	78.1	77.9	78.0	79.2	46.5	58.2	50.0
Section II	8	12	20	11	12	23	1.2	77.3	78.4	77.9	90.9	58.3	73.9	57.1
Section III	44	40	84	94	87	181	2.2	78.5	80.2	79.3	88.3	60.9	75.1	45.3
Entire ground	78	78	156	129	142	271	1.6	78.3	79.3	78.9	86.8	56.3	70.8	47.5

Table 4. Classification of fin whales by length in each section

Body length group (in ft.)	Whaling ground Section I						Section II					
	Number			%			Number			%		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
~55	0	2	2	0.0	0.5	0.2	0	0	0	0.0	0.0	0.0
56~60	27	22	49	6.0	5.6	5.8	3	0	3	4.4	0.0	2.3
61~65	153	59	212	34.2	14.9	25.2	27	6	33	39.1	9.8	25.4
66~70	254	136	390	56.7	34.3	46.2	38	20	58	55.1	32.8	44.6
71~75	14	170	184	3.1	42.9	21.8	1	33	34	1.4	54.1	26.2
76~	0	7	7	0.0	1.8	0.8	0	2	2	0.0	3.3	1.5
Total	448	396	844	100.0	100.0	100.0	69	61	130	100.0	100.0	100.0

Section III						Total					
Number			%			Number			%		
Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0	0	0	0.0	0.0	0.0	0	2	2	0.0	0.2	0.1
13	5	18	2.2	1.0	1.7	43	27	70	3.9	2.8	3.4
193	48	241	33.3	9.7	22.4	373	113	486	34.0	11.9	23.7
345	204	549	59.5	41.1	51.0	637	360	997	58.1	37.8	48.6
29	224	253	5.0	45.2	23.5	44	427	471	4.0	44.8	23.0
0	15	15	0.0	3.0	1.4	0	24	24	0.0	2.5	1.2
580	496	1076	100.0	100.0	100.0	1097	953	2050	100.0	100.0	100.0

Table 5. Catch ratio of immature blue whales in each section

Whaling ground / Sex	I	II	III	Total
Male	20.8	9.1	11.7	13.2
Female	53.5	41.7	39.1	43.7
Total	41.8	26.1	24.9	29.2

(Total blue whale catch : 100)

Table 6. Catch ratio of immature fin whales in each section

Whaling ground / Sex	I	II	III	Total
Male	18.3	11.6	5.7	11.2
Female	23.2	11.5	13.1	17.2
Total	20.6	11.5	9.1	14.0

(Total fin whale catch : 100)

Table 7. Infection rate, external parasites, 1946/1951

Season	Whale sp. / Parasites sp.	Blue			Fin			Humpback			Sperm		
		No. of whales infected	No. of whales investigated	Infection rate (%)	No. of whales infected	No. of whales investigated	Infection rate (%)	No. of whales infected	No. of whales investigated	Infection rate (%)	No. of whales infected	No. of whales investigated	Infection rate (%)
1946~47	Cyamus sp.	66	690	10.6	84	474	17.7						
	Coronula sp.	6	〃	0.9	37	〃	7.8						
	Conchoderma sp.	0	〃	0.0	4	〃	0.8						
	Pennella sp.	21	〃	3.0	6	〃	1.3						
	Diatom film	352	〃	51.0	303	〃	63.9						
1947~48	Cyamus sp.	49	703	7.5	43	605	7.7						
	Coronula sp.	24	〃	3.5	54	〃	9.8						
	Conchoderma sp.	5	〃	0.7	5	〃	0.1						
	Pennella sp.	10	〃	1.6	5	〃	0.1						
	Diatom film	181	〃	34.8	208	〃	52.4						
1948~49	Cyamus sp.	18	631	2.9	46	1012	4.8						
	Coronula sp.	3	〃	0·5	14	〃	1.4						
	Conchoderma sp.	0	〃	0.0	1	〃	0.1						
	Pennella sp.	2	〃	0.3	3	〃	0.3						
	Diatom film	77	〃	13.9	281	〃	38.4						
1949~50	Cyamus sp.	20	817	2.4	52	1056	4.9	56	67	83.6	47	172	27.3
	Coronula sp.	3	〃	0.4	15	〃	1.4	67	〃	100.0	0	〃	0.0
	Conchoderma sp.	1	〃	0.1	4	〃	0.4	67	〃	100.0	4	〃	2.3
	Pennella sp.	5	〃	0.6	6	〃	0.6	0	〃	0.0	3	〃	1.7
	Diatom film	382	〃	46.8	528	〃	50.0	1	〃	1.5	129	〃	75.0
1950~51	Cyamus sp.	3	271	1.1	46	2050	2.2	2	9	22.2	69	409	16.9
	Coronula sp.	9	〃	3.3	68	〃	3.3	9	〃	100.0	2	〃	0.5
	Conchoderma sp.	1	〃	0.4	5	〃	0.2	9	〃	100.0	7	〃	1.7
	Pennella sp.	0	〃	0.0	11	〃	0.5	0	〃	0.0	1	〃	0.2
	Diatom film	45	〃	16.6	815	〃	39.8	0	〃	0.0	99	〃	24.2

Table 8. Sperm whales with light testes (under 52 ft. in length)

Body length (in ft.)	Under 3 kg		Under 4 kg		Under 5 kg		Under 6 kg		Total catch
	Number	%	Number	%	Number	%	Number	%	
42					1	50.0	1	50.0	2
43	1	14.3	1	14.3	1	14.3	4	57.1	7
44					2	20.0	8	80.0	10
45			2	11.8	5	29.4	6	35.3	17
46	1	3.0	1	3.0	7	21.2	13	39.4	33
47					3	8.3	13	36.1	36
48			4	7.4	6	11.1	10	18.5	54
49					1	1.5	4	6.2	65
50					1	1.9	3	5.6	54
51							2	3.9	52
Total	2	0.6	8	2.4	27	8.2	64	19.4	330

Table 9. Frequency of size of Euphausia in Sections I, II and III

Size	Section I	Section II	Section III
L	10.1%	3.1%	0.4%
M	58.7%	20.3%	3.4%
S	22.5%	68.8%	93.2%
X	6.2%	7.8%	2.8%
?	2.5%	0	0.2%
Total	100	100	100

Note: L: over 5 cm from a head of rostrum to end of telson
M: 4-5 cm 〃 〃
S: less than 4 cm 〃
X: all of L, M and S mixed
?: size unknown in digested condition

Table 10. Products by Japanese fleets

Sperm whale products

Fleet	Sperm whale oil	Frozen	Salted				Total	Liver oil
		red meat	Tail flukes	leather	gelatinous material	fibrous head tissue		
	ton	ton	ton	ton	ton	ton	ton	kg
Hashidate	2187.0	41.0	71.0	94.0	103.0	22.5	2,518.5	3,526.0
Nisshin	1612.0	432.0	33.0	95.0	69.0	2.0	2,243.0	2,000.0
Total	3799.0	473.0	104.0	189.0	172.0	24.5	4,761.5	5,526.0

Baleen whale products

Fleet		Hashidate				Nisshin				Total			
Sp.		B	F	H	Total	B	F	H	Total	B	F	H	Total
No of whales treated		134	824	9	967	137	1226	0	1363	271	2050	9	2330
B.W.U.				550.1				750.0				1300.1	
Whale oil				10,100 tons				14,960 tons				25,060 tons	
Frozen	Red meat			8,814.2 tons				11,972.0 tons				20,786.2 tons	
	Ventral grooves			—				716.0				716.0	
	Others			469.2				22.0				491.2	
Salted	Red meat			2,311.0 tons				1,821.0 tons				4,132.0 tons	
	Ventral meat			689.0				1,016.0				1,705.0	
	Blubber of ventral grooves			—				686.0				686.0	
	Ventral grooves			1,630.4				1,402.0				3,032.4	
	Tail flukes			248.5				309.0				557.5	
	Jaw ligaments			—				15.0				15.0	
Baleen				24.0 tons				14.0 tons				38.0 tons	
Total				24,286.3 tons				32,933.0 tons				57,219.3 tons	
Liver oil				14,546.0kg				14,300.0kg				28,846.0kg	

Post-war 5 seasons catch & products (in Tons)

Season	No of whales treated				B.W.U.	Whale oil	Frozen	Salted	Others	Total
	B	F	H	Total						
1950～51	271	2050	9	2330	1300.1	25.060	21,993.4	10,127.9	66.8	57,248.1
1949～50	617	1056	67	1940	1371.8	27.010	24,351.5	13,889.4	365.0	65,515.9
1948～49	631	1012		1643	1137.0	20.350	17,620.1	16,535.0	522.7	55,027.8
1947～48	710	608		1318	1014.0	17.830	18,205.3	9,048.1	301.3	45,384.7
1946～47	690	474		1164	927.0	12.260	11,832.9	20,385.4	10.8	34,489.1

Table 11. Catch and products by all fleets, 1950/51 Antarctic season

Fleet	Species						Production in brls			No. of factory ship	No. of catcher boat	No. of processed whale B.W.U.	Oil product per B.W.U. in brls
	Blue	Fin	Hump	Sei	Sperm	Total	Whale oil	Sp. W. oil	Total				
Norway													
Thorshammer	124	934	401	—	268	1,727	78,000	13,160	91,160	1	12	751.0	103.9
Thorshavet	643	234	—	—	333	1,210	99,790	17,939	117,729	1	14	760.0	131.3
Thorshörvdi	231	1494	2	18	207	1,952	122,222	10,985	133,207	1	15	974.0	125.5
Kosmos III	502	1087	349	11	422	2,371	129,380	22,020	151,400	1	14	1,187.0	109.0
Kosmos IV	328	1643	6	—	575	2,552	124,921	27,079	152,000	1	14	1,160.0	107.7
Sir James Clark Ross	325	833	5	—	235	1,398	85,000	12,500	97,500	1	13	742.0	114.6
Antarctic	248	609	14	—	132	1,003	69,265	7,030	76,295	1	10	556.0	124.6
Pelagos	161	1047	356	—	131	1,695	84,012	6,500	90,512	1	12	827.0	101.6
Norhval	339	718	82	—	154	1,293	89,200	7,800	97,000	1	13	753.0	118.5
Suderöy	181	411	—	—	21	613	50,100	1,025	51,135	1	7	387.0	129.5
United Kingdom													
Southern Harvester	355	916	—	16	322	1,609	111,060	18,455	129,515	1	15	816.0	136.1
Southern Venturer	341	1190	—	42	210	1,783	125,558	10,747	136,305	1	14	943.0	133.1
Balaena	1,045	207	21	—	493	1,766	130,600	22,100	152,700	1	16	1,163.4	112.3
South Africa													
Abraham larsen	584	1463	1	—	455	2,503	138,100	23,900	162,000	1	15	1,315.0	104.9
Netherlands													
Willem Barendsz	306	851	265	1	237	1,660	91,369	12,191	103,560	1	12	837.7	109.1
Panama													
Olympic Challenger	565	774	114	—	53	1,506	122,000	3,000	125,000	1	12	997.6	122.3
Japan													
Hashidatemaru	134	825	9	—	243	1,211	59,412	12,865	72,277	1	9	550.1	108.0
Nisshinmaru No. 1	137	1227	—	—	166	1,530	88,000	9,482	97,482	1	9	750.5	117.3
U.S.S.R.													
Slava	380	949	—	279	81	1,689	106,752	4,901	111,653	1	15	901.0	118.5
Total	6,929	17,412	1625	367	4,738	31,071	1,904,751	243,678	2,148,430	19	241	16,371.3	116.3

Table 12. Body length composition

Fin, Total

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pregnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
55ft.				2					2	2			2
6	1		1	1					1	2			2
7	2		2	1					1	3			3
8	9		9	8					8	17			17
9	10	1	11	9					9	19	1		20
60	18	2	20	8					8	26	2		28
1	20	8	28	16					16	36	8		44
2	22	24	46	24	1				25	46	25		71
3	19	48	67	16	2	1			19	35	51		86
4	7	81	88	10	3	2			15	17	86		103
65	7	137	144	28	7	3			38	35	147		182
6	4	159	163	14	18	9			41	18	186		204
7		170	170	10	18	13		1	42	10	202		212
8	3	158	161	9	33	26			68	12	117		229
9		92	92	2	60	27			89	2	179		181
70		51	51	3	79	38			120	3	168		171
1	1	23	24	3	91	38			132	4	152		156
2		15	15		71	28			99		114		114
3		5	5		61	35			96		101		101
4					49	23			72		72		72
75					19	9			28		28		28
6					14	5			19		19		19
7					2	1			3		3		3
8					1	1			2		2		2
Total	123	974	1097	164	529	259	0	1	953	287	1762	1	2050
Average		66.1ft.							69.6ft.				67.7ft.
Sex ratio		53.5%							46.5%				100.0%
%	11.2	88.8	100.0	17.2	55.5	27.2	0.0	0.1	100.0	14.0	86.0	1	100.0

Fin, Section I

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pregnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
55ft.				2					2	2			2
6	1		1	1					1	2			2
7	2		2							2			2
8	7		7	8					8	15			15
9	6		6	7					7	13			13
60	10	1	11	6					6	16	1		17
1	16	1	17	9					9	25	1		26
2	15	9	24	12	1				13	27	10		37
3	10	19	29	9	2	1			12	19	22		41
4	4	27	31	5	3				8	9	30		39
65	7	45	52	12	4	1			17	19	50		69
6	2	62	64	7	10	3			20	9	75		84
7		59	59	7	8	3			18	7	70		77
8	2	65	67	3	12	6			21	5	83		88
9		38	38	1	24	9			34	1	71		72
70		26	26	1	30	12			43	1	68		69
1		10	10	2	35	12			49	2	57		59
2		2	2		31	3			34		36		36
3		2	2		28	11			39		41		41
4					22	7			29		29		29
75					15	4			19		19		19
6					4	2			6		6		6
7					1				1		1		1
8													
Total	82	366	448	92	230	74	0	0	396	174	670	0	844
Average		65.8ft.							68.9ft.				67.3ft.
Sex ratio		53.1%							46.9%				100.0%
%	18.3	81.7	100.0	23.2	58.1	18.7	0.0	0.0	100.0	20.6	79.4	0.0	100.0

Fin, Section II

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pregnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
55ft.													
6													
7													
8	1		1							1			1
9	1		1							1			1
60	1		1							1			1
1		1	1	1					1	1	1		2
2	2	4	6	3					3	5	4		9
3		4	4								4		4
4	1	5	6							1	5		6
65		10	10	2					2	2	10		12
6	2	10	12	1					1	3	10		13
7		9	9			1			1		10		10
8		11	11		1	5			6		17		17
9		4	4		3	1			4		8		8
70		2	2		7	1			8		10		10
1		1	1		6	5			11		12		12
2					3	2			5		5		5
3					3	5			8		8		8
4					5	2			7		7		7
75					1	1			2		2		2
6					1				1		1		1
7						1			1		1		1
8													
Total	8	61	69	7	30	24	0	0	61	15	115	0	130
Average		65.6ft.						70.5ft.				67.9ft.	
Sex ratio		53.1%						46.9%				100.0%	
%	11.6	88.4	100.0	11.5	49.2	39.3	0.0	0.0	100.0	11.5	88.5	0.0	100.0

Fin, Section III

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pregnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
55ft.													
6													
7				1					1	1			1
8	1		1							1			1
9	3	1	4	2					2	5	1		6
60	7	1	8	2					2	9	1		10
1	4	6	10	6					6	10	6		16
2	5	11	16	9					9	14	11		25
3	9	25	34	7					7	16	25		41
4	2	49	51	5		2			7	7	51		58
65		82	82	14	3	2			19	14	87		101
6		87	87	6	8	6			20	6	101		107
7		102	102	3	10	9		1	23	3	121		125
8	1	82	83	6	20	15			41	7	117		124
9		50	50	1	33	17			51	1	100		101
70		23	23	2	42	25			69	2	90		92
1	1	12	13	1	50	21			72	2	83		85
2		13	13		37	23			60		73		73
3		3	3		30	19			49		52		52
4					22	14			36		36		36
75					3	4			7		7		7
6					9	3			12		12		12
7					1				1		1		1
8					1	1			2		2		2
Total	33	547	580	65	269	161	0	1	496	98	977	1	1076
Average		66.3ft.						69.9ft.				68.0ft.	
Sex ratio		53.9%						46.1%				100.0%	
%	5.7	94.3	100.0	13.1	54.2	32.5	0.0	0.2	100.0	9.1	90.8	0.1	100.0

Blue whales, Total

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pregnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
70ft.	2		2	4					4	6			6
1	3		3	4					4	7			7
2	4	1	5	5					5	9	1		10
3	3		3	15					15	18			18
4	4	6	10	10					10	14	6		20
75		4	4	7					7	7	4		11
6	1	7	8	6					6	7	7		14
7		12	12	8	1	1			10	8	14		22
8		14	14	3	1	1			5	3	16		19
9		15	15		4	2	1		7		22		22
80		17	17		3	3			6		23		23
1		9	9			4			4		13		13
2		14	14		5	2			7		21		21
3		9	9		3	10			13		22		22
4		3	3		9	3			12		15		15
85					2	2			4		4		4
6		1	1		4	2	1		7		8		8
7					3	4			7		7		7
8					2	3			5		5		5
9						2			2		2		2
90													
1													
2					1	1			2		2		2
Total	17	112	129	62	38	40	2	0	142	79	192	0	271
Average		78.3ft.							79.3ft.				78.9ft.
Sex ratio		47.6%							52.4%				100.0%
%	13.2	86.8	100.0	43.7	26.8	28.2	1.3	0.0	100.0	29.2	70.8	0.0	100.0

Blue whales, Section I

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pregnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
70ft.	1		1	3					3	4			4
1				2					2	2			2
2				1					1	1			1
3	1		1	3					3	4			4
4	2		2	3					3	5			5
75		1	1	5					5	5	1		6
6	1	3	4	2					2	3	3		6
7		3	3	3					3	3	3		6
8		1	1	1					1	1	1		2
9		1	1		1		1		2		3		3
80		4	4		2	1			3		7		7
1						2			2		2		2
2		3	3		2				2		5		5
3		1	1		2	3			5		6		6
4		2	2		2	2			4		6		6
85													
6					1				1		1		1
7						1			1		1		1
8													
9													
90													
1													
2													
Total	5	19	24	23	10	9	1	0	43	28	39	0	67
Average		78.1ft.							77.9ft.				78.0ft.
Sex ratio		35.8%							64.2%				100.0%
%	20.8	79.2	100.0	53.5	23.3	20.9	2.3	0.0	100.0	41.8	58.2	0.0	100.0

Blue whales, Section II

Sex / Body length	Male			Female						Total			
					Mature								
	Immature	Mature	Total	Immature	Pregnant	Resting	Lactating	Unknown	Total	Immature	Mature	Unknown	Total
70ft.													
1													
2				1					1	1			1
3	1		1	3					3	4			4
4													
75													
6		2	2	1					1	1	2		3
7		3	3								3		3
8		3	3								3		3
9		1	1		1	1			2		3		3
80													
1		1	1								1		1
2					1	1			2		2		2
3					1				1		1		1
4					1				1		1		1
85						1			1		1		1
6													
7													
8													
9													
90													
1													
2													
Total	1	10	11	5	4	3	0	0	12	6	17	0	23
Average		77.3ft.						78.4ft.				77.9ft.	
Sex ratio		47.8%						52.2%				100.0%	
%	9.1	90.9	100.0	41.7	33.3	25.0	0.0	0.0	100.0	26.1	73.9	0.0	100.0

