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AUSTRALIAN CATCHES OF HUMPBACK WHALES

1961

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SUMMARY

Catches of humpback whales at Australian whaling stations during 1961 have been analysed and compared with the catches of previous years.

On the east coast of Australia quotas were not filled in 1961, catches were dispersed over a wider area, rates of catching were much lower, and the males and females killed were of smaller size and lower age, with much higher percentages of immature individuals, than in previous years. These changes, which were heralded by similar (though less severe) trends in the catches of 1960, indicate that this population of humpback whales declined drastically in 1961.

Data from Norfolk Island contain evidence of some reduction in the numbers of humpback whales passing that point in recent years. However, this decline appears to have been far less severe than that which is evident in the humpback stream which migrates along the east coast of Australia.

On the west coast of Australia the catch per unit effort appeared to increase in 1961; however this was not due to a greater availability of humpbacks than in earlier years, but was achieved by more effective employment of whaling equipment. The sizes and ages of whales killed in 1961 continued to be less than in previous years, and the percentages of immature whales increased, indicating a further decline in the size of the breeding stock. With catching now concentrating more upon the juveniles in the population, there can be little of the adult stock left, and very little recruitment of young whales into the breeding stock.

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I. INTRODUCTION

The total catch of humpback whales reported from the Group V population (located between 130°E. and 170°W.) during 1961 was close to 1300 whales. The catches made in the various locations within this sector were:-

East coast of Australia	731
Norfolk Island	170
New Zealand	80
Antarctic Area V	293
Tonga: Number not known but less than	50

The total catch of humpback whales reported from the Group IV population (70°E. to 130°E.) during 1961 was 584 whales distributed as follows:-

West coast of Australia	580
Antarctic Area IV	4

In this report the whaling operations and humpback catches at Australian whaling stations during 1961 are analysed and tabulated, and the results of this season compared with operations of earlier years, using the same criteria and methods as in the previous report (Chittleborough 1961).

II. CATCHES FROM THE EAST COAST OF AUSTRALIA

(a) Quotas, Catches, and Length of Seasons

The quotas allotted to the two whaling stations on the east coast of Australia for 1961 were the same as in 1960, viz. 660 humpback whales to Whale Products Pty Ltd, operating at Tangalooma (27°11½'S., 153°23½'E.), and 150 humpbacks to Byron Whaling Co., operating at Byron Bay (28°37½'S., 153°38'E.).

At Tangalooma hunting commenced on June 5 and continued until October 30, the total catch being 591 humpback whales. At Byron Bay hunting commenced on June 18 and ceased on October 31 with a total catch of 140 humpbacks.

(b) Area of Catch

Figure 1 shows that the humpback catch off Tangalooma was dispersed over a greater area in 1960 than in previous years, and very much more scattered in 1961. The extended area of catching in 1961 was partly due to the longer hunting period in that year. In recent years the quota at this station has been filled as the whales passed in their northward migration (ending early in August) but operations in 1961 continued throughout the duration of the southward migration. The catching vessels generally operated in the southern half of the whaling area while the whales were migrating northwards and in the northern half of the area during the southward migration.

Figures 2 and 3 show that there has also been a greater dispersal of catches off Byron Bay in recent years.

(c) Catches, Sightings, and Effort

The total effort and catch of each catcher on the east coast of Australia for the whole of each whaling season in recent years are shown in Tables 1 and 2. Using either catcher day or hunting hour as a unit of effort, the catch per unit of effort by each catcher on the east coast was much less in 1961 than in any previous season.

The whaling effort expended at Tangalooma was increased still further during the 1961 season by the use of an aircraft which flew approximately 325 hours locating whales for the catching vessels. This was the first year in which that station had used an aircraft to assist whaling operations.

In 1961 whaling was carried on for practically the whole of the time of both the northward and southward migrations. Summaries of catcher operations for seven day periods over the whole season (Tables 3, 4, and 5) show that although the effort remained almost constant over the season, catches and rates of catching varied greatly.

The sightings per unit effort and the killings per unit effort as recorded from catchers of Tangalooma and Byron Bay throughout the 1961 season are shown in Figures 4 and 5. The majority of the northward moving whales had passed these stations by early August. There then supervened a period during which few whales were present, before the southward moving whales appeared. Cows with new-born calves were among the last of the southward moving whales.

In Figure 4 the southward moving stream would appear to have comprised more whales than the northward stream. However, during the period of southward movement (from mid-August) there were still some individuals moving north. Also the aircraft used for whale spotting off Tangalooma was of greater assistance to the catchers in locating whales during the latter half of the season than in June or July.

Data from the catcher Byrond I in 1959 (Fig. 6) are given for comparison with that catcher's records in 1961 (Fig. 5). The northward stream of humpbacks passed Cape Byron at the same time in 1959 as in 1961, but the numbers passing that point in 1961 were far less than in 1959.

Since the density of whales off a particular point of the coast fluctuates during the course of the migrations (north and south), any index of density to be used in comparisons between years should relate to the same part of the migration. The period of catching operations has varied greatly from year to year. The only procedure to follow is to use data for each year for some specified time of operations corresponding as closely as possible to some constant proportion of the migration. This has been done in Table 6 and Figure 7 which summarize operations over the time of the greater part of the northward migration each year at Tangalooma. The availability of humpback whales, as indicated by the average catch per hunting hour (Fig. 7B), decreased from 1960 to 1961 by an amount similar to the decline in availability from 1959 to 1960.

During the 1961 season, the catcher Kos I (from Tangalooma) captured 22.5% of the humpbacks sighted, while the catcher Byrond I (from Byron Bay) captured 23.0% of the humpbacks sighted. As there was a higher level of selection at Byron Bay than at Tangalooma (see Section (d) below), the catcher Byrond I might have been expected to have captured a lower percentage of its sightings than the Kos I. Sightings may not have been made and recorded with the same vigilance from the two catchers. The aircraft at Tangaldoma no doubt increased the sightings recorded by the Kos I.

Corresponding records of sightings from each previous year would be useful; the only record available is for the catcher Byrond I which in the 1959 season captured 10.5% of the humpbacks sighted.

(d) Composition of Catches

(1) Sex Ratio: The percentage of females taken at Tangalooma was higher in 1961 than in previous years (Table 7) due to the extension of the catching period in 1961. Catches during the latter half of August and early in September contained a high proportion of females. Females (those not suckling new-born calves) are normally in the vanguard of the southern migration.

(2) Size Composition: Table 8 shows that the length frequency distribution of catches from this population in 1961 varied from one locality to another. There was a very considerable difference between the length frequency distribution of catches at Byron Bay and that of the catches at Tangalooma. This difference in size composition is also shown in the mean lengths of catches of males and females (Tables 9 and 10). This difference can be attributed to the maintenance of a higher degree of selection at Byron Bay than at Tangalooma.

Tables 9 and 10 show that the mean lengths of both males and females taken on the east coast of Australia during 1961 were less than the mean lengths of the catches of recent years.

(3) Puberal Females: More puberal females were captured off the east coast during the 1961 season, and their mean length was less than in previous years (Table 11). As discussed by Chittleborough (1960a) these changes were due to less stringent selection of large whales rather than to earlier maturation of female humpbacks.

(4) Sexually Immature Whales: The percentage of immature whales in a catch may be estimated from the records of body length by applying a mean length at maturity (Chittleborough 1955a, b). However, since there may appear to be variations in the sizes of whales at maturity from year to year, dependent upon the degree of selection applied for a particular catch, percentages of immature individuals are determined more accurately from the examination of the gonads.

Puberal females have been included with the immature females in the samples listed in Table 12 because they would not yet have had an opportunity to breed. Table 12 shows that in the catches from the east coast the percentages of immature males and females were both much greater in 1961 than in previous years.

(5) Age Composition: Ovaries: Table 13, in which the ovulation count is used as an index of age, shows that there were more of the older females in the 1961 catch at Byron Bay than in the catch of the same season at Tangalooma.

Figure 8 shows that on the east coast there were fewer old females in the 1960 catch than in the 1959 catch. However, the 1961 catch from the same region was much more deficient in old females than the catches of earlier years.

Ear Plugs: During 1961, catches of both males (Table 14) and females (Table 15) at Byron Bay comprised higher proportions of old individuals than those at Tangalooma in that year.