Blue whales, Section III

Sex / Body length	Male			Female						Total			
					Mature								
	Immature	Mature	Total	Immature	Pregnant	Resting	Lactating	Unknown	Total	Immature	Mature	Unknown	Total
70ft.	1		1	1					1	2			2
1	3		3	2					2	5			5
2	4	1	5	3					3	7	1		8
3	1		1	9					9	10			10
4	2	6	8	7					7	9	6		15
75		3	3	2					2	2	3		5
6		2	2	3					3	3	2		5
7		6	6	5	1	1			7	5	8		13
8		10	10	2	1	1			4	2	12		14
9		13	13		2	1			3		16		16
80		13	13		1	2			3		16		16
1		8	8			2			2		10		10
2		11	11		2	1			3		14		14
3		8	8			7			7		15		15
4		1	1		6	1			7		8		8
85					2	1			3		3		3
6		1	1		3	2	1		6		7		7
7					3	3			6		6		6
8					2	3			5		5		5
9						2			2		2		2
90													
1													
2					1	1			2		2		2
Total	11	83	94	34	24	28	1	0	87	45	136	0	181
Average		78.5ft.						80.2ft.				79.3ft.	
Sex ratio		51.9%						48.1%				100.0%	
%	11.7	88.3	100.0	39.1	27.6	32.2	1.1	0.0	100.0	24.9	75.1	0.0	100.0

Sperm whales

Body length \ Sex	Male			
	Under 5 kg in testes weight	5kg and over in testes weight	Unknown	Total
40 ft.				
1				
2	1	1		2
3	1	6		7
4	2	8		10
45	5	10	2	17
6	7	25	1	33
7	3	32	1	36
8	6	47	1	54
9	1	63	1	65
50	1	52	1	54
1		52		52
2		32	1	33
3		24	1	25
4		15		15
55		5		5
6		1		1
Total	27	373	9	409
Average body length				49.2ft.
Sex ratio				100.0%

Humpback whales

Body length \ Sex	Male			Female						Total			
	Immature	Mature	Total	Immature	Mature: Pergnant	Mature: Resting	Mature: Lactating	Unknown	Total	Immature	Mature	Unknown	Total
35 ft.													
6													
7				1					1	1			1
8													
9													
40													
1					2				2		2		2
2													
3						1			1		1		1
4		2	2								2		2
45					1				1		1		1
6					2				2		2		2
7													
8													
9													
Total	0	2	2	1	5	1	0	0	7	1	8	0	9
Average body length		44.0ft.						42.7ft.				43.0ft.	
Sex ratio		22.2%						77.8%				100.0%	

Table 13. Classification of catch by length group

Blue whales

Group \ Season	Number					%				
	1946 ~47	1947 ~48	1948 ~49	1949 ~50	1950 ~51	1946 ~47	1947 ~48	1948 ~49	1949 ~50	1950 ~51
Group I (under 71 ft.)	23	9	5	1	6	3.3	1.3	0.8	0.1	2.2
Group II (71~85 ft.)	634	639	583	763	241	91.0	90.0	92.4	93.4	88.9
Group III (over 85 ft.)	33	62	43	53	24	4.8	8.7	6.8	6.5	8.9
Total	690	710	631	817	271	100.0	100.0	100.0	100.0	100.0
Immature male (under 74 ft.)	85	28	30	40	13	23.0	8.7	7.7	7.2	10.1
Mature male (over 73 ft.)	284	310	361	517	116	77.0	91.3	92.3	92.8	89.9
Total	369	338	391	557	129	100.0	100.0	100.0	100.0	100.0
Immature female (under 78 ft.)	131	71	44	57	51	40.8	19.1	18.3	21.9	35.9
Mature female (over 77 ft.)	190	301	196	203	91	59.2	80.9	81.7	78.1	64.1
Total	321	372	240	260	142	100.0	100.0	100.0	100.0	100.0

Fin whales

Group \ Season	Number					%				
	1946 ~47	1947 ~48	1948 ~49	1949 ~50	1950 ~51	1946 ~47	1947 ~48	1948 ~49	1949 ~50	1950 ~51
Group I (under 56 ft.)	2	0	0	0	2	0.4	0.0	0.0	0.0	0.0
Group II (56~65 ft.)	217	110	237	283	556	45.8	18.1	23.4	26.8	27.2
Group III (over 65 ft.)	255	498	775	773	1492	53.8	81.9	76.6	73.2	72.8
Total	474	608	1012	1056	2050	100.0	100.0	100.0	100.0	100.0
Immature male (under 63 ft.)	54	6	43	36	117	21.6	2.3	8.8	5.8	10.7
Mature male (over 62 ft.)	196	257	445	583	980	78.4	97.7	91.2	94.2	89.3
Total	250	263	488	619	1097	100.0	100.0	100.0	100.0	100.0
Immature formale (under 65 ft.)	72	13	39	33	104	32.1	3.8	7.4	7.6	10.9
Mature female (over 64 ft.)	152	332	485	404	849	67.9	96.2	92.6	92.4	89.1
Total	224	345	524	437	953	100.0	100.0	100.0	100.0	100.0

Humpback whales

Group \ Season	Number					%				
	1946 ~47	1947 ~48	1948 ~49	1949 ~50	1950 ~51	1946 ~47	1947 ~48	1948 ~49	1949 ~50	1950 ~51
Group I (under 36 ft.)				0	0				0.0	0.0
Group II (36~45 ft.)				57	7				85.1	77.8
Group III (over 45 ft.)				10	2				14.9	22.2
Total				67	9				100.0	100.0
Immature male (under 39 ft.)				0	0				0.0	0.0
Mature male (over 39 ft.)				24	2				100.0	100.0
Total				24	2				100.0	100.0
Immature female (under 41 ft.)				8	1				18.6	14.3
Mature female (over 40 ft.)				35	6				81.4	85.7
Total				43	7				100.0	100.0

Table 14. Semimonthly pregnant ratio

Fin whales

	Dec.	Jan.		Feb.		Mar.	Total
	latter half	former half	latter half	former half	latter half	former half	
Total female whales	196	186	154	161	150	105	952
Mature whales	142	150	135	145	122	93	787
Pregnant whales	112	109	80	104	72	48	525
Pregnant ratio	78.9%	72.6%	59.3%	71.7%	59.0%	51.6%	66.7%

Blue whales

	Dec.	Jan.		Feb.		Mar.	Total
	latter half	former half	latter half	former half	latter half	former half	
Total female whales	23	20	33	23	25	18	143
Mature whales	10	10	24	16	9	11	80
Pregnant whales	8	3	11	6	3	7	38
Pregnant ratio	80.0%	30.0%	45.8%	37.5%	33.3%	63.6%	47.5%

Humpback whales

	Feb.		Total
	former half	latter half	
Total female whales	7		7
Mature whales	6		6
Pregnant whales	5		5
Pregnant ratio	83.3%		83.3%

Table 15. Dimensions and weight of whales

Sperm whales (in meters)

(1) Total length
(2) Lower jaw, projection beyond tip of snout
(3) Tip of snout to blowhole
(4) Tip of snout to angle of gape
(5) Tip of snout to center of eye
(6) Tip of snout to tip of flipper
(7) Eye to ear (centers)
(8) Notch of flukes to posterior emargination of dorsal fin
(9) Flukes, width at insertion
(10) Notch of flukes to anus

Serial No.	(1) (ft.)	Sex	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
H 155	(43) 13.05	M	0.76	—	2.75	3.40	5.50	—	4.35	—	4.25
H 195	(43) 13.15	M	0.78	—	3.15	3.77	5.90	—	4.50	—	3.80
H 192	(43) 13.20	M	0.56	—	2.90	3.45	5.65	—	4.50	—	3.90
H 111	(44) 13.32	M	0.70	—	3.20	3.55	5.95	—	3.65	—	3.80
H 152	(44) 13.40	M	0.98	—	3.12	3.90	6.10	—	4.00	—	3.70
N 103	(45) 13.80	M	1.00	0.50	3.29	3.65	5.98	0.43	4.30	1.00	4.22
H 104	(46) 13.95	M	0.70	—	3.00	3.65	5.90	—	4.55	—	4.20
N 119	(46) 13.95	M	1.11	0.46	3.67	3.95	6.33	0.46	4.75	1.13	4.11
N 102	(46) 13.96	M	0.87	0.52	3.35	3.72	6.14	0.44	4.24	1.00	4.08
H 21	(46) 14.00	M	1.00	0.55	3.80	4.15	6.40	—	4.50	—	4.00
N 9	(46) 14.11	M	1.00	0.75	3.00	4.30	—	0.46	4.55	1.15	4.24
H 204	(46) 14.15	M	1.10	0.50	3.40	3.80	6.25	0.45	5.15	—	4.20
N 113	(47) 14.33	M	1.03	0.55	3.52	3.93	6.50	0.43	4.50	1.03	4.08
H 208	(47) 14.35	M	1.20	0.48	3.35	3.80	6.20	0.40	5.30	1.15	3.75
H 213	(47) 14.40	M	1.16	0.70	3.71	4.10	6.56	0.40	4.42	—	3.90
H 203	(48) 14.55	M	0.85	0.65	3.35	3.85	6.20	0.45	5.20	—	4.10

N: Nisshinmaru fleet H: Hashidatemaru fleet

(11) Notch of flukes to umbilicus
(13) Anus to reproductive aperture (centers)
(14) Dorsal fin, vertical height
(15) Dorsal fin, length of base
(16) Flipper, tip to axilla
(17) Flipper, tip to anterior end of lower border
(18) Flipper, length along curve of lower border
(19) Flipper, greatest width
(20) Severed head, condyle to tip
(21) Skull, greatest width
(22) Skull length, condyle to tip of premaxilla
(23) Skull, height
(24) Tail flukes, tip to notch
(25) Tail flukes, total spread

(11)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
6.50	1.45	—	—	0.84	1.24	—	0.62	—	1.80	3.60	1.30	—	—
6.30	1.50	—	—	0.82	1.20	—	0.60	—	1.90	4.00	1.26	—	—
6.45	1.50	—	—	0.83	1.25	—	0.64	—	1.70	4.10	1.40	—	—
6.55	1.60	—	—	0.88	1.36	—	0.64	—	1.70	3.85	1.40	—	—
6.00	1.45	—	—	0.91	1.29	—	0.61	—	1.80	3.80	1.30	—	—
6.53	1.44	0.25	1.40	1.28	1.32	1.47	0.62	4.78	1.75	3.89	1.23	1.66	3.17
6.75	1.65	—	0.90	0.70	1.30	—	0.68	—	1.80	4.30	1.30	—	—
6.63	1.69	0.34	1.25	0.97	1.29	1.30	0.66	4.95	—	3.70	1.42	1.97	3.79
6.48	1.42	0.28	1.42	0.92	1.30	1.40	0.68	4.98	1.90	4.09	1.25	1.97	3.98
6.40	1.30	—	—	1.00	1.30	—	0.60	5.30	1.85	4.45	1.45	—	—
6.75	1.75	0.30	1.20	0.70	1.00	1.38	0.40	—	1.90	4.20	1.30	—	—
6.70	1.65	—	—	0.98	1.48	—	0.68	—	1.85	4.00	1.35	—	—
—	1.08	0.35	1.60	1.00	1.35	1.38	0.68	4.98	1.92	4.10	1.26	1.77	—
6.40	1.60	—	—	1.00	1.42	—	0.67	—	1.85	3.75	1.30	1.95	—
6.70	1.80	—	—	0.77	1.25	—	0.60	—	2.05	4.30	1.35	—	—
6.80	1.65	—	—	1.00	1.33	—	0.67	—	1.85	4.10	1.40	—	—

Sperm whales (continued)

Serial No.	(1) (ft.)	Sex	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
N 112	(48) 14.63	M	1.15	0.71	3.92	4.50	6.86	0.48	4.55	1.16	4.30
H 202	(48) 14.65	M	0.80	0.75	3.35	3.95	6.50	—	4.50	—	4.30
N 166	(48) 14.66	M	0.64	0.71	2.90	4.56	6.80	0.51	4.58	0.95	4.13
H 81	(48) 14.70	M	0.95	—	3.75	4.15	6.60	0.45	4.55	1.10	4.35
H 37	(49) 14.80	M	0.95	0.60	3.83	4.30	6.10	—	4.60	—	4.20
H 205	(49) 14.82	M	0.90	0.65	3.50	3.95	6.25	0.45	5.45	1.08	4.25
H 3	(49) 14.90	M	1.15	0.70	3.80	4.30	6.90	—	4.70	—	4.15
H 79	(49) 14.90	M	0.90	0.85	3.50	4.10	6.65	0.45	4.90	—	4.20
N 65	(49) 14.94	M	0.90	0.50	3.74	4.06	6.95	0.47	4.60	0.93	4.33
N 125	(49) 14.97	M	1.07	0.55	3.74	4.17	6.65	0.50	4.63	1.28	3.82
N 74	(49) 15.04	M	1.03	0.62	3.37	4.55	7.00	0.51	4.88	1.12	4.05
N 121	(50) 15.18	M	1.05	0.80	3.79	4.28	6.74	0.50	5.07	1.14	4.30
H 53	(50) 15.20	M	0.92	0.55	3.60	3.96	6.30	—	—	—	4.40
N 10	(50) 15.24	M	—	0.50	3.34	4.23	6.90	0.52	4.80	1.10	4.60
H 4	(50) 15.25	M	0.95	0.90	3.70	4.30	6.85	—	4.75	—	4.35
H 63	(50) 15.30	M	1.25	0.70	3.90	4.30	7.15	—	4.56	—	4.35
H 97	(51) 15.45	M	1.35	—	4.15	4.45	7.30	0.46	4.65	—	3.90
H 117	(51) 15.45	M	1.20	0.75	4.00	4.40	7.05	0.40	4.60	—	4.40
H 36	(51) 15.50	M	0.70	0.65	3.80	4.40	7.00	—	5.05	—	4.60
N 36	(51) 15.57	M	1.15	0.57	3.77	4.43	7.06	0.50	5.08	1.18	4.30
N 159	(51) 15.60	M	1.18	0.60	4.10	4.47	7.15	0.45	4.98	1.08	4.50
N 62	(51) 15.62	M	1.10	0.60	3.80	4.31	6.90	0.43	5.37	1.11	4.88
H 64	(52) 15.85	M	0.95	0.75	4.05	4.50	7.20	—	4.75	-	4.45

(11)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
6.80	1.52	0.25	1.20	0.99	1.31	1.33	0.73	5.00	2.06	4.48	1.40	2.00	3.96
6.90	1.50	—	—	0.95	1.40	—	0.62	—	1.90	4.30	1.30	—	—
6.70	1.67	0.23	1.30	1.00	1.34	1.38	0.62	—	2.26	4.30	1.46	2.04	3.70
7.10	1.50	—	1.05	1.10	1.53	—	—	—	1.95	4.80	1.40	1.90	—
6.90	1.60	—	—	0.73	1.08	—	0.65	—	1.95	4.60	—	—	—
7.10	1.85	—	—	1.06	1.33	—	0.70	—	1.90	4.10	1.40	2.18	—
7.20	1.65	—	—	0.84	1.35	—	0.63	5.35	1.90	4.20	1.45	—	—
7.00	1.80	—	0.80	1.30	1.75	—	0.65	—	1.90	5.05	—	—	—
6.80	1.47	0.28	1.56	1.20	1.38	1.45	0.73	—	—	—	—	2.00	—
6.45	1.78	0.26	1.37	0.94	1.39	1.48	0.66	5.42	2.18	4.68	1.43	1.90	—
6.63	1.54	0.31	1.40	1.01	1.36	1.39	0.67	5.76	2.20	4.90	1.49	1.91	3.20
6.95	1.60	0.27	1.16	0.94	1.31	1.33	0.72	5.48	2.04	4.39	1.64	1.91	3.54
7.05	1.70	—	—	0.84	1.30	—	0.65	—	1.82	4.20	1.51	—	—
7.00	1.40	0.30	1.40	1.03	1.44	1.50	0.75	5.20	2.00	4.50	1.42	—	—
7.15	1.75	—	—	1.15	1.50	—	—	—	2.00	4.75	—	—	—
7.10	1.30	—	1.14	0.90	1.40	—	0.69	—	2.25	4.70	1.50	—	—
6.70	1.60	—	—	0.96	1.45	—	0.67	—	2.10	4.85	1.45	—	—
7.15	1.90	—	1.50	—	1.40	—	0.76	—	1.90	4.50	—	—	—
7.30	1.60	—	—	0.96	1.28	—	0.66	—	2.00	4.65	1.55	—	—
6.98	1.62	0.38	1.25	1.40	1.10	1.34	0.73	5.38	2.06	4.49	1.50	2.09	3.87
7.21	1.70	0.25	1.74	1.12	1.63	1.69	0.72	5.02	1.80	4.78	1.38	1.96	3.80
7.58	1.62	0.26	1.37	1.51	1.06	1.26	0.74	5.20	2.10	4.80	1.48	2.04	4.02
7.45	1.85	—	—	1.00	1.40	—	0.71	5.80	2.20	5.30	1.60	—	—

Sperm whale (continued)

Serial No.	(1) (ft.)	Sex	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
H 200	(52) 15.85	M	1.15	0.55	3.95	4.55	7.20	—	5.00	—	4.50
N 11	(52) 15.87	M	1.26	0.63	3.80	4.75	6.65	0.47	5.05	1.08	4.53
N 160	(52) 15.87	M	1.12	0.53	—	3.87	6.92	0.52	4.98	0.98	4.80
N 75	(52) 15.89	M	1.20	0.65	3.64	4.57	7.27	0.53	5.07	1.30	4.71
N 7	(53) 16.00	M	1.31	0.70	3.91	5.00	7.55	0.54	4.86	1.16	4.45
N 6	(53) 16.15	M	1.35	0.40	4.10	4.80	7.60	0.53	5.15	1.16	4.40
N 35	(53) 16.15	M	1.11	0.52	4.10	4.60	7.20	0.50	4.91	1.15	4.78
H 1	(53) 16.20	M	1.30	0.70	4.35	4.65	7.30	—	5.60	—	4.20
H 136	(53) 16.20	M	1.20	0.70	4.25	4.70	7.50	0.45	4.55	—	—
N 5	(54) 16.30	M	1.02	0.59	3.83	4.52	6.83	0.53	5.00	—	4.70
N 76	(54) 16.60	M	0.97	0.60	4.08	4.17	—	0.60	5.16	1.30	4.86

(11)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
7.25	1.90	—	1.20	—	1.38	—	0.70	—	2.05	4.85	1.60	—	—
7.70	1.70	0.47	1.50	1.24	1.45	1.48	0.67	—	2.15	5.05	1.60	2.17	—
7.58	1.78	0.26	1.44	1.05	1.39	1.46	0.70	5.34	2.08	4.56	1.47	—	—
7.45	1.89	0.32	1.37	0.98	1.47	1.57	0.77	5.65	1.97	4.92	1.47	—	3.76
7.20	1.80	0.30	1.37	1.57	1.17	1.34	0.76	6.30	2.30	5.10	1.60	2.08	4.12
7.20	1.70	0.35	1.26	1.56	1.09	1.28	0.71	—	2.30	4.80	1.50	2.25	4.36
7.48	1.55	0.34	1.68	1.43	1.06	1.32	0.68	6.00	2.30	5.05	1.36	—	—
6.95	1.75	—	—	1.21	1.94	—	0.73	6.09	—	5.20	1.38	—	—
7.40	1.80	—	—	1.05	1.55	—	0.80	—	2.05	5.00	1.60	—	—
7.50	1.50	0.26	1.55	0.70	0.96	1.00	0.52	—	2.15	4.90	1.50	1.90	—
7.75	1.87	0.36	1.48	1.10	1.60	1.73	0.77	5.67	2.20	4.95	1.58	2.24	4.32