The samples of males from the east coast in 1960 comprised younger individuals than did those taken in 1959, and this trend was intensified in the 1961 catch of males (Fig. 9). However, the sample of males from the east coast in 1961 comprised much higher percentages of older individuals than the sample of males from the west coast in 1961.

The sample of females from the east coast in 1960 comprised slightly younger individuals than those in the 1959 sample, and this trend was very greatly intensified in 1961 (Fig. 10). This figure also shows that the age distribution of the females sampled on the east coast in 1961 was very similar to that of the females from the west coast in 1961.

The mean age of the adult males sampled on the east coast in 1961 was almost the same as that of the corresponding sample of adult males from 1960 (Table 16). The mean age of the adult females sampled on the east coast in 1961 was considerably less than those of corresponding samples from previous years.

(e) Summary and Conclusions

On the east coast of Australia in 1961, humpback whale quotas were not filled, catches were much more widely dispersed, rates of catching were much lower, and the males and females killed were of smaller size and lower age, with much higher percentages of immature individuals, than in previous years.

This situation was heralded by similar trends (though of less magnitude) in the catches from 1959 to 1960 (Chittleborough 1961). Since there is no evidence of a significant change in the behaviour of this migrating stream of whales, the only possible conclusion is that this population has been depleted very drastically.

The sequence of the depletion of this population differs from the pattern of depletion of the Group IV humpback population in one interesting aspect. The males of the Group IV population were depleted first, then, as the killing was concentrated more upon the females, these also declined rapidly in number, size, and age. Upon the evidence of the data from the east coast of Australia, the decline of the Group V humpback population has been much more severe in the female than in the male segment. The reason for this difference is not clear, especially since the whaling on the east coast of Australia has been more concentrated upon males than females.

Humpback whaling in Antarctic waters results in the capture of much higher proportions of females than operations in temperate and tropical waters. Hence it might be suggested that the Group V humpback population was hunted relatively more severely in Antarctic waters than the Group IV population. However, the records of humpback catches held by the Bureau of International Whaling Statistics show similar proportions (just over 30%) of the total catches made from both the Group IV and the Group V populations over the past thirteen years were taken in Antarctic waters.

The difference in pattern of depletion of these two populations may have been due primarily to differences in the size and composition of the two populations at the commencement of post-war whaling (in 1949 on the west coast and 1952 on the east coast of Australia). The Group IV population was probably larger than that of Group V initially, but because of intense slaughter (especially of males) from 1936 to 1938 (4738 males and 2506 females killed), the Group IV population in 1949 was deficient in old individuals, especially old males. On the other hand, the Group V population had been very lightly fished prior to 1952, so comprised an accumulation of old individuals. Natural mortality of adult males appears to be less than that of adult females, so that in an unfished population there would be a greater accumulation of old males than old females. Selective killing upon such a population could deplete adult females more rapidly than adult males.

III. CATCHES AT NORFOLK ISLAND

In 1961 the whaling station at Norfolk Island (29°01'S. 167°58'E.) commenced hunting on June 19 and filled the quota (170 humpbacks) on October 31. The catch was dispersed further offshore than in 1960 continuing a recent trend in catches from Norfolk Island (Figure 11).

The average catch per catcher day was less in 1961 than in earlier years (Table 17), though differences in times and methods of operations from year to year preclude detailed comparisons of catching rates.

From detailed records kept on the catcher Norfolk Whaler throughout the 1961 season (Table 18), the sightings and killings per unit effort have been determined for 7 day periods throughout the season (Fig. 12). These records show the northward and southward migrating streams of humpbacks passing Norfolk Island, slightly later than the migrations past Tangalooma (Fig. 4) and Byron Bay (Fig. 5), but the numbers passing Norfolk Island were greater than the numbers in the stream moving along the east coast of Australia. This is further indicated by the capture in 1961 of 11.9% of the sightings at Norfolk Island, compared with a corresponding value of 23% for the east coast of Australia.

The percentage of females in the total catch during 1961 was less than in most other years (Table 7). The majority of the females were taken in the latter half of the season, especially in September, as has been noted in previous years.

The humpbacks taken at Norfolk Island were generally larger than those taken from other localities during 1961 (Tables 8, 9, and 10). Considering only the Norfolk Island catches, the mean length of the males taken in 1961 was within the range of previous years' catches, while the mean length of females captured in 1961 was less than in previous years.

The percentages of immature individuals followed the same trends as mean lengths, i.e. the percentage of immature males in 1961 was within the range of previous years' catches, while the percentage of immature females in 1961 was greater than in previous years (Table 12).

On the evidence of ovulation counts (Table 13) relatively old females continued to be more common in catches at Norfolk Island than in catches of females on the east coast of Australia. Similarly the ear plug data show that in 1961 the old males and females were more abundant in catches at Norfolk Island than in catches in the east coast of Australia (Tables 14 and 15).

Figure 13A shows that while the percentage of young females (ovulations) in recent catches of females at Norfolk Island have increased, old females (20 + ovulations) have not decreased. Figure 13B shows that there was little change in the age distribution of males sampled at Norfolk Island in 1960 and in 1961.

The evidence given above indicates that there has been a recent diminution in the numbers of humpback whales which pass Norfolk Island each year, and that this decline has been more pronounced in the females than in the males. However, this reduction is far less severe than that which is evident in the humpback stream which migrates along the east coast of Australia. Selection of larger (and older) individuals has been maintained successfully at a higher level at Norfolk Island. This is further evidence of a significant degree of segregation of humpbacks passing Norfolk Island from the stream passing up and down the east coast of Australia.

IV. CATCHES FROM THE WEST COAST OF AUSTRALIA

(a) Quotas, Catches, and Length of Seasons

In 1961 the Albany whaling station (35°05'S., 117°56'E.) commenced humpback whaling on June 5 and filled its quota (105 humpbacks) on July 15. During the first half of June there was some overlap between sperm whaling and humpback whaling operations. (In 1961 the station at Albany took 454 sperm whales).

The Carnarvon whaling station (24°53'S. 113°38'E.) commenced hunting on June 26 and filled its quota (475 humpbacks) on August 26. Two Bryde's whales were also captured in this period.

(b) Area of Catch

Catches on the west coast of Australia in 1961 continued to be widely dispersed as shown by Chittleborough (1960b) for the catches of recent years. The extremes of this trend in operations at Carnarvon (catches of 1951 and 1961) are shown in Figures 14 and 15 respectively. Table 19 shows that even more of the Carnarvon catch was killed outside Shark Bay in 1961 than in previous years.

(c) Catches, Sightings, and Effort

In 1961 the availability of humpbacks off Albany, as indicated by the sightings per 100 hours hunting (Table 20) was approximately one half of that recorded from the east coast during the corresponding part of the northward migration (Tables 3 and 5).

At Albany during 1961 the average humpback catch per catcher day was 1.62 compared with a corresponding value of 1.06 for the same period (June 5 - July 15) in 1960. This would appear to indicate that more humpbacks were available off Albany during 1961 than in 1960. Of those humpbacks sighted from the catchers in 1960, 27% were captured, whereas in 1961 39% of those sighted were killed. This indicates that the faster rate of capture of humpbacks in 1961 was due to greater operating efficiency rather than to the presence of larger numbers of whales than in 1960.

Unfortunately detailed records of the operations of catchers from Carnarvon during 1961 have not been made available. The catch of 475 humpback whales was taken in a total of 296 catcher days, i.e. an average of 1.60 humpbacks per catcher day which is greater than the average of 1.17 humpbacks per catcher day achieved by the same five vessels over the same period during 1960.

In 1961 whaling tactics at Carnarvon were revised with the object of achieving the greatest possible efficiency of the whaling units. The Company's tanker was moored in the lee of Dorre Island (30 miles from the whaling station and close to the centre of the hunting area), where it served as a base and supply depot for the catchers. This saved the catchers a total of at least 200 miles (or over 20 hours) steaming each day between the whaling grounds and the station. Using the mean value of 13.3 steaming hours per catcher day by each catcher in 1960, the basing of the catchers by Dorre Island in 1961 saved an equivalent of $1\frac{1}{2}$ catcher days for each day of the season, or a total of 93 catcher days over the whole season (June 26 to August 26).

More intensive use of aircraft for locating humpbacks was made in 1961 than in 1960. In 1960 one aircraft spent approximately 280 flying hours searching for humpback whales. During the 1961 season two aircraft flew a total of approximately 500 hours searching for humpback whales. The increase of 220 flying hours should be converted to equivalent hunting time by catching vessels and included in the effort expended in 1961.