Weight of Sperm

	1950～1951					
Serial No.	H No. 3	H No. 37	H No. 104	H No. 117	H No. 200	H No. 202
Body length (ft.)	49	49	46	51	52	48
Blubber						
Blubber	6,312	5,929	6,880	6,200	6,964	5,938
Head blubber	4,520	4,808	3,306	5,015	3,075	4,223
Blubber of lower jaw	112	150	160	160	184	150
Tail flukes	330	326	318	479	410	295
Dorsal fin	—	—	—	—	—	—
Blubber of flipper	216	193	226	270	260	190
Other blubber	—	—	037	70	106	85
Total	11,490	11,406	10,927	12,194	10,999	10,881
Meat						
Red meat	7,152	4,900	4,600	4,400	6,052	5,065
Other meat	2,030	2,612	3,235	3,185	3,914	2,078
Total	9,182	7,512	7,835	7,585	9,966	7,143
Internal organs						
Heart	150	87	97	095	160	109
Lungs	170	112	136	214	210	150
Tongue	317	202	90	150	165	273
Gum	—	—	—	—	—	—
Oesophagus	—	—	—	—	—	—
Stomachs	212	220	180	210	267	199
Small intestine	265	300	297	217	220	285
Large intestine	53	61	102	123	89	131
Pancreas	—	—	—	—	—	—
	—	—	—	—	—	—
Kidney	165	148	170	133	154	138
Liver	480	450	463	380	575	492
Bladder	—	—	—	—	—	—
Testes	—	—	—	—	—	—
Penis	—	—	—	—	—	—
Internal fats	442	372	250	197	261	280
Diaphragm	159	220	157	196	183	209
Others	179	—	5	126	—	—
Total	2,592	2,172	1,947	2,041	2,284	2,266
Bones						
Skull	2,063	1,819	1,370	2,020	2,341	1,873
Vertebrae	1,355	1,505	1,385	1,941	2,119	1,452
Ribs	510	450	0,382	630	564	530
Jaw bones & teeth	240	325	84	300	312	175
Scapula	96	100	96	110	132	090
Hyoid bone	—	—	—	—	—	—
Pharyngeal bone	—	—	—	—	—	—
	—	—	—	—	—	—
Other bones	369	270	336	290	120	404
Total	4,633	4,469	3,653	5,291	5,588	4,524
Miscellaneous						
Spermaceti case	4,510	5,370	3,661	6,497	7,108	4,820
Fibrous head tissue	250	450	91	0,178	150	66
Spermaceti	1,733	1,810	1,275	2,371	2,780	2,078
Suprarenal body	—	—	—	—	—	—
Other	2,196	1,278	565	850	1,050	605
Total	8,689	8,908	5,592	9,896	11,088	7,569
Grand total	36,586	34,467	29,954	37,007	39,925	32,383

Whales (in kilograms)

1950～1951									
H No. 203	H No. 204	N No. 5	N No. 7	N No. 36	N No. 76	N No. 125	N No. 103	N No. 159	N No. 166
48	46	54	53	51	54	49	45	51	48
6,523	6,930	5,827	6,891	7,150	8,615	6,520	4,659	7,533	6,342
4,300	4,065	6,482	6,777	5,929	5,669	3,851	2,616	4,842	4,885
163	110	250	274	206	245	118	96	212	129
338	340	568	614	815	467	510	283	424	537
—	—	—	—	113	—	—	—	27	12
126	102	—	—	—	—	—	—	—	—
095	70	—	—	—	—	—	—	—	—
11,545	11,617	13,127	14,556	14,213	14,996	10,999	7,654	13,038	11,905
5,530	4,390	9,255	9,401	9,839	11,946	9,394	4,656	10,450	8,363
2,745	2,765	—	—	—	—	—	—	—	—
8,275	7,155	9,255	9,401	9,839	11,946	9,394	4,656	10,450	8,363
115	095	102	118	118	145	108	92	110	99
208	225	363	384	355	308	308	186	221	305
290	235	140	102	98	35	85	74	77	103
—	—	—	29	18	18	20	9	14	18
—	—	064	—	—	88	94	112	33	96
225	180	301	337	212	234	157	151	245	197
250	230	260	230	208	381	257	192	353	278
125	110	162	90	99	61	70	53	97	107
—	—	4	10	12	10	14	6	11	8
—	—	—	—	—	—	—	—	—	4
157	127	172	179	162	218	157	95	182	205
405	340	517	513	483	567	430	327	300	445
—	—	—	14	011	14	12	7	6	9
—	—	11	12	007	14	10	3	10	12
—	—	083	74	064	83	40	30	73	88
340	250	347	359	444	511	515	354	340	406
190	160	—	238	212	197	118	182	—	140
88	104	—	—	—	—	—	—	—	—
2,423	2,056	2,526	2,689	2,503	2,884	2,395	1,873	2,072	2,520
1,727	1,784	2,745	2,833	2,283	2,591	2,354	1,386	1,981	2,346
1,775	1,604	2,337	2,075	2,089	3,493	2,466	1,679	2,333	1,872
535	518	676	742	647	879	442	480	553	662
265	192	326	391	284	350	261	185	280	279
86	108	150	263	232	135	82	119	113	161
—	—	2,223	377	358	323	300	200	283	271
—	—	135	85	82	159	68	30	100	135
—	—	10	—	6	—	—	4	—	1
335	280	—	—	—	—	—	—	—	—
4,723	4,486	6,602	6,776	5,953	7,930	5,973	4,083	5,642	5,727
4,971	4,360	1,255	1,774	1,198	1,366	1,069	490	1,115	1,219
167	60	8,007	8,802	6,664	9,825	6,741	4,405	6,925	7,543
1,820	1,540	2,020	2,858	2,643	2,748	2,371	1,290	2,130	1,806
—	—	—	—	1	—	—	—	—	1
470	400	—	—	—	—	—	—	—	—
7,428	6,360	11,282	13,434	10,506	13,939	10,181	6,194	10,170	10,569
34,394	31,674	42,792	46,846	43,014	51,695	38,942	26,251	41,373	39,084

Dimensions of Baleen Whales

Serial Number	487	417	507	1207	919	1208	961	596
Sp.	Fin	Fin	Fin	Fin	Fin	Blue	Blue	Hump-back
Sex	Male	Male	Female	Female	Female	Male	Male	Female
Factory ship	Nisshin	Hashidate	Nisshin	Nisshin	Hashidate	Nisshin	Hashidate	Hashidate
Length of whales (ft.)	67	67	67	57	68	83	78	41
Linear measurements (in m)								
Total length	20.42	20.45	20.32	17.40	20.60	25.32	23.80	12.47
Lower jaw, projection beyond tip of snout.	0.36	ND	0.22	0.31	ND	0.60	ND	0.50
Tip of snout to blowhole	3.73	3.85	4.00	3.25	3.95	4.80	4.30	2.55
Tip of snout to angle of gape	3.98	ND	4.25	3.28	4.55	5.12	4.60	3.05
Tip of snout to center of eye	4.12	4.15	4.27	3.45	4.40	5.23	4.55	3.15
Tip of snout to tip of flipper	7.98	7.70	7.91	6.76	7.70	11.00	10.30	ND
Eye to ear (centers)	0.94	0.85	0.94	0.81	ND	1.42	ND	0.65
Notch of flukes to posterior emargination of dorsal fin	4.12	ND	4.45	3.76	5.00	5.30	4.70	4.10
Flukes, width at insertion	1.14	ND	0.90	0.98	ND	1.55	ND	ND
Notch of flukes to anus	5.54	ND	5.70	4.90	5.75	6.70	6.70	2.60
Notch of flukes to umbilicus	9.14	9.50	9.11	7.63	8.90	10.50	10.70	ND
Notch of flukes to end of ventral grooves	8.53	9.25	8.91	7.50	8.70	9.80	9.50	5.20
Anus to reproductive aperture (centers)	1.35	1.55	0.54	0.38	0.60	1.62	1.60	1.00
Dorsal fin, vertical height	0.48	ND	0.41	0.47	0.60	0.12	0.62	0.60
Dorsal fin, length of base	1.27	ND	1.92	1.31	1.20	1.25	1.30	ND
Flipper, tip to axilla	1.78	1.60	1.71	1.32	1.90	2.30	2.45	3.40
Flipper, tip to anterior end of lower border	2.59	2.10	2.35	1.83	2.70	2.85	3.30	3.85
Flipper, length along curve of lower border	2.62	ND	2.42	1.88	ND	3.03	ND	ND
Flipper, greatest width	0.70	0.54	0.61	0.46	0.54	0.85	0.85	1.00
Severed head, condyle to tip	5.38	ND	5.50	ND	5.55	ND	5.90	3.70
Skull, greatest width	2.25	2.10	2.20	1.84	2.27	3.06	3.09	3.10
Skull length, condyle to tip of premaxilla	5.35	5.10	5.20	4.50	5.50	6.43	5.85	3.65
Flipper, tip to head of humerus	ND	ND	ND	ND	ND	ND	ND	ND
Tail, depth at dorsal fin	1.78	ND	2.00	ND	ND	ND	ND	ND

ND: No. Date available.

Weight of Baleen Whales

Serial No: Sp. Sex.	487 Fin male	417 Fin male	507 Fin female	1207 Fin female	919 Fin female	1208 Blue male	961 Blue male	596Hump-back female
Factory Ship	Nis-shin	Hashi-date	Nis-shin	Nis-shin	Hashi-date	Nis-shin	Hashi-date	Hashi-date
Length of whale (ft.)	67	67	67	57	68	83	78	41
Weight of Parts: (kgs)								
Blubber								
Blubber	5,004	4,264	4,970	3,351	5,004	11,768	11,068	4,307
Head blubber	1,177	1,203	1,072	616	1,026	2,370	2,122	603
Blubber of ventral grooves	3,965	4,635	3,509	2,227	5,215	11,200	12,305	ND
Blubber of lower jaw	840	966	657	514	814	2,204	1,460	615
Flukes	332	346	391	245	310	546	625	290
Total	11,318	11,414	10,599	6,953	12,369	28,088	27,580	5,815
Meat								
Red meat	19,889	17,742	24,663	16,213	18,455	40,954	25,860	6,195
Ventral meat	237	3,033	1,218	662	3,250	3,406	855	3,754
Connective tissues	1684	ND	1,353	753				
Total	21,810	20,775	27,234	17,628	21,705	44,360	26,715	9,949
Internal organs								
Heart	207	398	246	162	210	412	430	90
Lungs	414	387	658	343	260	960	730	175
Tongue	1,343	1,347	1,386	844	1,450	2,708	1,938	1,080
Stomachs	250	201	249	231	201	420	223	165
Oesophagus	22	ND	32	79	ND	67	ND	ND
Small intestine	177	202	332	334	610	824	1,001	276
Large intestine	608	472	429	347	445	380	667	184
Pancreas	20	ND	32	28	ND	40	ND	ND
Spleen	5	ND	2	4.5	ND	16	ND	ND
Kidney	142	211	210	134	160	290	262	145
Liver	503	515	531	397	518	1,047	625	420
Bladder	21	ND	13	16	ND	22	ND	ND
Penis (Ovaries)	44	ND	1	0.5	1	105	ND	4
Testes (Uterus & Vagina)	5	11	144	30	ND	64	39	ND
Diaphragm	218	121	220	142	290	490	325	180
Internal fats	1,769	813	1,850	770	2,089	5,952	2,798	994
Total	5,748	4,678	6,335	3,862.5	6,243	13,797	9,038	3,713
Bones								
Skull	2,084	2,065	2,218	1,186	2,280	5,328	2,645	1,180
Vertebrae	3,605	3,387	3,928	2,569	3,527	10,109	6,510	1,288
Ribs	1,281	1,032	1,574	174	835	2,409	1,040	715
Jaw bones	880	938	1,010	544	974	1,907	1,668	431
Scapula	263	195	240	158	188	393	475	160
Hyoid bone	45	ND	48	42	30	175	ND	ND
Nasal Cartilage	110	ND	85	ND	ND	230	ND	ND
Total	8,268	7,617	9,103	5,173	7,834	20,551	12,338	3,774
Miscellaneous								
Gums	129	ND	202	131	ND	450	ND	ND
Jaw ligaments	321	184	276	191	310	985	370	183
Baleen	315	415	552	184	504	1,053	465	234
Tendons	ND	ND	ND	ND	ND	ND	ND	ND
Flippers	411	263	467	226	352	640	912	706
Scraps	10	461	ND	2	265	7	1,836	443
Total	1,186	1323	1,497	735	1,431	3,135	3,583	1,566
Total weight	48,330	45,807	54,768	34,351.5	49,582	109,930	79,254	24,817

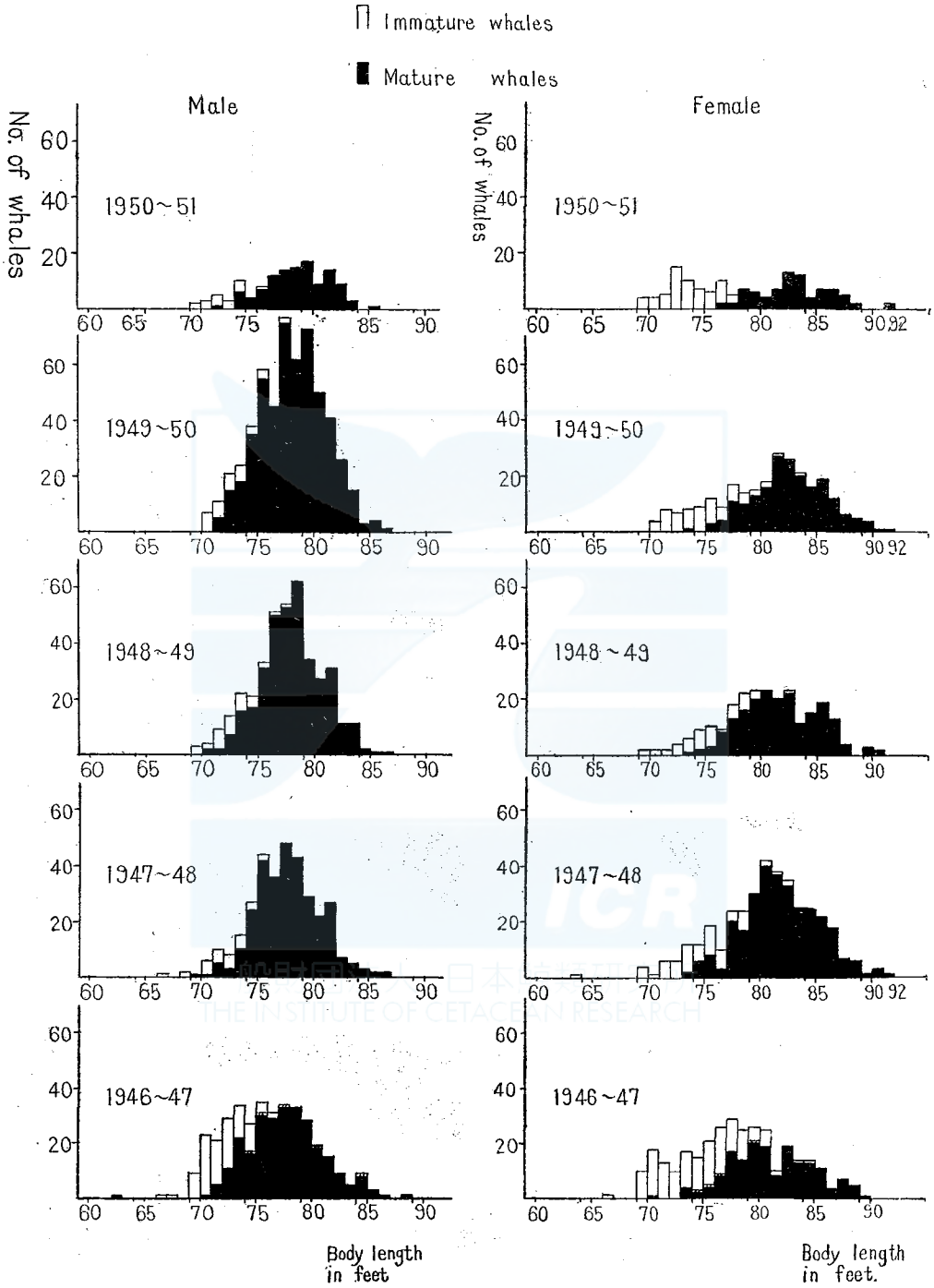


Fig. 1. Length frequencies of Blue whales.

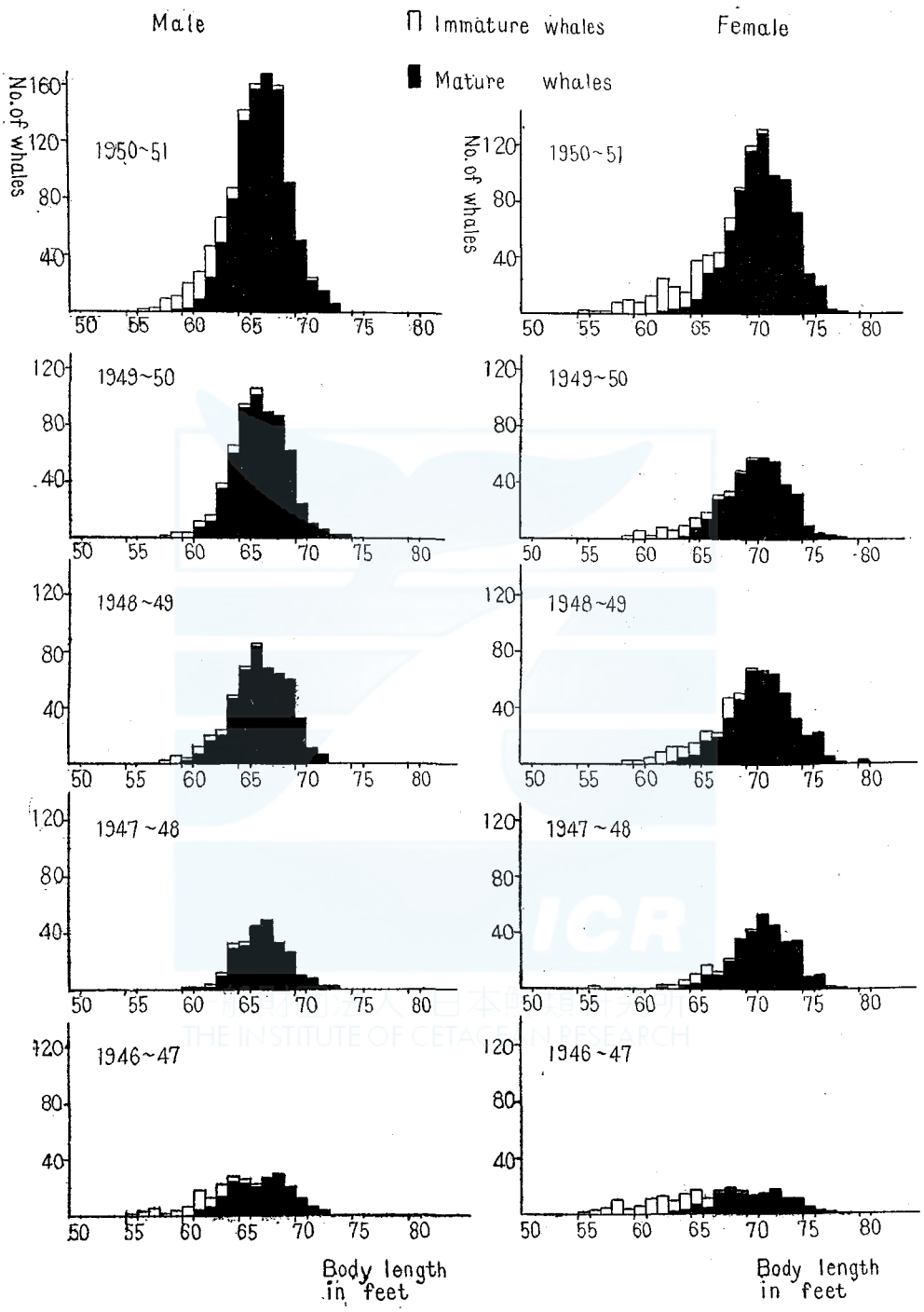


Fig. 2. Length frequencies of Fin whales.

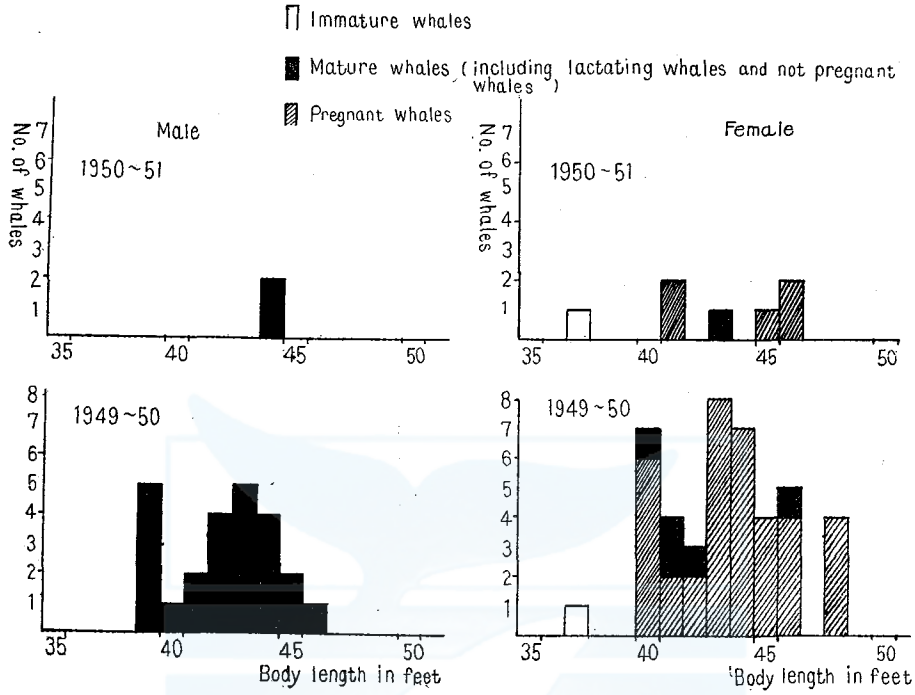


Fig. 3. Length frequencies of Humpback whales.

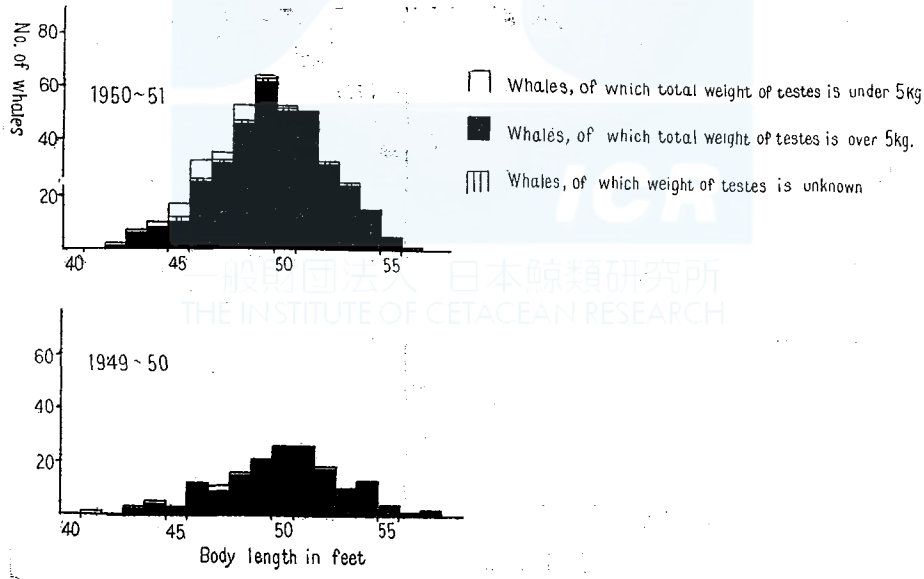


Fig. 4. Length frequencies of Sperm whales.

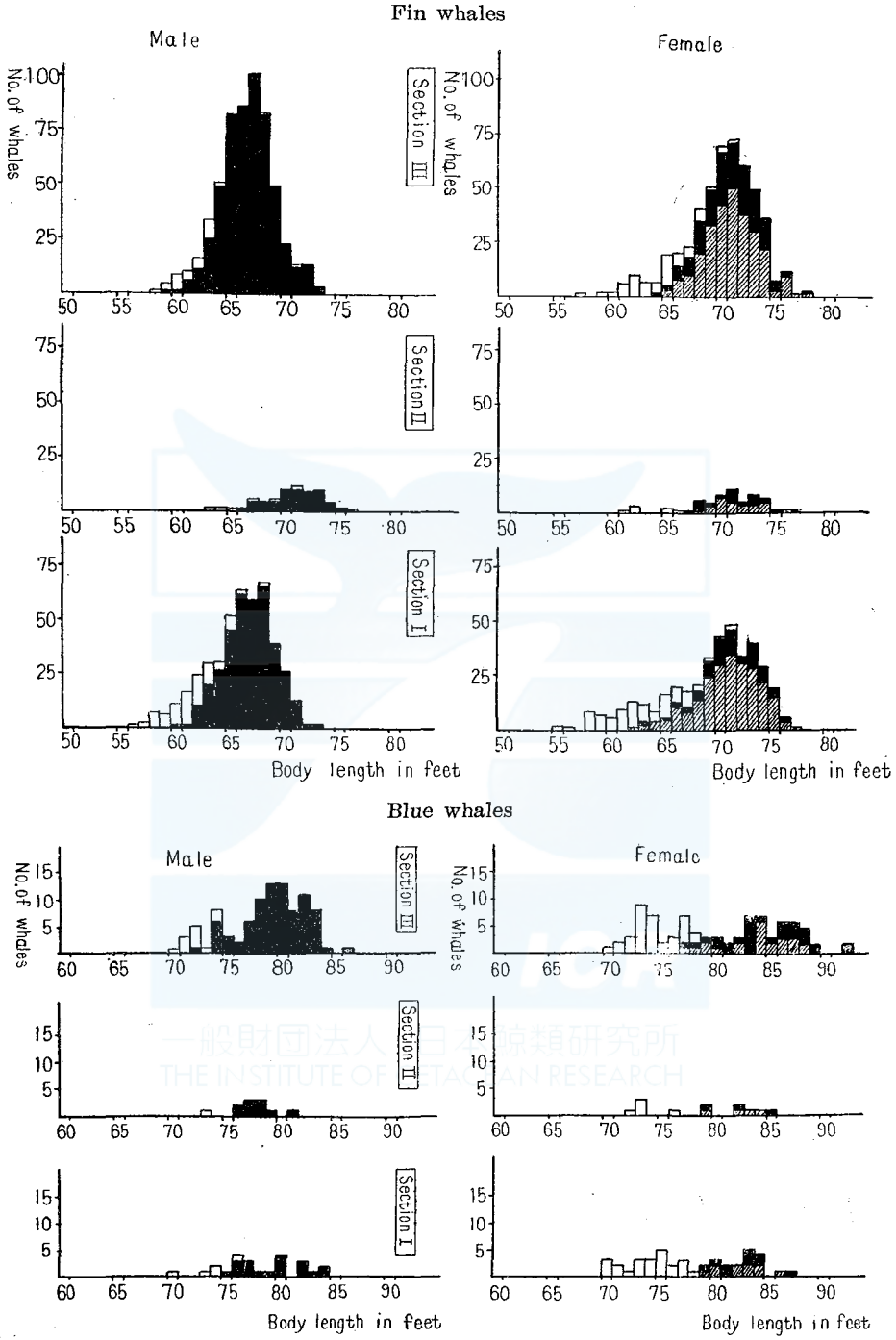


Fig. 5. Length frequencies of whales by sections.

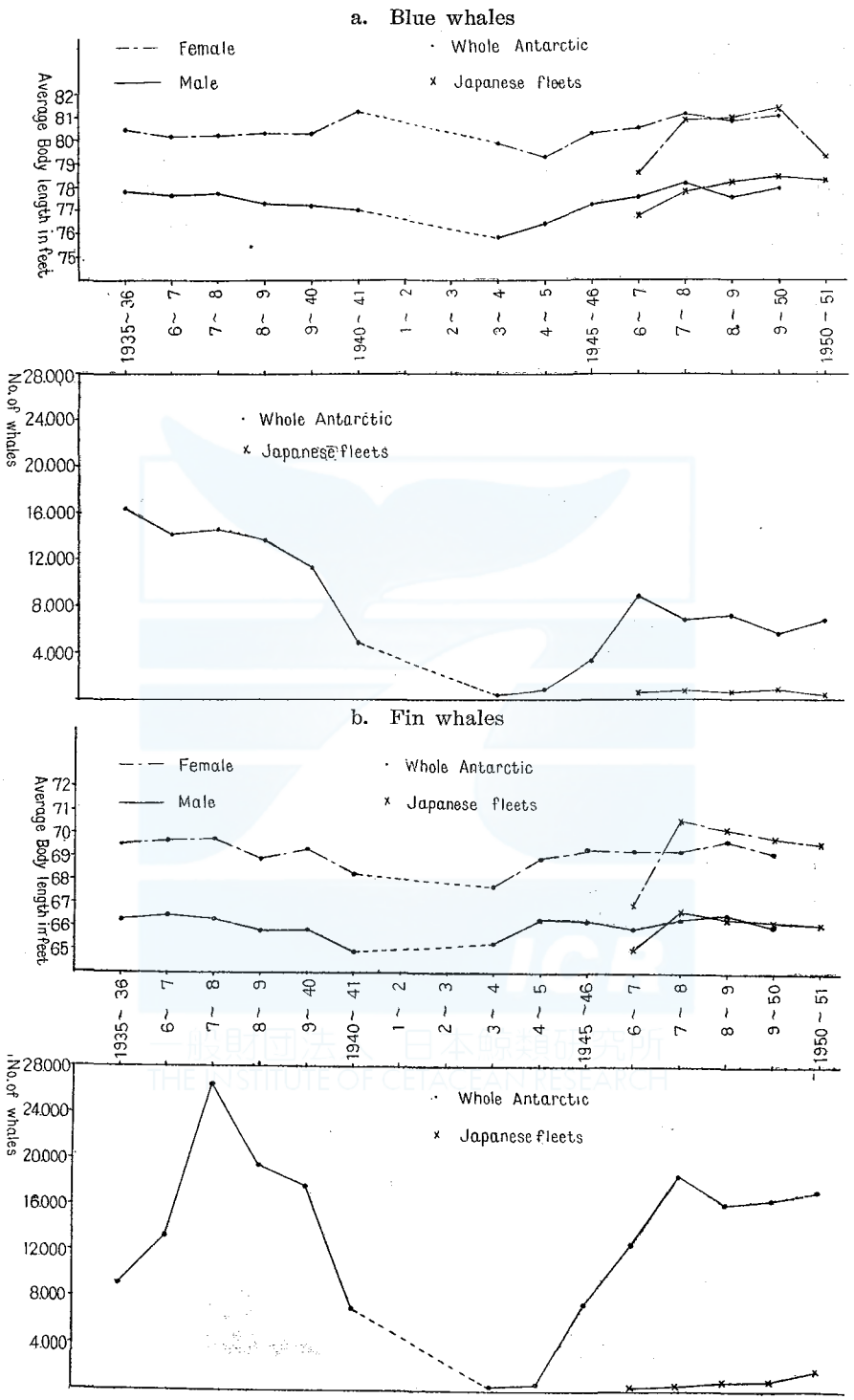
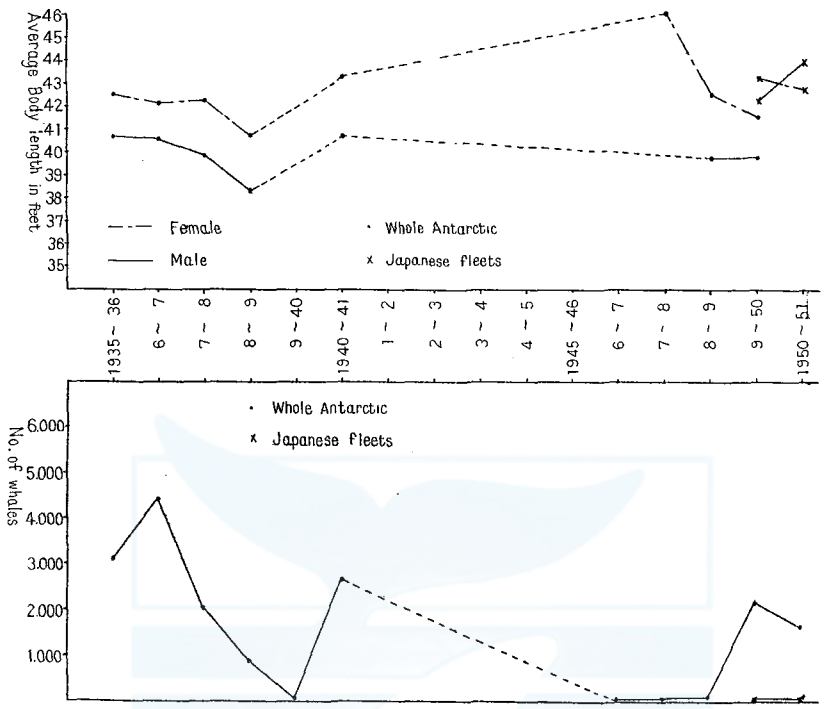


Fig. 6a-d. Number of whales and average body length.

c. Humpback whales



d. Sperm whales

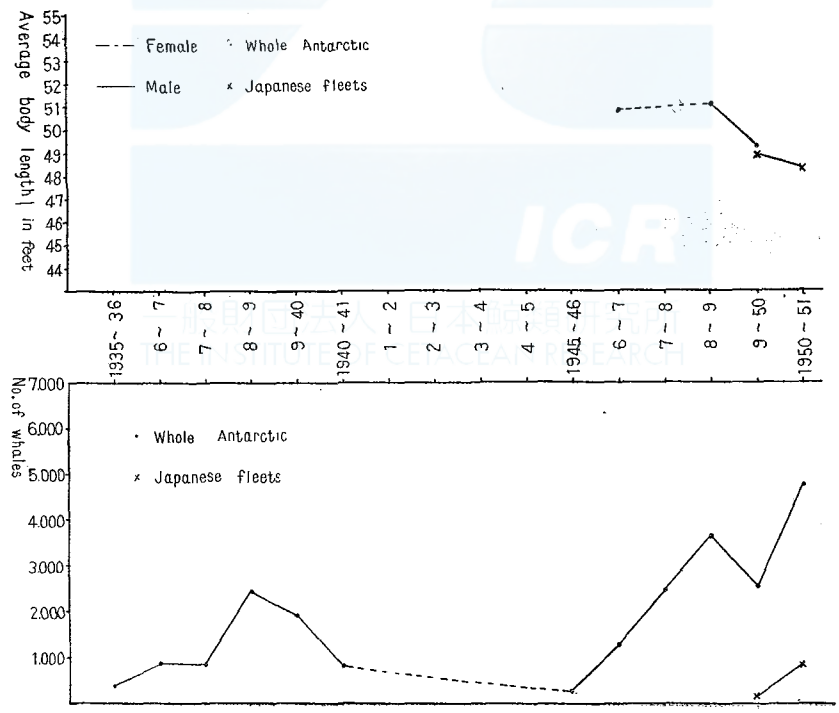
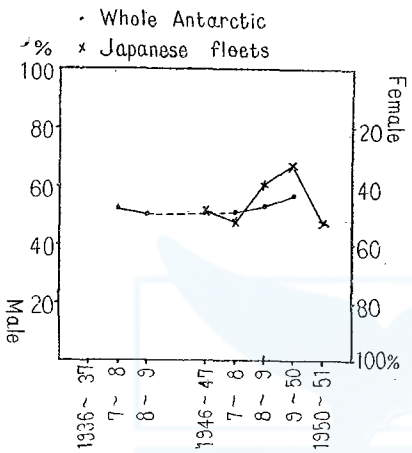
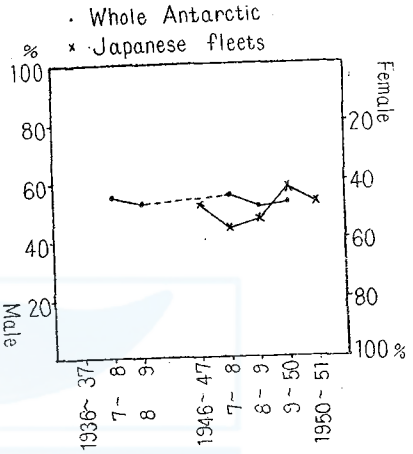


Fig. 7. Seasonal & monthly fluctuation of sex ratio.

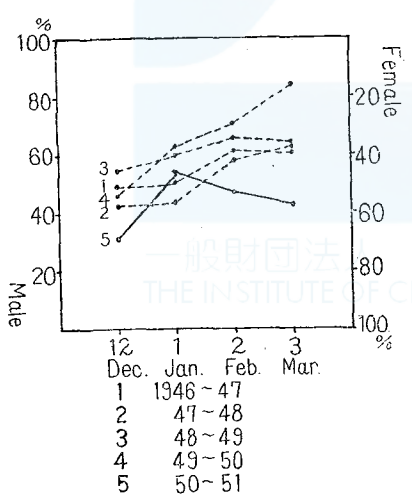
Blue whales



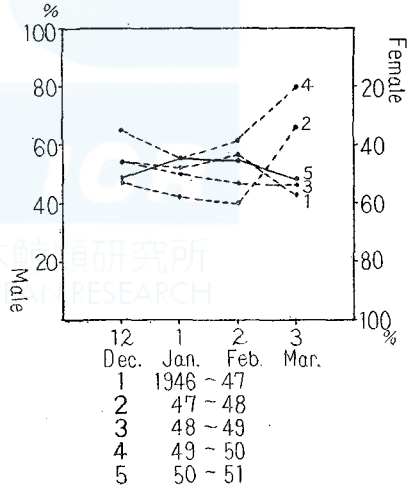
Fin whales



Blue whales (caught by Japanese fleets)



Fin whales (caught by Japanese fleets)



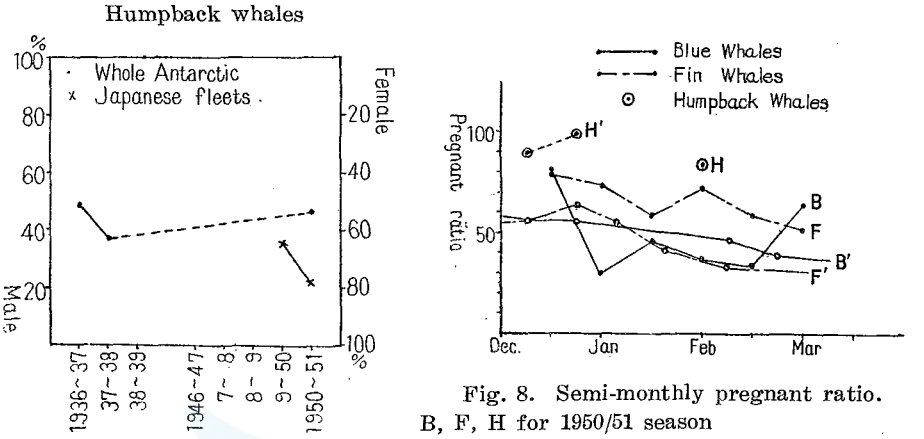


Fig. 8. Semi-monthly pregnant ratio.
B, F, H for 1950/51 season
B′, F′, H′ for average for post-war 4 seasons

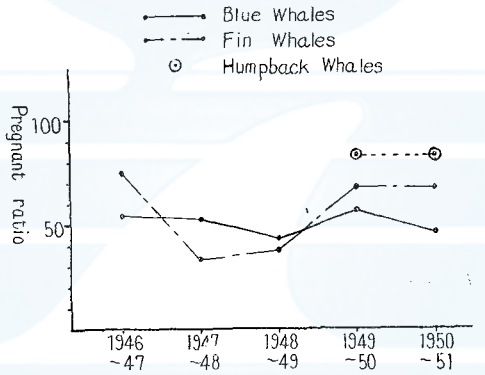


Fig. 9. Seasonal pregnant ratio.