Spotting aircraft travel at approximately ten times the speed of a catcher and can scan a wider strip of ocean. Therefore, in one hour an aircraft can cover an area scanned by a catcher in at least 10 hours of steaming by a catcher. The advantages of aircraft in searching for whales are lessened by the possibility of the aircraft not sighting some whales which are submerged as

the aircraft passed. As a conservative estimate, one aircraft flying hour will be considered equivalent to five hunting hours by a catcher. Then 220 flying hours would be equivalent to 1100 hunting hours by a whaling vessel. If one catcher day is of 11 hunting hours (the interval between sunrise and sunset at Carnarvon at that time of year, then 220 flying hours would be equivalent to 100 additional catcher days.

At Carnarvon the total whaling effort expended over the 1961 humpback season, expressed in units equivalent to the operations of 1960, would be 296 (actual catcher days in 1961) + 93 (gained by change of anchorage) + 100 (representing additional flying time) = 489 catcher days. A total of 466 catcher days were expended at Carnarvon in 1960. Thus the whaling effort at Carnarvon in 1961 was greater than in 1960, although concentrated within a shorter season than in 1960.

A further change of whaling tactics at Carnarvon in 1961 was in the method of incentive payments to catcher crews. In previous years a bonus system was based upon the size of whales captured, but in 1961 it was based on the number of whales captured. This would stimulate the rate of capture of whales at the expense of any selection of larger individuals which might have been encouraged by the previous bonus system.

(d) Composition of Catches

(1) Sex Ratio: Recent catches from the west coast of Australia comprised almost equal numbers of males and females (Table 7).

(2) Size Composition: Catches in 1961 at the two whaling stations on the west coast were of similar length distribution (Table 21). Mean lengths of both males (Table 9) and females (Table 10) taken in 1961 were less than in any previous years. Figure 16 shows that catches on the west coast are now concentrated upon individuals at or just over the minimum legal length (35 ft).

(3) Puberal Females: The mean length of the puberal females taken on the west coast in 1961 was less than that of puberal females taken in any previous year (Table 11). This reflects a very low level of selection in 1961, after the removal of larger (faster growing) immature individuals from the population in 1960 and in 1959.

(4) Sexually Immature Whales: In 1961 there was a further increase in the proportion of immature individuals in the west coast catch; immature whales are now beginning to predominate in catches from this population (Table 12).

(5) Age Composition: Ovaries: Table 22, in which the ovulation count is used as an index of age, shows that in 1961 the distribution of ages of females taken at Albany was similar to that of the large sample of females taken at Carnarvon. Figure 17 shows that on the evidence of ovarian data, females sampled in 1961 were even younger than those sampled in 1960 and that in earlier years (e.g. 1952) older females were more commonly taken.

Ear Plugs: Table 23, in which ear plug laminations are used for determination of age, shows that in 1961 the distribution of ages of both sexes taken at Albany were similar to those of the larger samples taken at Carnarvon. Figures 19 and 20 show the decline of age within samples of males and females taken each year on the west coast from 1957 to 1961, as determined from ear plugs. Assuming these samples to be representative of the population, the males decreased in age earlier and to a greater extent than the females as a result of commercial exploitation. Table 16 shows that the mean ages of adult males and females captured on the west coast of Australia in 1961 were lower than in previous years and only slightly above the age at puberty (4 - 5 years).

(e) Summary and Conclusion

In 1961 the catch per unit effort on the west coast appeared to increase; however, this was not due to a greater availability of humpbacks than in earlier years, but was achieved by more effective employment of whaling equipment. The sizes and ages of whales killed in 1961 continued to decrease, and the percentages of immature whales increased, indicating a further decline in the size of the breeding stock. With catching now concentrating more upon the immature portion of the population, there can be little of the adult stock left, and very little recruitment of young whales into the breeding stock.