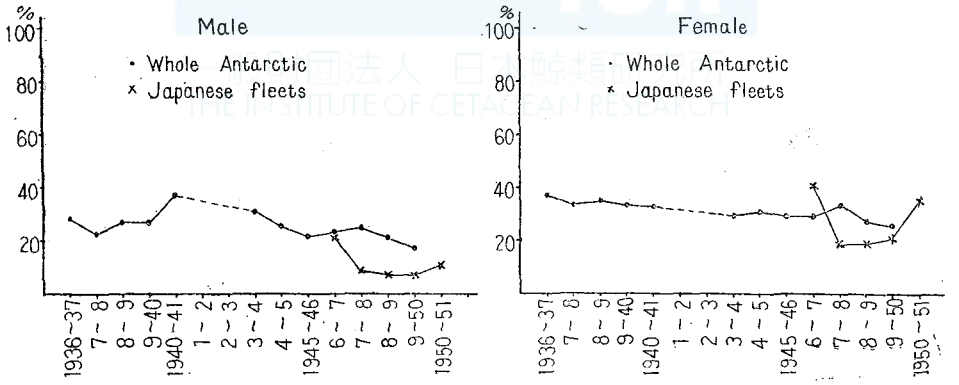


Fig. 10. Number of immature blue whales caught.

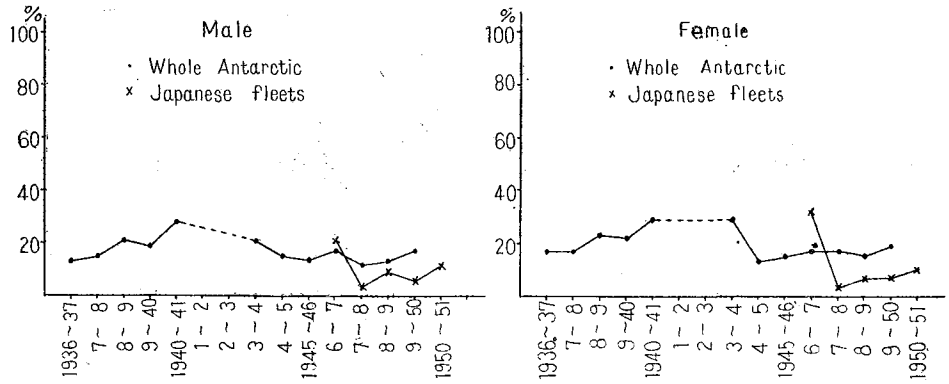


Fig. 11. Number of immature fin whales caught.

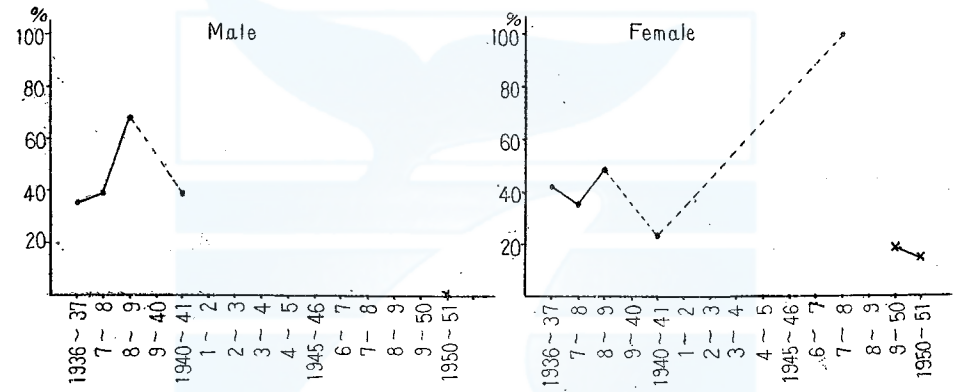


Fig. 12. Number of immature humpback whales caught.

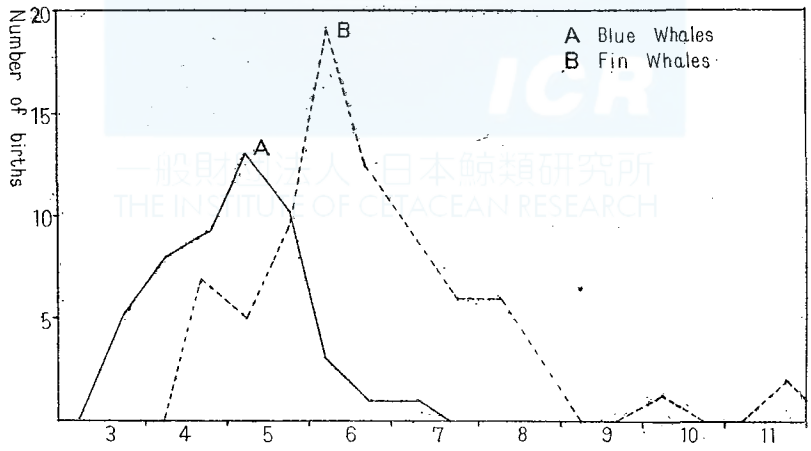


Fig. 13. Curve of frequency of births (Source: Discovery Reports Vol. 1)
A: Blue whales B: Fin whales

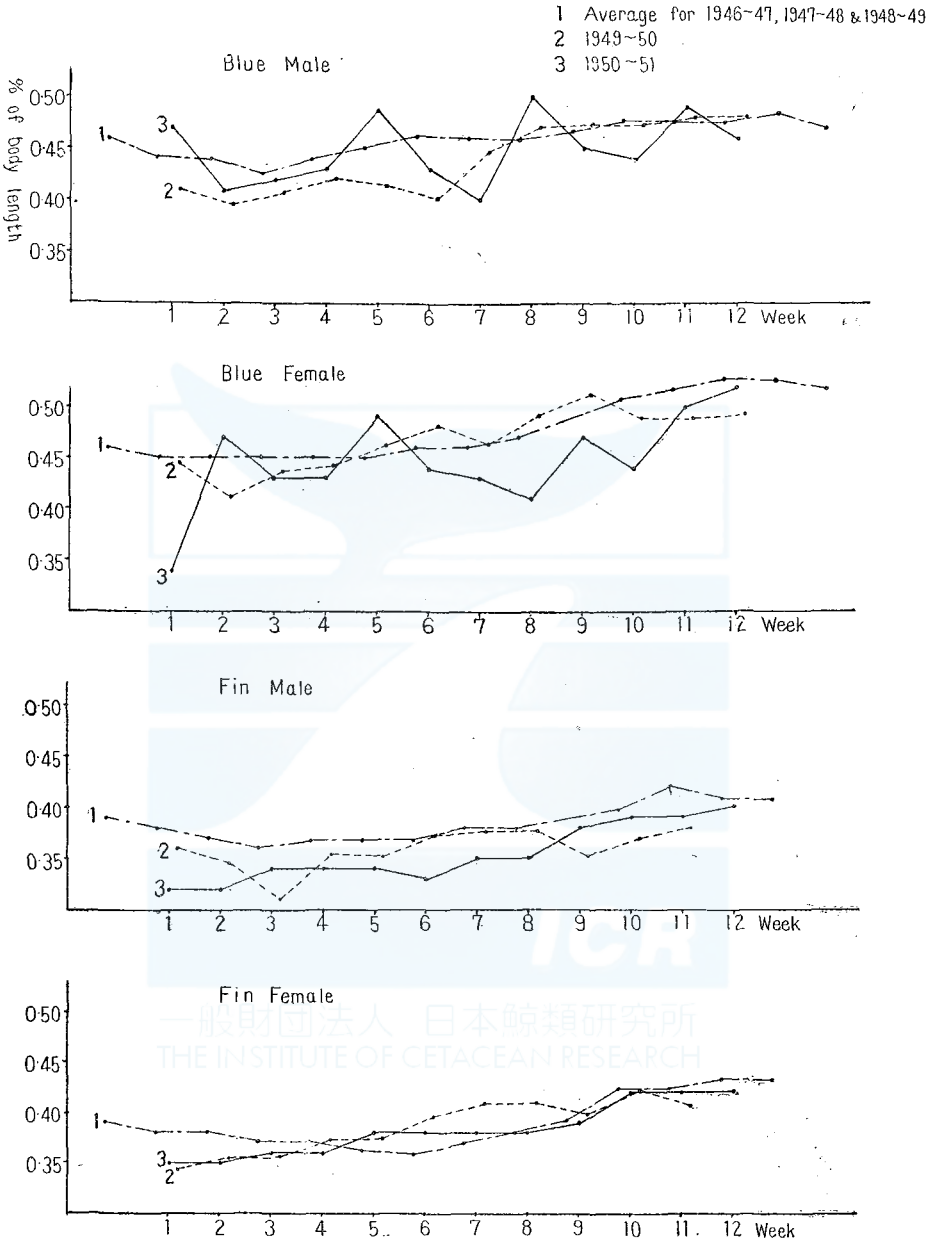


Fig. 14. Weekly fluctuation of thickness of blubber.

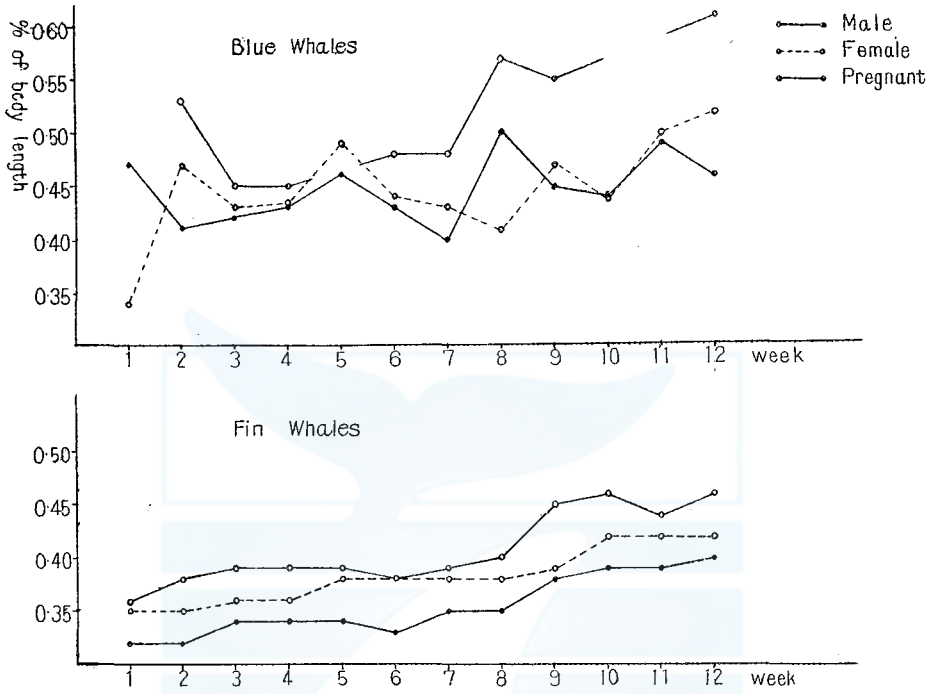


Fig. 15. Comparison of weekly fluctuation of blubber thickness.

1st week	Dec. 22-23
2nd week	Dec. 24-30
3rd week	Dec. 31-Jan. 6
4th week	Jan. 7-13
5th week	Jan. 14-20
6th week	Jan. 21-27
7th week	Jan. 28-Feb. 3
8th week	Feb. 4-10
9th week	Feb. 11-17
10th week	Feb. 18-24
11th week	Feb. 25-Mar. 3
12th week	Mar. 4-9

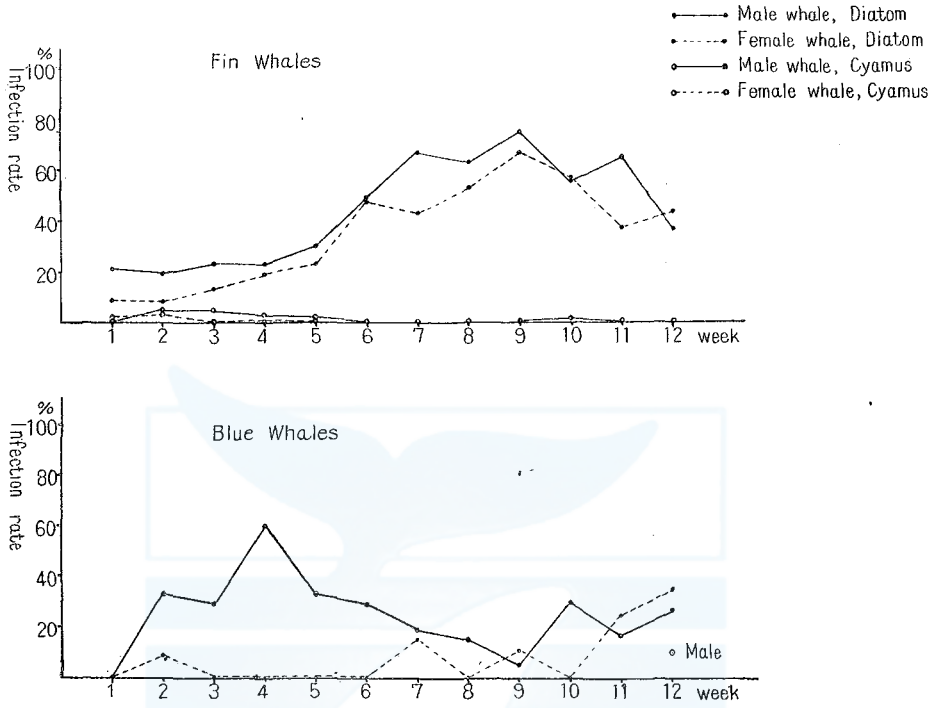


Fig. 16. Weekly fluctuation of infection rate of Diatom film and Cyamus

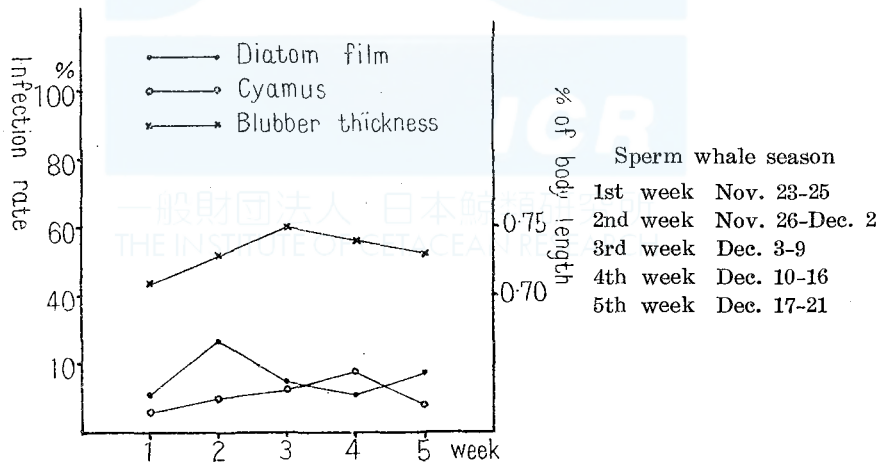
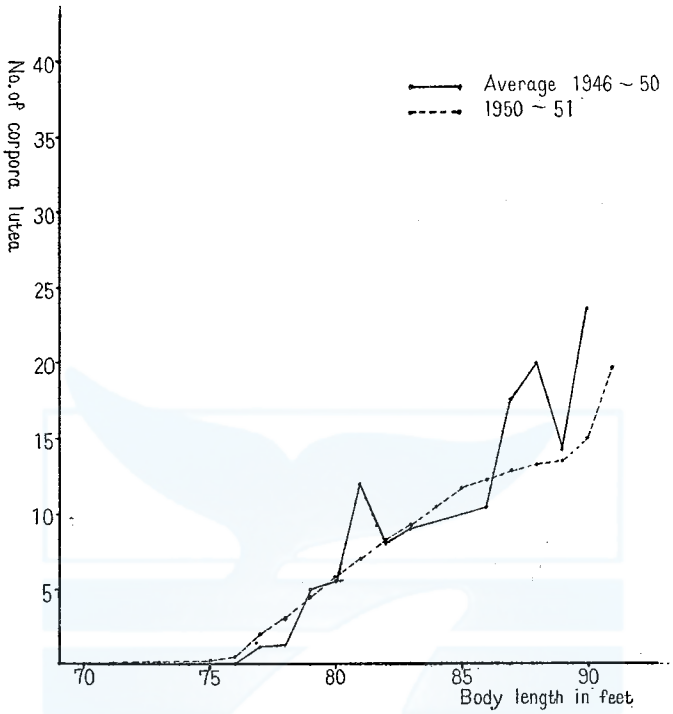


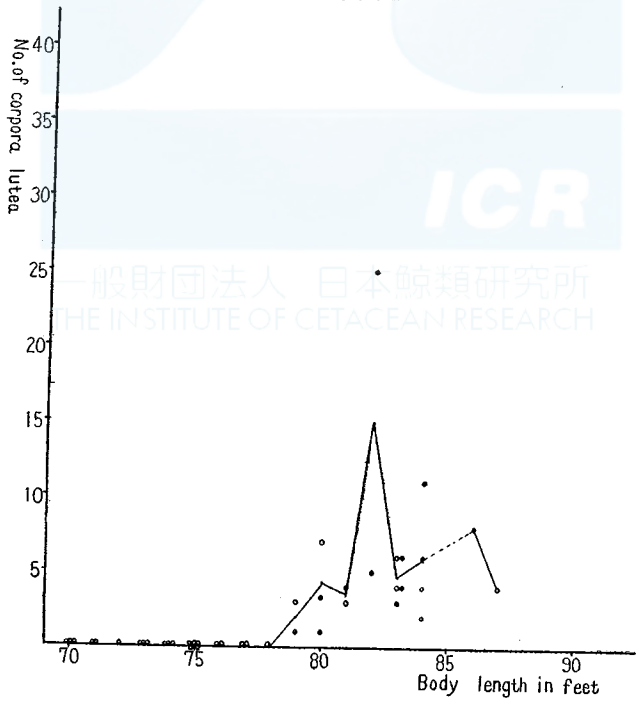
Fig. 17. Weekly fluctuation of blubber thickness and infection rate of Diatom film and Cymus

Fig. 18. Relation between number of corpora lutea and body length of blue whales.

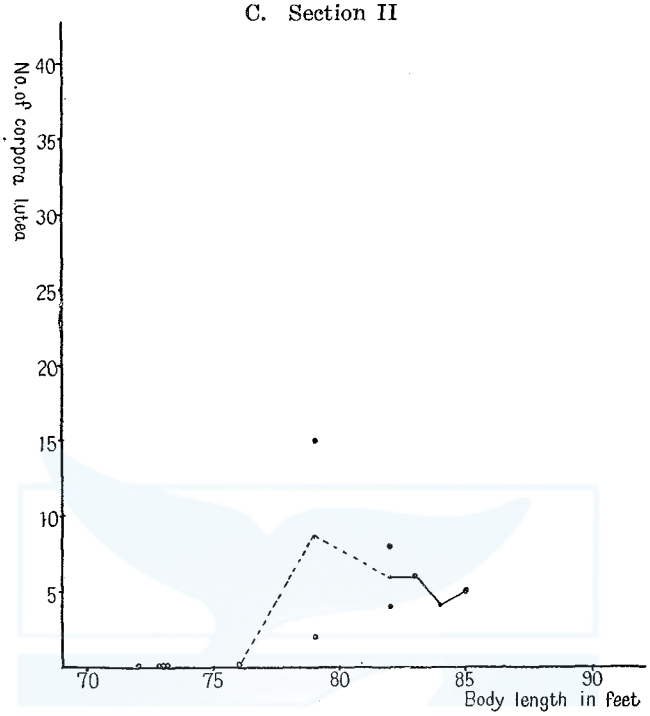
A. Entire ground



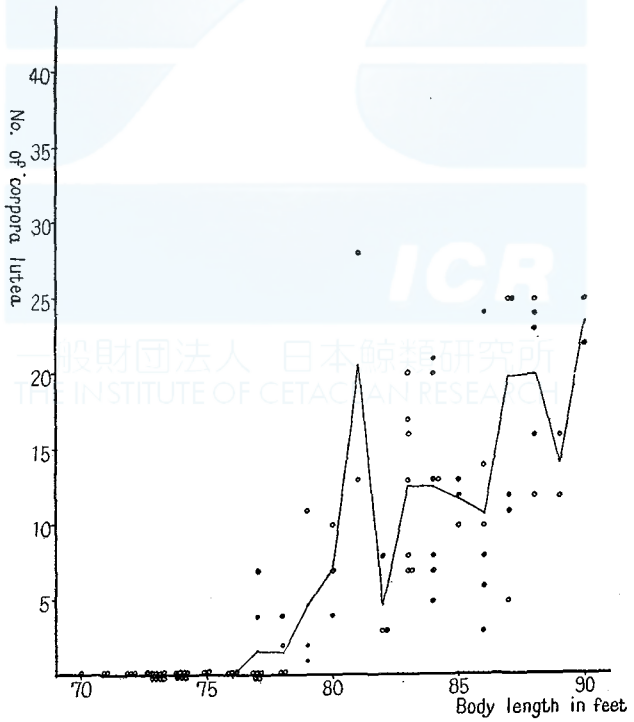
B. Section I



C. Section II



D. Section III



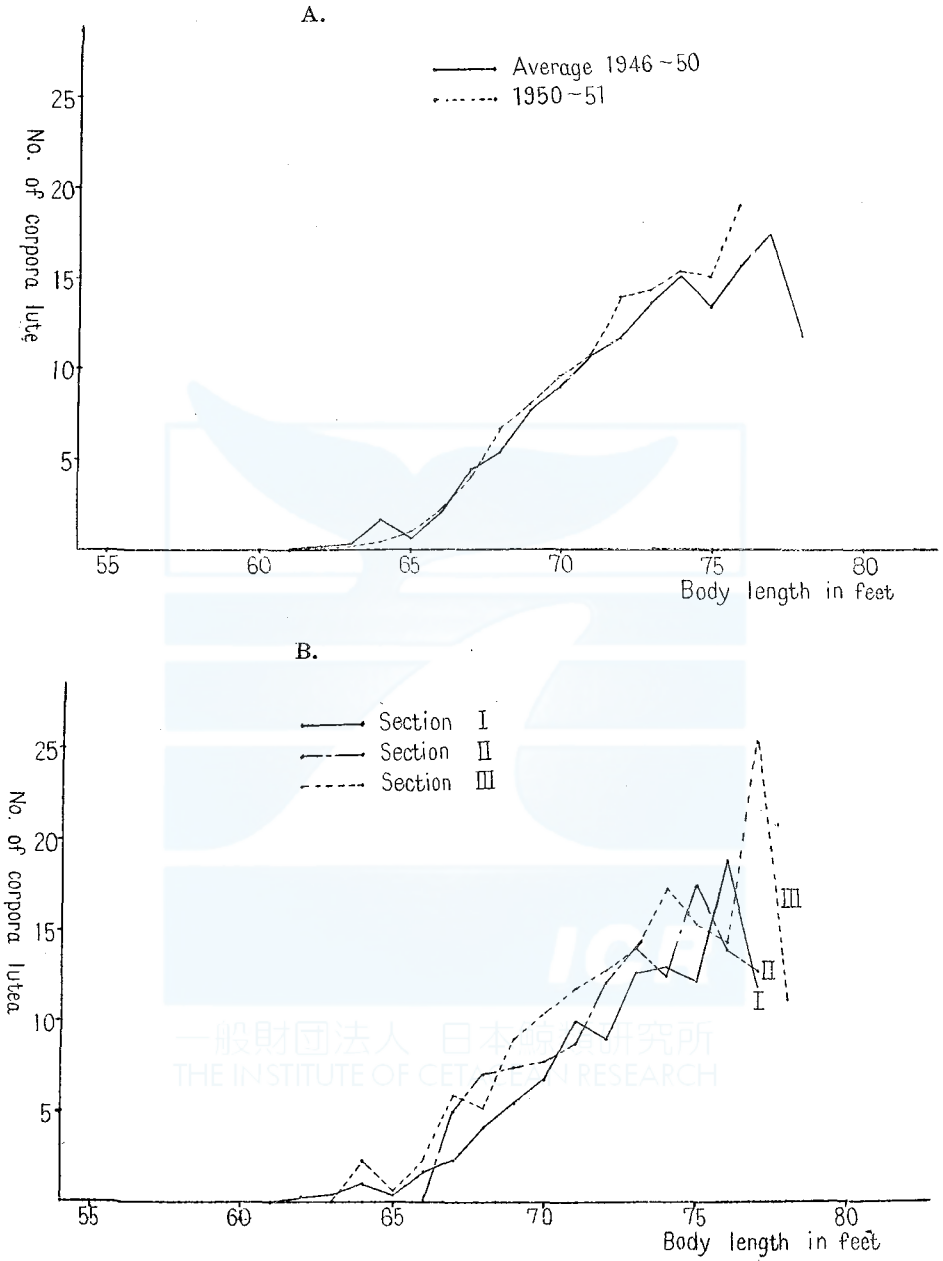
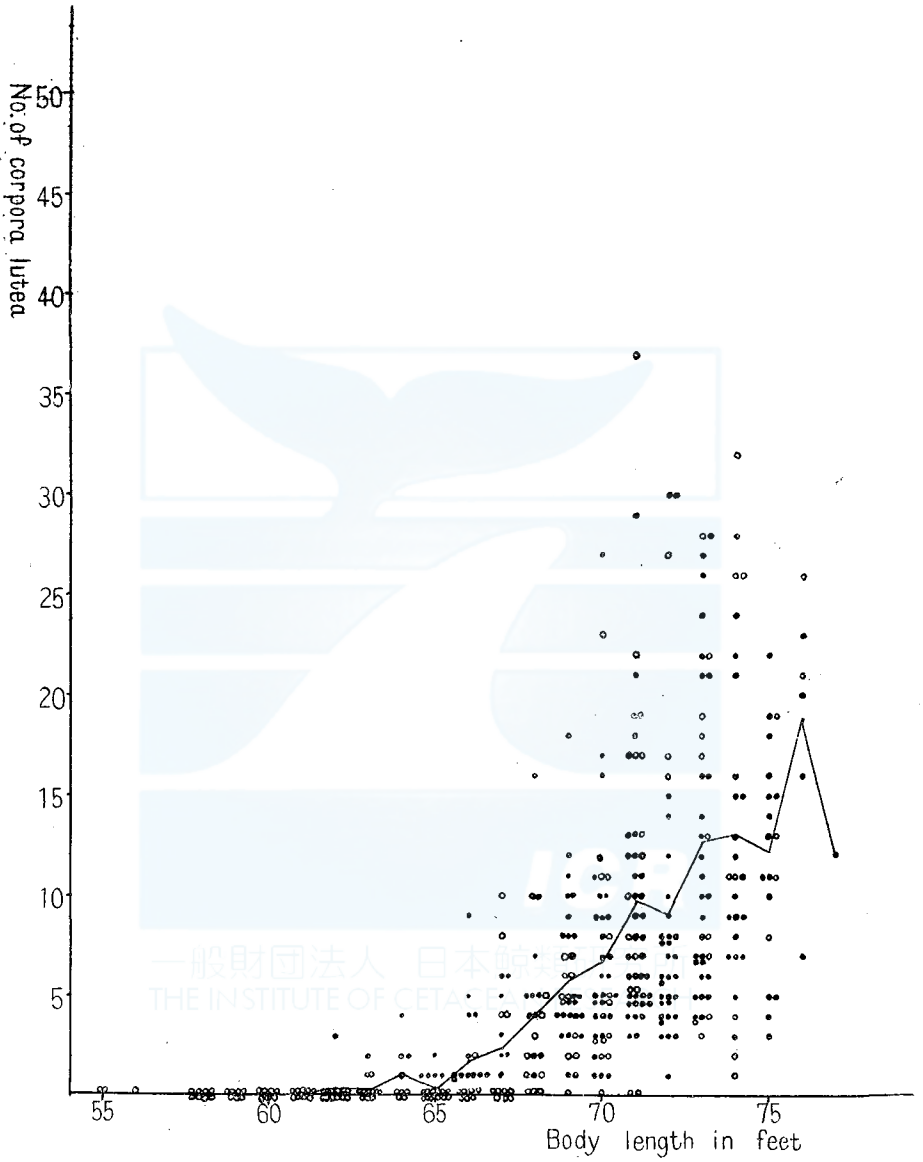
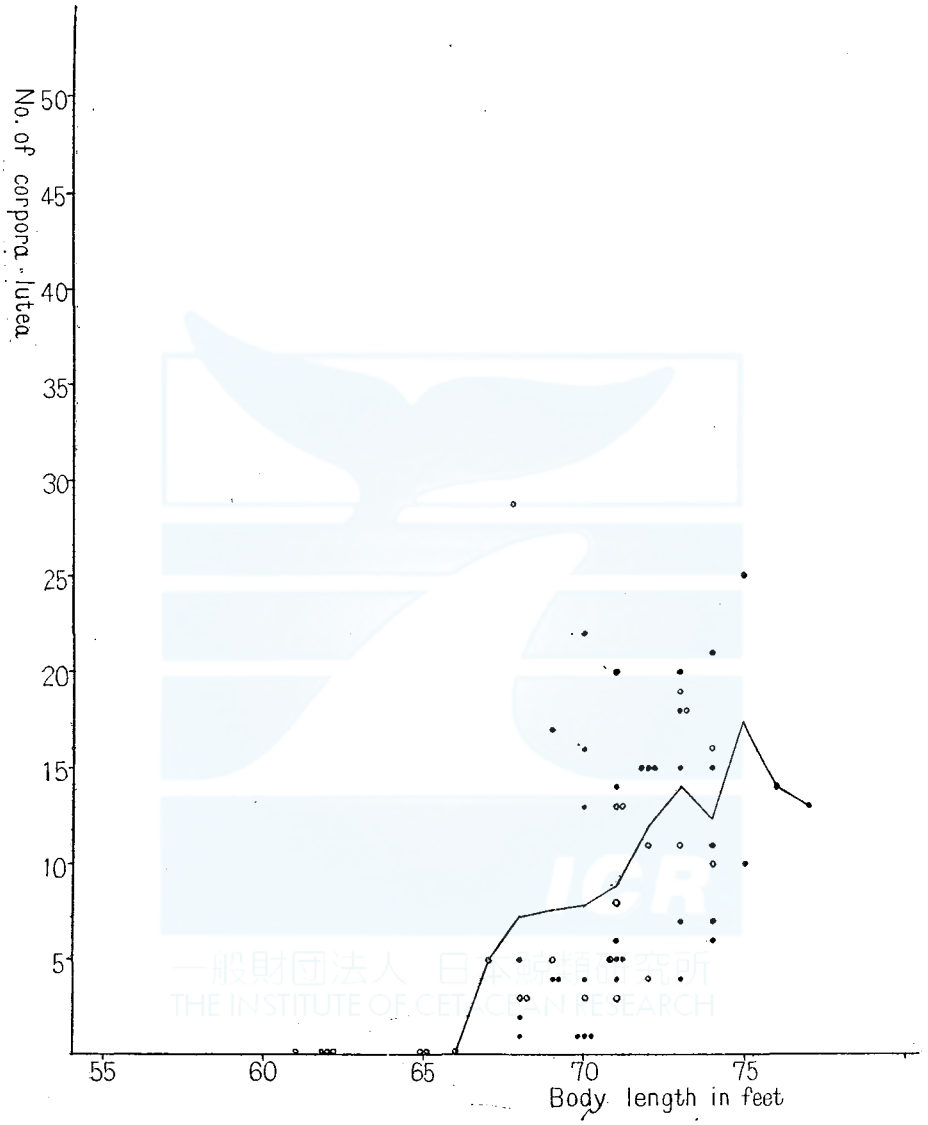


Fig. 19. Relation between number of corpora lutea and body length of fin whales.

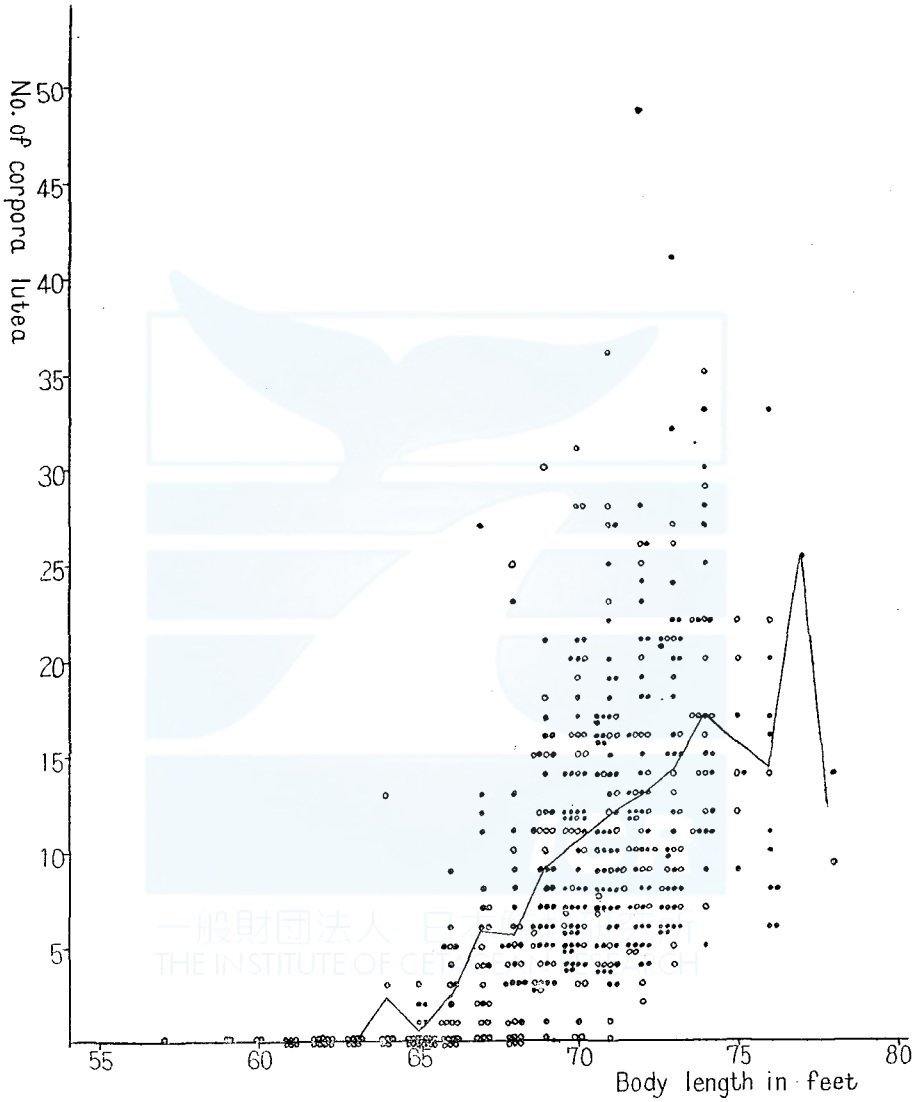
C. Section I


No. of corpora lutea
50
45
40
35
30
25
20
15
10
5
55
60
65
70
75
Body length in feet

D. Section II


No. of corpora lutea
50
45
40
35
30
25
20
15
10
5
55
60
65
70
75
Body length in feet

E. Section III



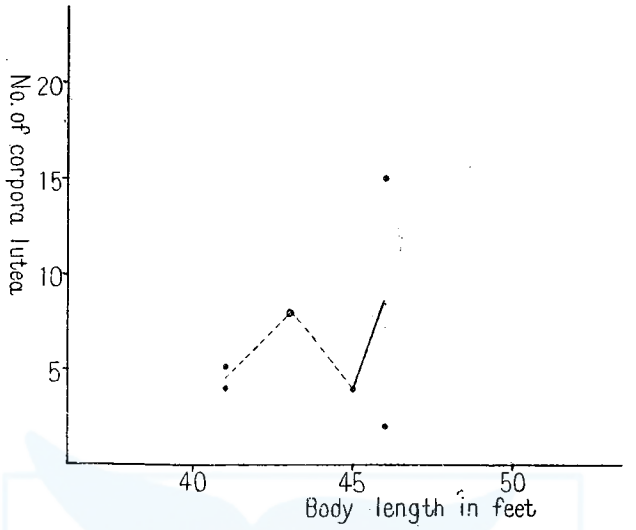


Fig. 20. Relation between number of corpora lutea and body length of humpback whales.