V. WHALE MARKS

A greater number of whale marks (total 24) were recovered from humpback whales at Australian whaling stations during 1961 than in any previous season, even though the total catch was less. Of those recovered (listed in Table 24), two were from

Group IV (marked and recovered off the west coast of Australia); ten were fired in Antarctic waters and recovered on the east coast of Australia; seven were fired into whales off the east coast and recovered in the same region; three were fired off New Zealand and recovered on the east coast of Australia; one was fired off Fiji and recovered on the east coast of Australia (after four years); and one was fired off Norfolk Island and recovered at that point (after three years).

Mark No.16790 is of considerable interest as it was fired in 1956 into a small whale (approximately 30 ft long) presumed to be a yearling, and recovered in August 1961 from a female 39ft 0 in. in length. If one year old when marked, this female was six years of age when killed. The ovaries contained one corpus albicans, indicating puberty occurred a year previously (i.e. at 5 years of age). The ear plugs (examined without knowledge of this mark recovery) were recorded as containing 10 laminations, giving further confirmation of a rate of deposition of two laminations per year, as shown by another marked whale (Chittleborough 1960c) and by other methods (Chittleborough 1959).

Through the co-operation of four of the whaling companies, small humpback whales were marked in 1961 whenever possible by crews of catchers. Twenty humpbacks were marked off the west coast, thirty four off the east coast of Australia, and 25 off Norfolk Island (the marking at Norfolk Island was arranged by W. Dawbin).

VI. ACKNOWLEDGMENTS

The co-operation of the whaling companies, enabling data to be collected at their respective whaling stations and from their catchers, is gratefully acknowledged.

Inspectors of the Department of Primary Industry, the Western Australian Fisheries and Game Department, and the Queensland Department of Harbours and Marine assisted greatly the collection of material.

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TABLE 1

OPERATIONS OF CATCHERSAT TANGALOOMA DURING WHOLE OF EACH WHALING SEASON, 1953-1961

Year	Ship	Whaling Season: Hunting commenced	Whaling Season: Hunting ceased	Total days hunting	Total hours hunting	Total humpbacks killed	Av. hunting hrs. per day	Av. whales per catcher day	Av. whales per hunting hr.	Av. hunting hrs. per whale
1953	Kos I	17/5	18/9	120	655½	351	5.46	2.93	0.54	1.87
1954	Kos VII	31/5	13/9	96	632	302	6.58	3.15	0.48	2.09
1955	Kos II	6/6	10/8	53	384	269	7.25	5.08	0.70	1.43
	Kos VII	7/6	11/8	65	403	292	6.20	4.49	0.72	1.38
1956	Kos II	11/6	13/8	63	429½	306	6.82	4.86	0.71	1.40
	Kos VII	11/6	13/8	63	432	293	6.86	4.65	0.68	1.47
1957	Kos I	10/6	10/8	60	422	292	7.03	4.87	0.69	1.45
	Kos II	10/6	10/8	60	404½	304	6.74	5.07	0.75	1.33
1958	Kos I	2/6	5/8	62	464½	294	7.49	4.74	0.63	1.58
	Kos II	2/6	5/8	61	468	307	7.67	5.03	0.66	1.52
1959	Kos I	8/6	9/8	63	454	329	7.21	5.22	0.72	1.38
	Kos II	8/6	9/8	63	472	331	7.49	5.25	0.70	1.43
1960	Kos I	6/6	17/8	73	699	329	9.58	4.51	0.47	2.12
	Kos II	6/6	17/8	73	702½	330	9.26	4.52	0.47	2.13
1961	Kos I	5/6	30/10	143	1469½	296	10.28	2.07	0.20	4.96
	Kos II	5/6	30/10	145	1472½	295	10.16	2.03	0.20	4.99

TABLE 2

OPERATIONS OF CATCHER AT BYRON BAY DURING WHOLE OF EACH WHALING SEASON, 1956-1961

Year	Ship	Hunting commenced	Hunting ceased	Total days hunting	Total hours hunting	Total humpbacks killed	Av. hunting hrs. per day	Av. whales per catcher day	Av. whales per hunting hr.	Av. hunting hrs. per whale
1956	Byrond I	26/6	9/8	39	209¾	120	5.38	3.08	0.57	1.75
1957	Norfolk Whaler	21/8	22/9	33	204¾	121	6.20	3.67	0.59	1.69
1958	Norfolk Whaler	23/5	20/7	48	307¼	120	6.40	2.50	0.39	2.56
1959	Byrond I	1/6	28/7	55	289½	150	5.26	2.73	0.52	1.93
1960	Byrond I	13/7	12/9	61	455½	150	7.59	2.46	0.33	3.06
1961	Byrond I	18/6	31/10	120	1095½	140	9.13	1.17	0.13	7.83