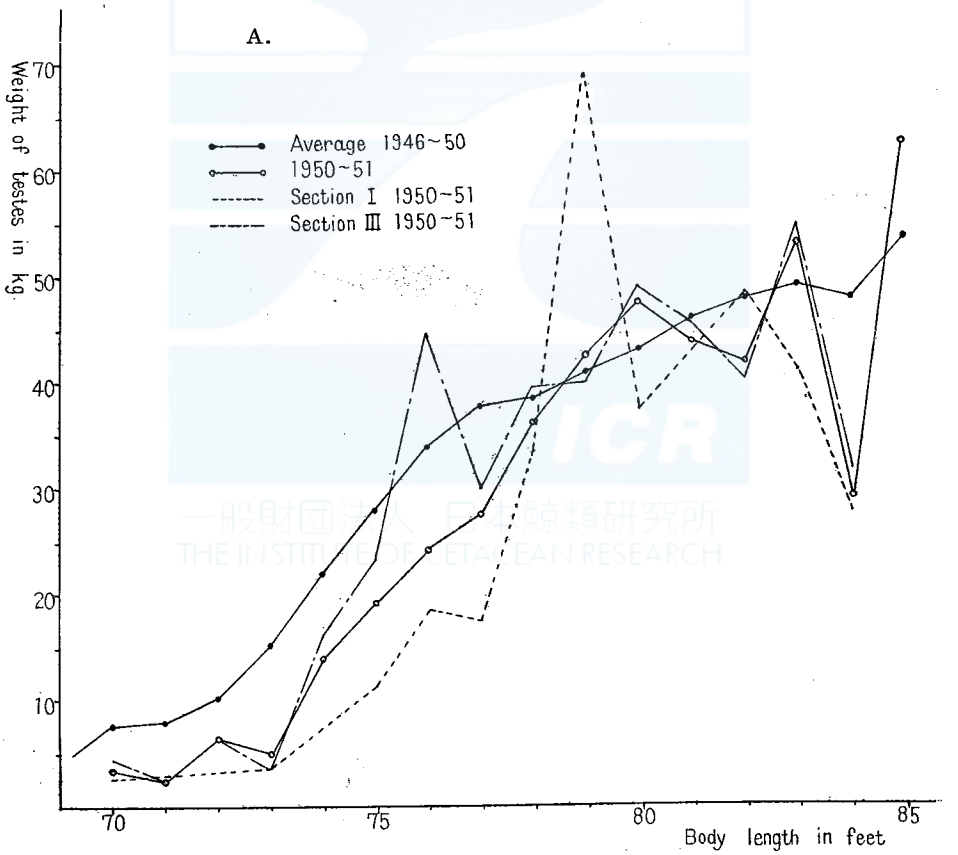
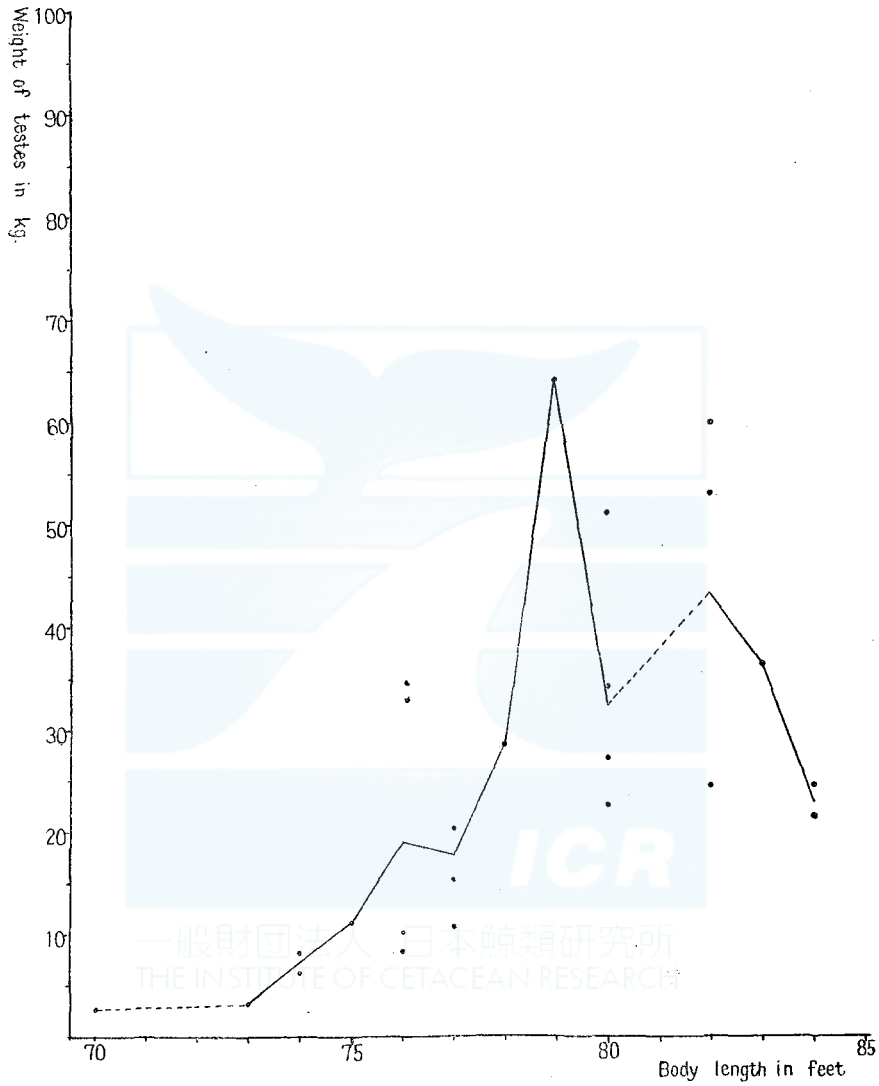
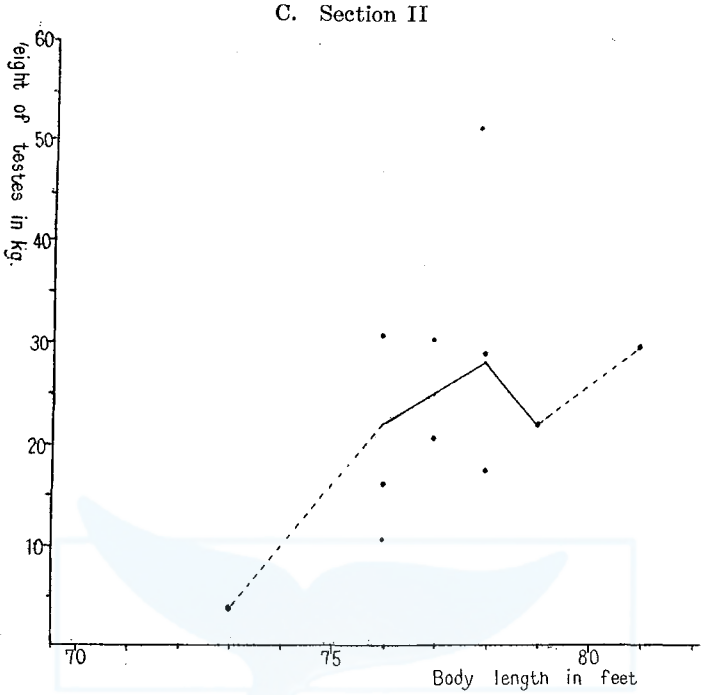


Fig. 21. Relation between weight of testes and body length of blue whales.

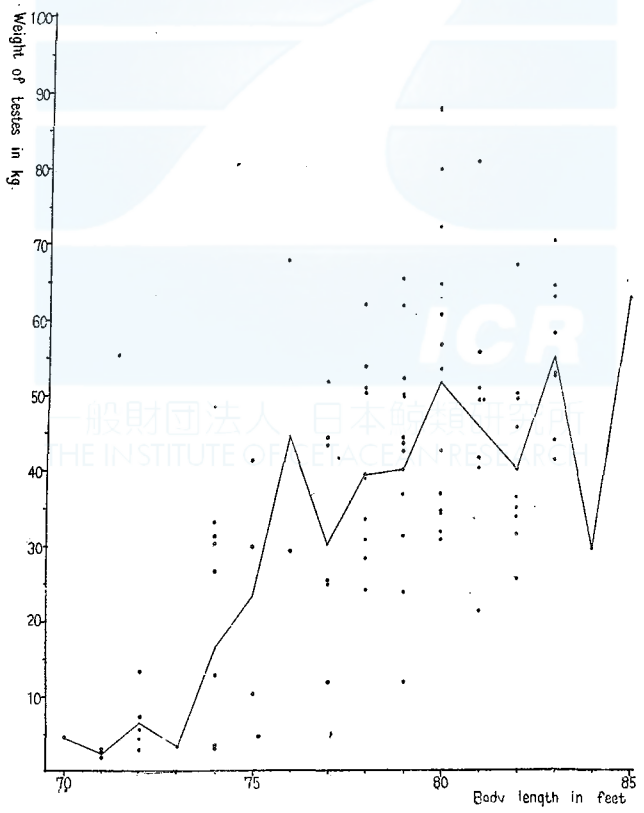
B. Section I



C. Section II



D. Section III



A. Comparison between section I and III

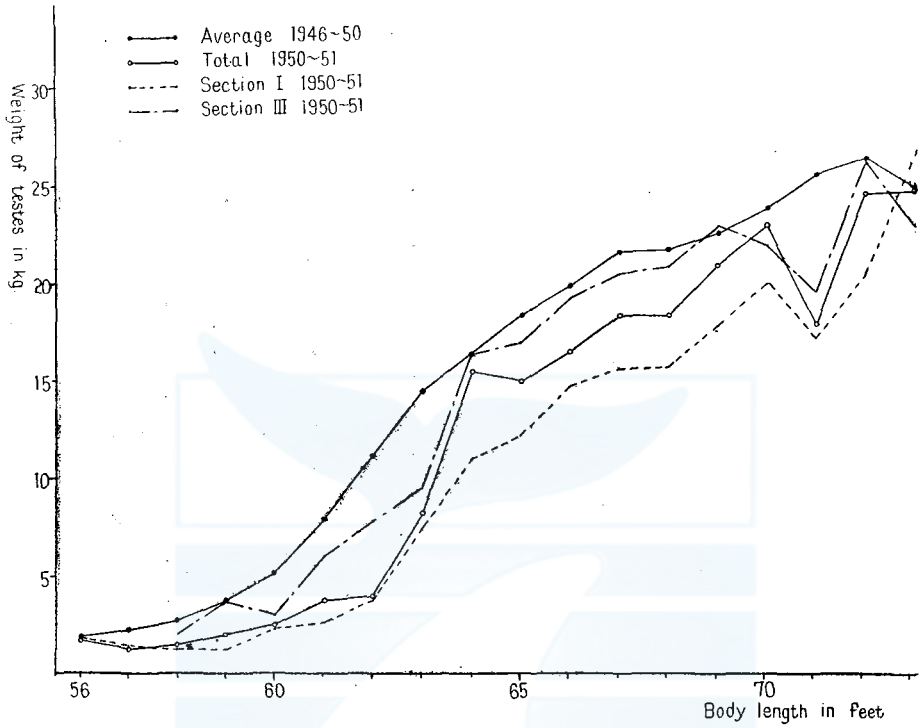
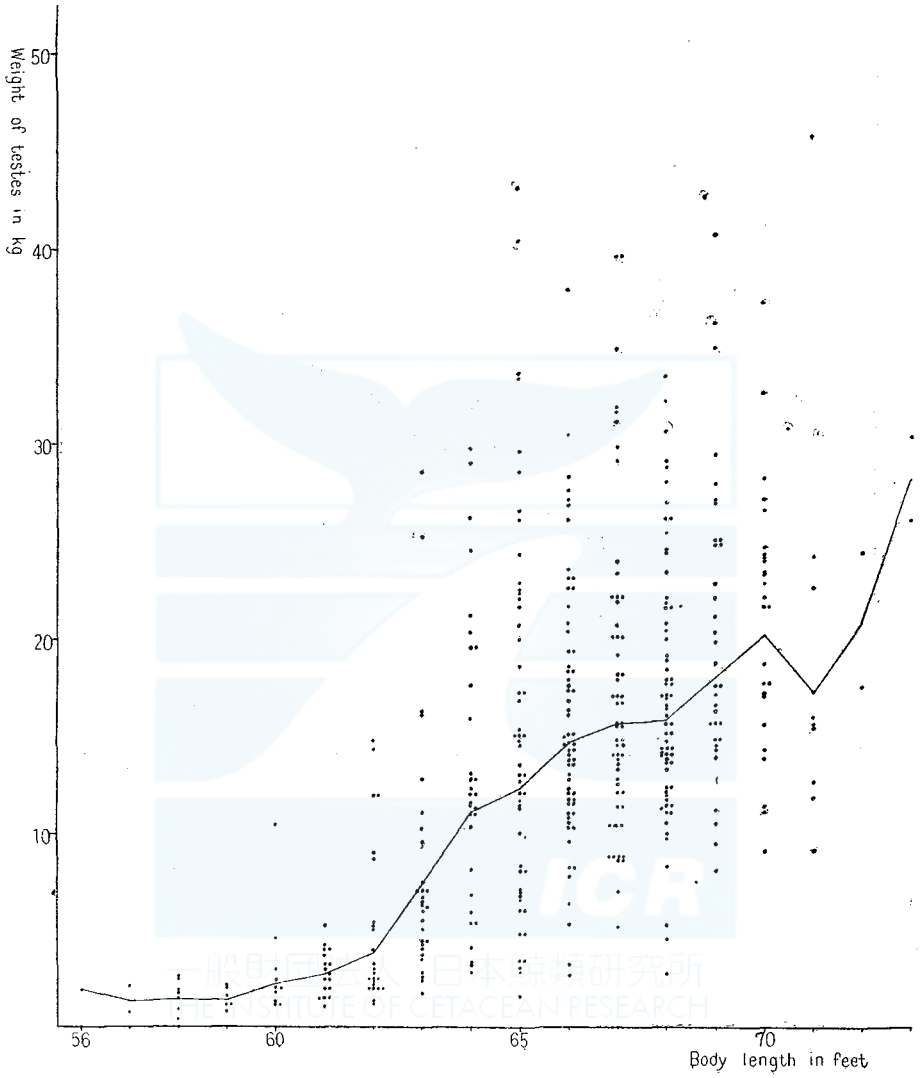
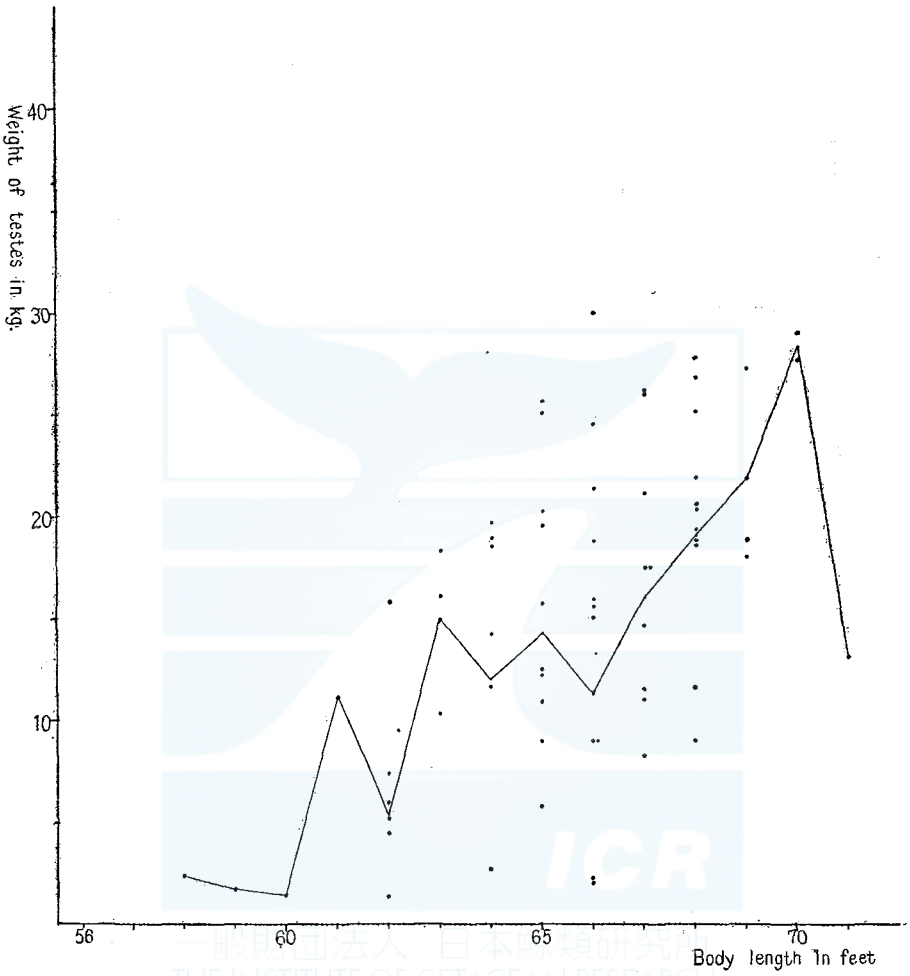


Fig. 22. Relation between weight of testes and body length of fin whales.

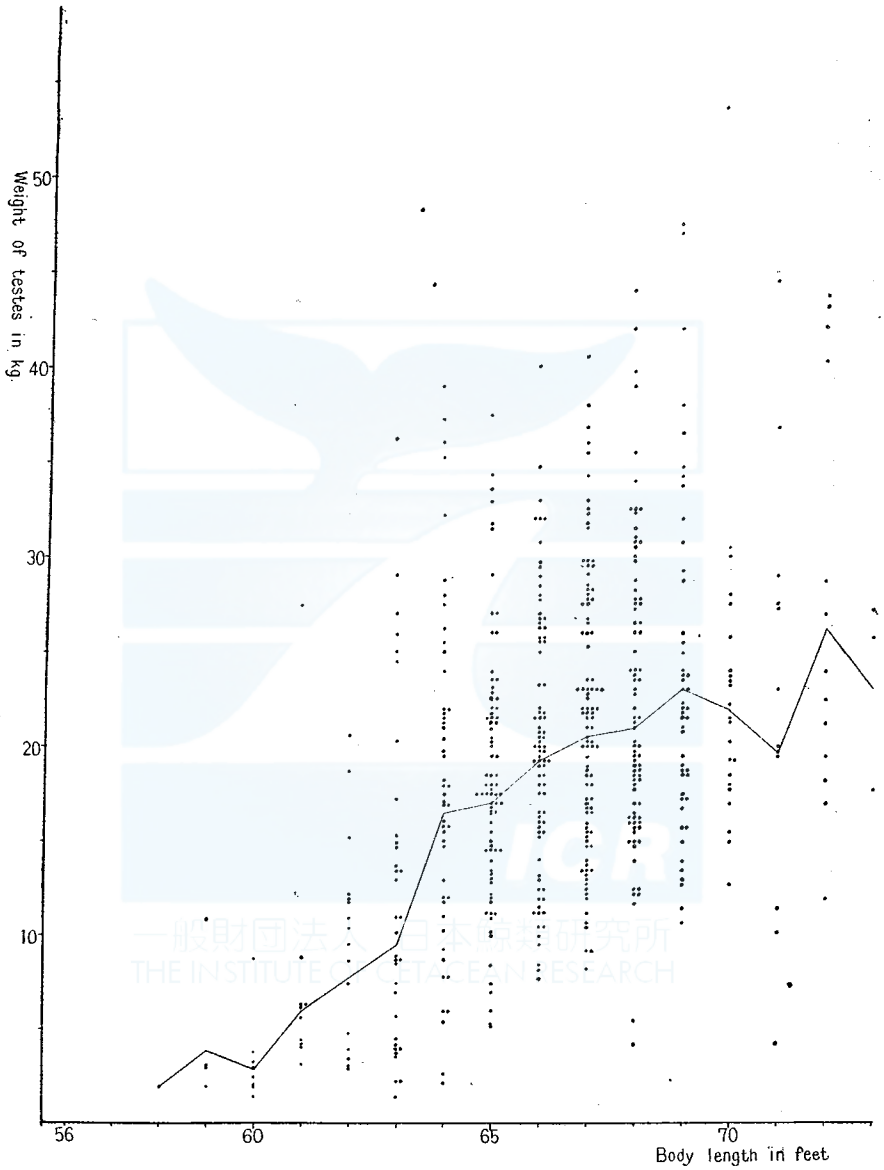
B. Section I


Weight of testes in kg
50
40
30
20
10
56
60
65
70
Body length in feet

C. Section II



D. Section III



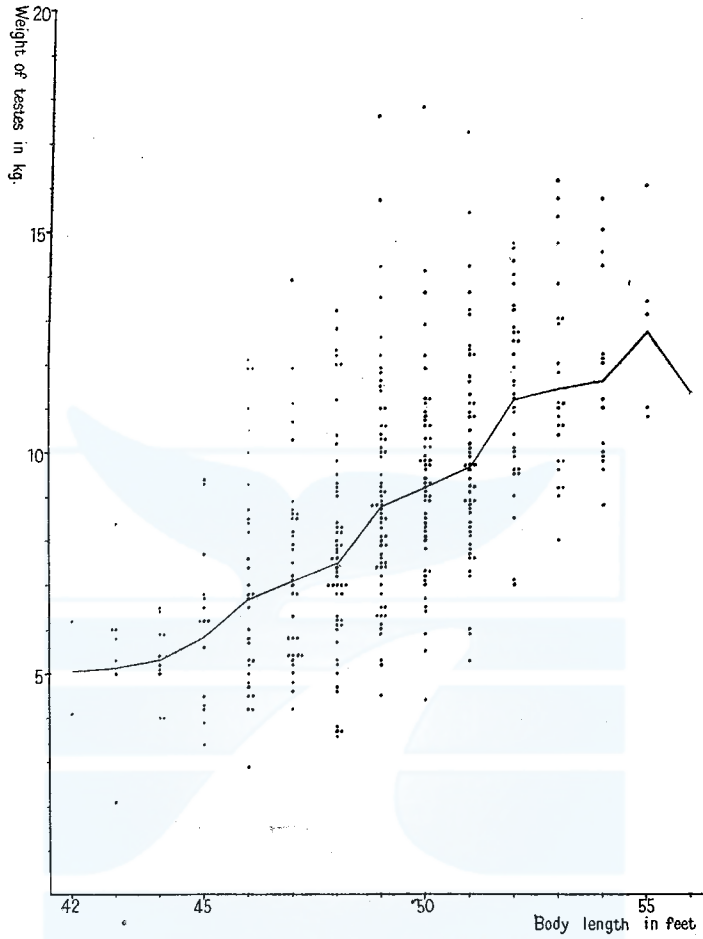


Fig. 23. Relation between weight of testes and body length of Sperm whales.

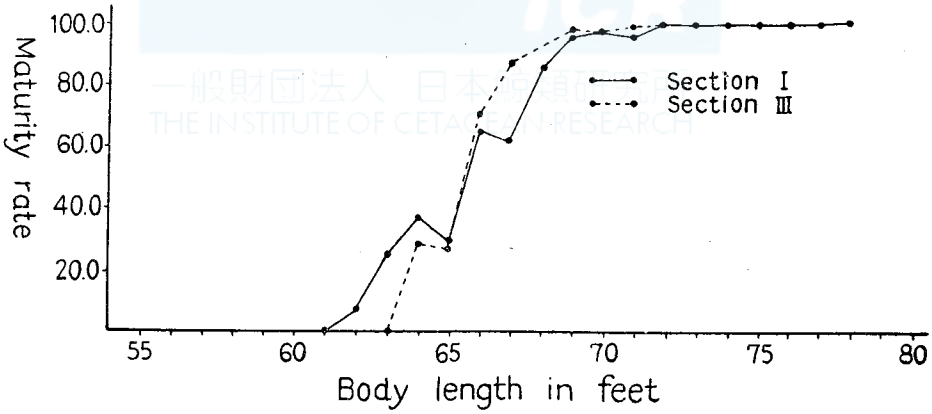


Fig. 24. Comparison of maturity ratio of fin whales between Section I and Section III.

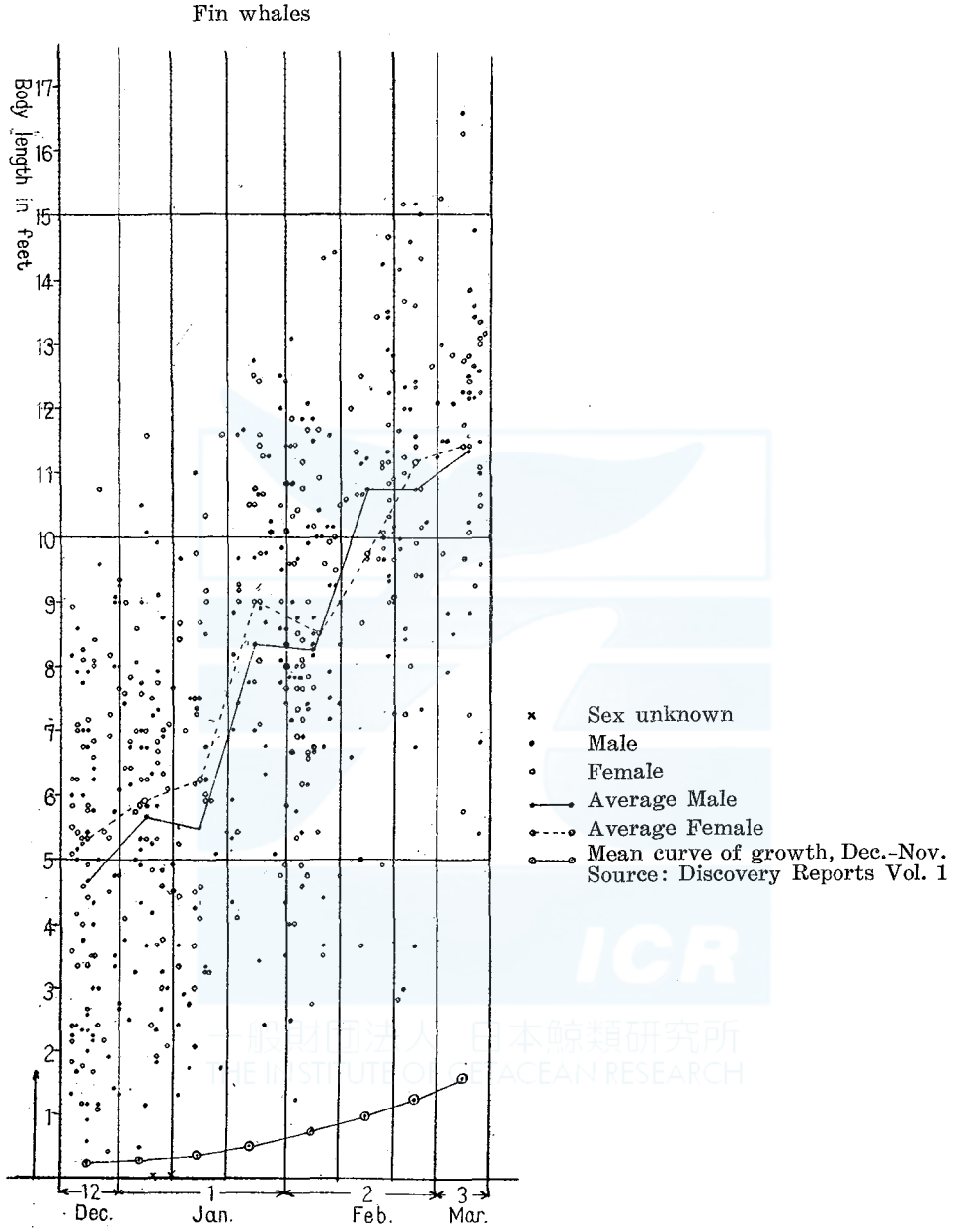
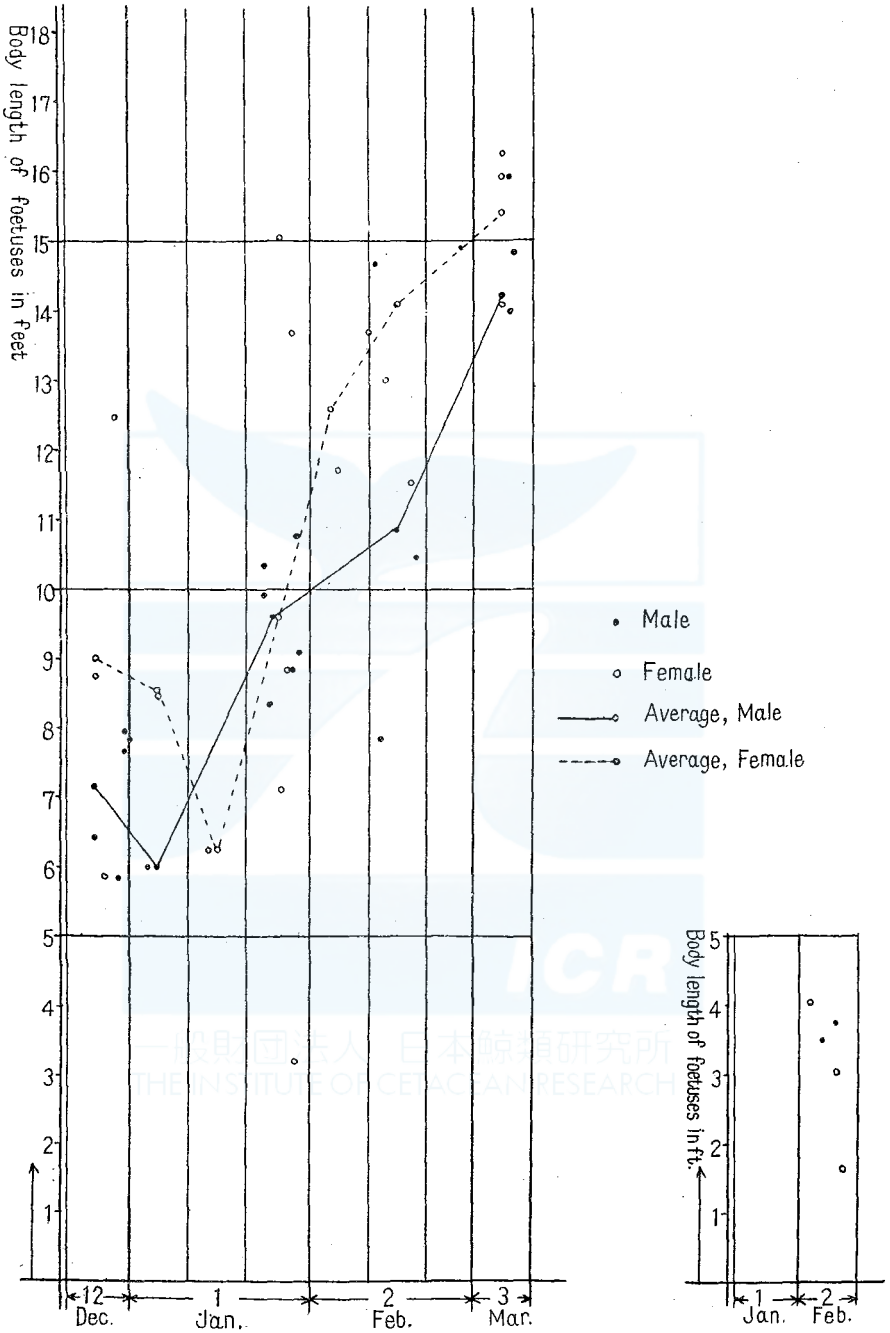


Fig. 25. Growth curve of foetuses.

Blue whales


Body length of foetuses in feet
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
12
Dec.
1
Jan.
2
Feb.
3
Mar.
Male
Female
Average, Male
Average, Female
Body length of foetuses in ft.
5
4
3
2
1
1
Jan.
2
Feb.

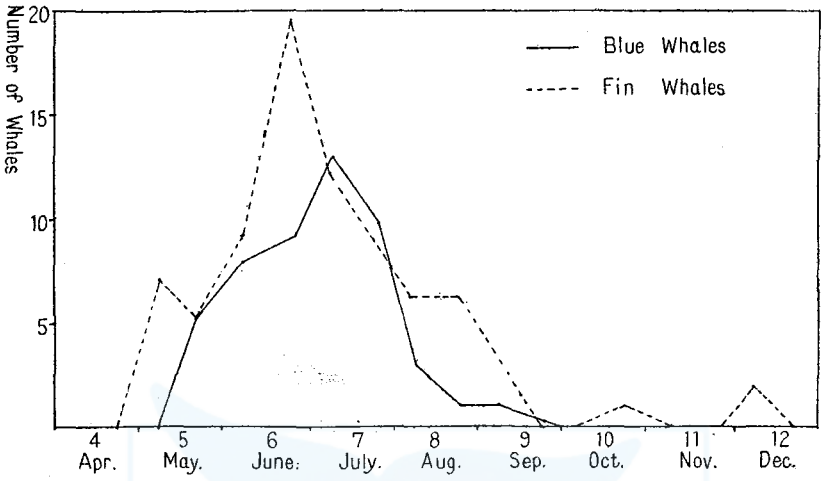


Fig. 26. Curve of frequency of pairing (Source : Discovery Reports Vol. 1)

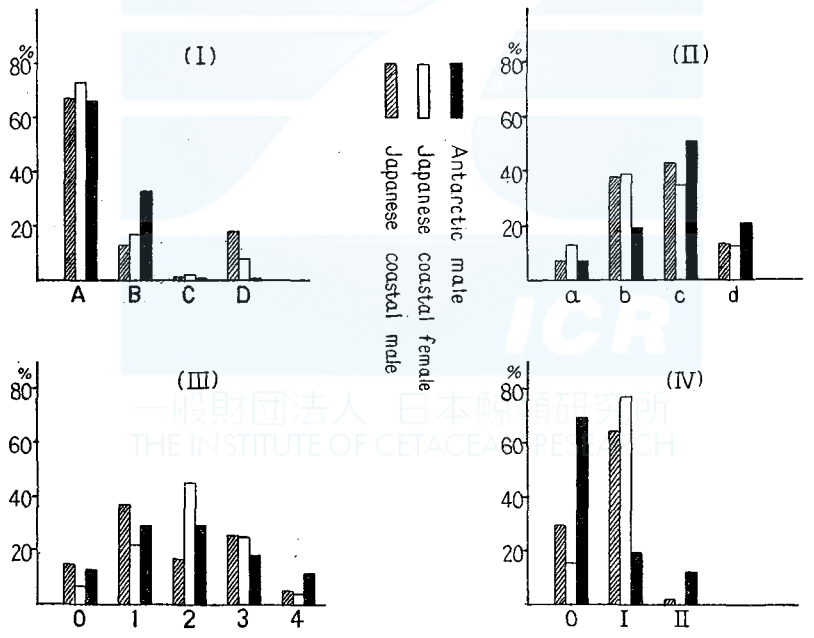


Fig. 27. Frequencies of body colour of sperm whales.

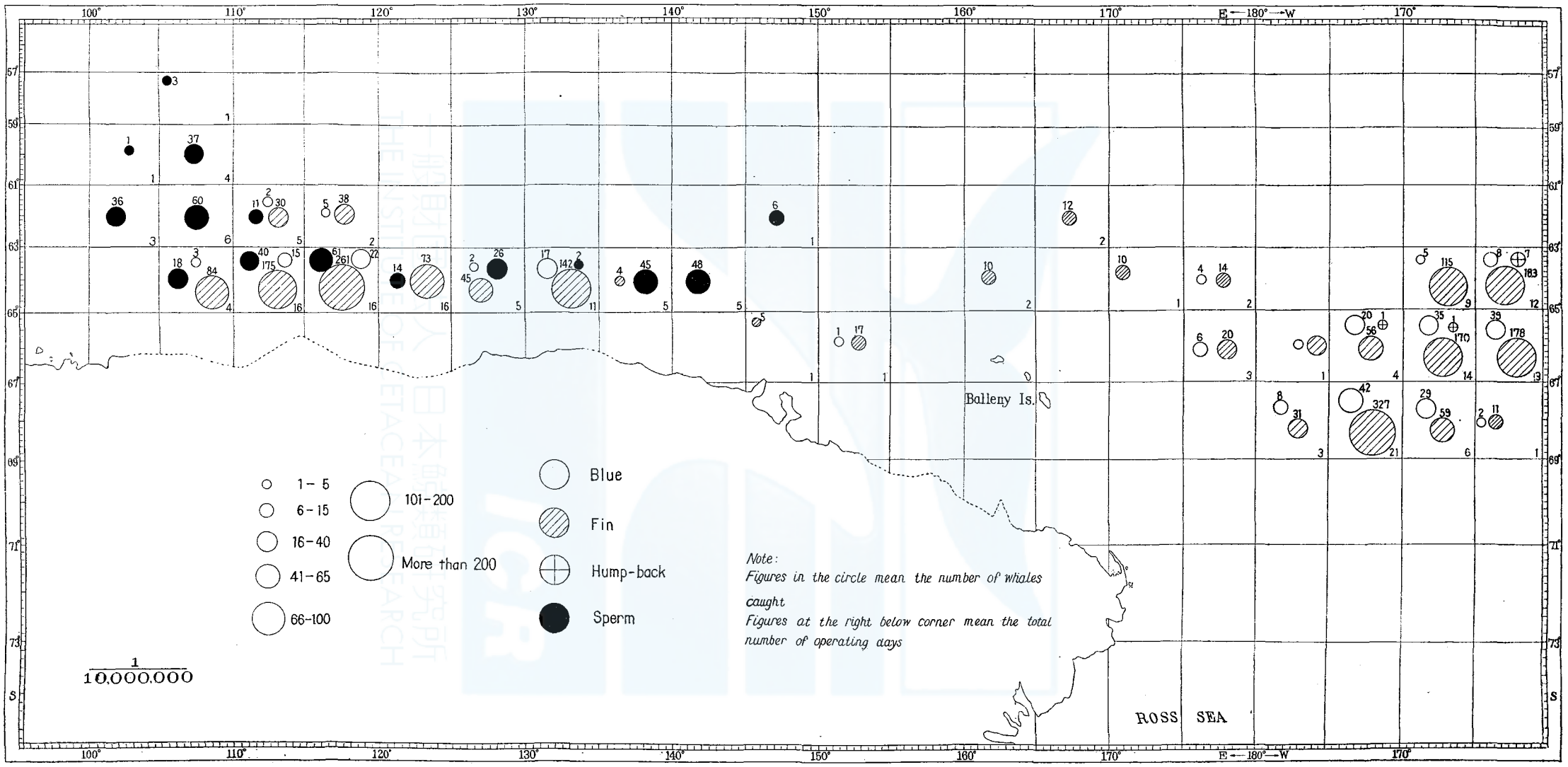


Fig. 28. Locality of whales caught by Japanese Fleets, 1950/51.

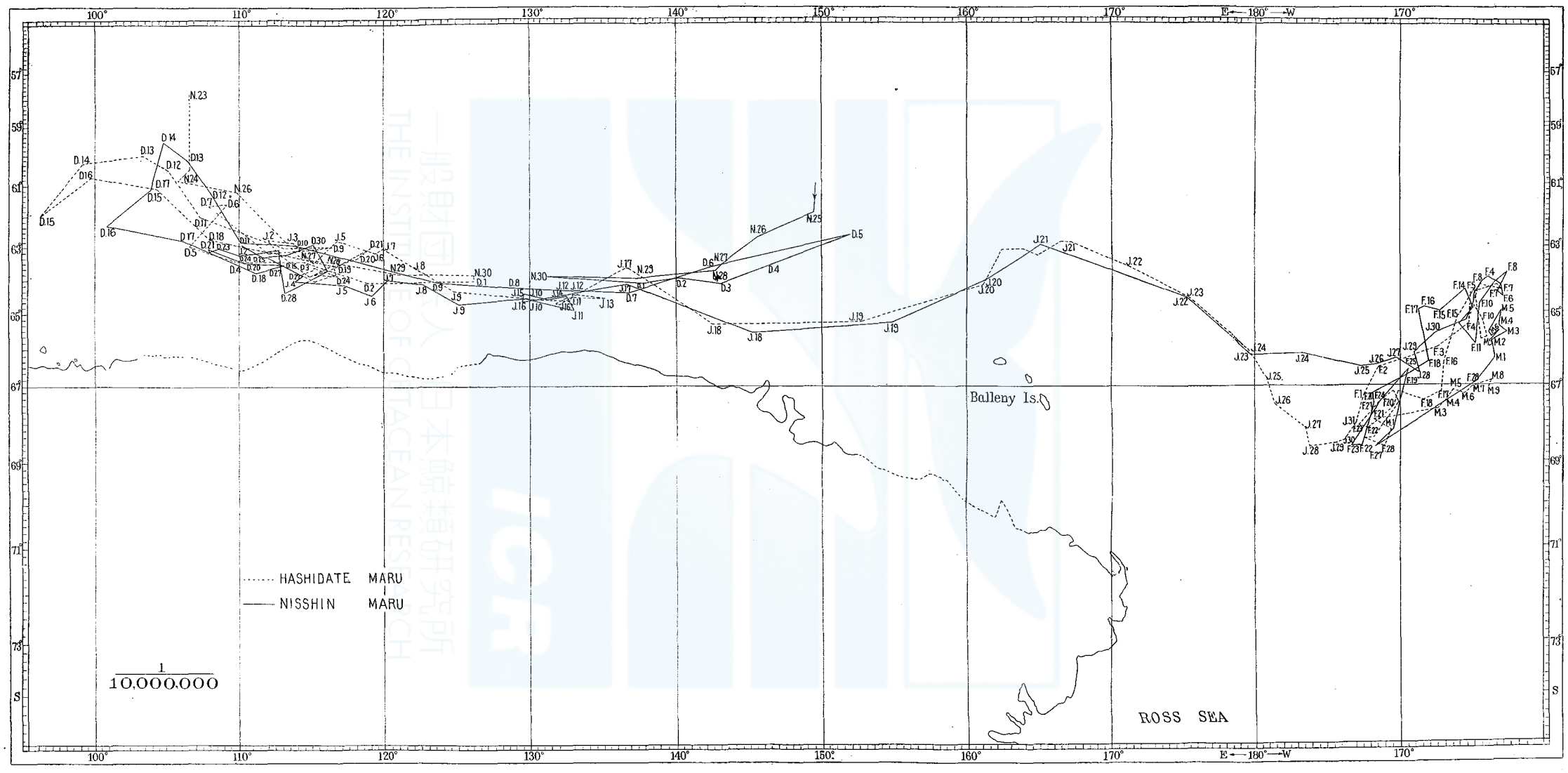


Fig. 29. Movement of Japanese Fleets, 1950/51.