TABLE 3

OPERATIONS OF CATCHER "KOS I"

MORETON ISLAND 1961

7 days ending	No. days whaling	Total hours steaming	Total hours hunting	Total humpbacks sighted	No. cows with calves	No. humpbacks killed	Direction travelling	Humpbacks sighted per 100 hrs. hunting	Cows with calves per 100 hrs. hunting	Humpbacks killed per 100 hrs. hunting
June 11	7	79¼	49½	35	0	5	5N.	71	0	10
18	7	82¾	55	41	0	5	5N.	75	0	9
25	7	91¾	63½	103	0	22	22N.	162	0	35
July 2	7	90¼	66¾	110	0	30	30N.	165	0	45
9	7	93¾	70¼	102	0	16	16N.	145	0	23
16	7	92¼	70½	47	0	19	19N.	67	0	27
23	6	73¾	60	37	0	13	13N.	62	0	22
30	7	90¼	73	18	1	7	7N.	25	1	10
Aug. 6	7	86	73¼	12	0	3	3N.	16	0	4
13	7	86½	74¾	10	0	1	1N.	13	0	1
20	7	86¾	75½	36	0	9	9S.	48	0	12
27	7	95¾	74¾	80	0	27	27S.	107	0	36
Sept. 3	7	91½	77¾	113	0	19	19S.	145	0	24
10	5	66¼	53½	105	0	15	15S.	196	0	28
17	7	113¾	68	83	0	26	26S.	122	0	38
24	7	96½	78	101	0	22	22S.	129	0	28
Oct 1	7	95	76¾	119	9	23	9N. 23S.	155	12	30
8	5	64¼	55½	88	16	15	3N. 28S.	159	29	27
15	7	94	80¼	35	14	8	22S.	44	17	10
22	7	95¼	81¾	33	22	8	3N. 27S.	40	27	10
29	7	95	83¾	6	1	3	4S.	7	1	4
30	1	8	7½	0	0	0	-	-	-	-
Total	143	1868½	1469½	1314	63	296				

TABLE 4

OPERATIONS OF CATCHER "KOS II"

MORETON ISLAND 1961

7 days ending	No. days whaling	No. hours steaming	No. hours hunting	Humpbacks killed	Direction	Humpbacks killed per 100 hrs. hunting
June 11	7	81½	68¼	4	4N.	6
18	7	83¼	61½	14	14N.	23
25	7	82½	63¾	20	20N.	31
July 2	7	94½	65¼	32	32N.	49
9	7	87	68½	22	22N.	32
16	7	89¾	69¾	20	20N.	29
23	7	84¾	72¼	10	10N.	14
30	7	91¾	70¼	5	5N.	7
Aug. 6	7	76¾	68¾	6	6N.	9
13	7	85¾	71¾	2	2N.	3
20	7	90¼	70½	10	8N. 2S.	14
27	7	89	71¼	21	5N. 14S.	29
Sept. 3	7	96¼	75½	23	3N. 13S.	30
10	5	66¼	49½	13	1N. 9S.	26
17	7	99¼	75½	16	6N. 10S.	21
24	7	96¼	79	20	4N. 16S.	25
Oct. 1	7	102½	75¼	25	5N. 20S.	33
8	6	71¾	51¾	11	1N. 9S.	21
15	7	102¼	79¼	10	2N. 8S.	13
22	7	100¼	80¼	8	3N. 5S.	10
29	7	97	77½	3	2N. 1S.	4
30	1	8	7¼	0	-	-
Total	145	1876½	1472½	295		

TABLE 5

OPERATIONS OF CATCHER "BYROND I"

BYRON BAY 1961

7 days ending	No. days whaling	Total hours steaming	Total hours hunting	Total humpbacks sighted	No. cows with young calves sighted	No. humpbacks killed	Direction travelling	Humpbacks sighted per 100 hrs. hunting	Cows with calves per 100 hrs. hunting	Humpbacks killed per 100 hrs. hunting
June 18	1	6¼	4¼	8	-	1	N.	-	-	-
25	7	85¾	65¼	60	-	13	N.	92	-	20
July 2	7	86	58¼	81	-	15	N.	139	-	26
9	7	84	49¼	51	-	18	N.	104	-	37
16	7	84	66¼	46	-	10	N.	69	-	15
23	7	82	66¾	18	-	7	N.	27	-	10
30	7	84	63	15	-	8	N.	24	-	13
Aug. 6	6	72¾	64	11	-	4	N.	17	-	6
13	5	52	43	5	-	1	2N. 3S.	12	-	2
20	3	30¼	28¼	1	-	0		4	-	0
27	6	68	56¼	42	-	4	3N. 20S.	75	-	7
Sept. 3	6	63¼	58	27	-	1	?	47	-	2
10	4	47	38	16	-	5	1N. 4S.	42	-	13
17	7	84¾	65½	36	-	10	S.	55	-	15
24	7	87¼	77½	13	-	4	1N. 5S.	17	-	5
Oct. 1	7	87½	61	55	5	14	2N. 19S.	90	8	23
8	5	48	31¾	25	9	5	14S.	79	28	16
15	5	60½	43½	25	12	5	2N. 14S.	57	28	11
22	7	90½	67½	35	25	6	2N. 28S.	52	37	9
29	7	86½	63	38	28	9	2N. 35S.	60	44	14
30-31	2	26¼	25¼	0	0	0		-	-	-
Total	120	1416½	1095½	608	79	140				

TABLE 6

OPERATIONS OF CATCHERS AT TANGALOOMA DURING PERIOD

JUNE 10 TO AUGUST 5 OF EACH SEASON, 1953-1961

Year	Vessel	Total days hunting	Total hours hunting	Total humpbacks killed	Average hunting hours per day	Average whales per catcher day	Average whales per hunting hour	Average hours per whale
1953	Kos I	55	247	171	4.49	3.11	0.69	1.44
1954	Kos VII	50	291½	157	5.83	3.14	0.54	1.86
1955	Kos II	45	312½	234	6.94	5.20	0.75	1.34
	Kos VII	56	326	263	5.82	4.70	0.81	1.24
	Total	101	638½	497	6.32	4.92	0.78	1.28
1956	Kos II	55	367	265	6.67	4.82	0.72	1.38
	Kos VII	55	374	257	6.80	4.67	0.69	1.46
	Total	110	741	522	6.74	4.75	0.70	1.42
1957	Kos I	55	387½	270	7.05	4.91	0.70	1.44
	Kos II	55	373½	274	6.79	4.98	0.73	1.36
	Total	110	761	544	6.92	4.95	0.71	1.40
1958	Kos I	55	389½	291	7.08	5.29	0.75	1.34
	Kos II	54	398½	300	7.38	5.56	0.75	1.33
	Total	109	788	591	7.23	5.42	0.75	1.33
1959	Kos I	57	401½	302	7.04	5.30	0.75	1.33
	Kos II	57	418	305	7.33	5.35	0.73	1.37
	Total	114	819½	607	7.19	5.32	0.74	1.35
1960	Kos I	57	532½	270	9.34	4.74	0.51	1.97
	Kos II	57	528½	284	9.27	4.98	0.54	1.86
	Total	114	1061	554	9.31	4.86	0.52	1.92
1961	Kos I	56	534¾	119	9.55	2.13	0.22	4.49
	Kos II	57	550½	131	9.66	2.30	0.24	4.20
	Total	113	1085¼	250	9.60	2.21	0.23	4.34

TABLE 7

PERCENTAGE FEMALES IN RECENT CATCHES OF HUMPBACK WHALES AT AUSTRALIAN STATIONS

	GROUP V POPULATION					
	TANGALOOMA		BYRON BAY		NORFOLK IS.	
Year	Total Catch	% Females	Total Catch	% Females	Total Catch	% Females
1956	600	32.2	120	35.0	150	38.7
1957	600	29.7	121	42.1	120	22.5
1958	600	29.0	120	29.2	120	47.5
1959	660	32.4	150	35.3	150	40.0
1960	660	36.7	150	48.0	170	43.5
1961	591	40.6	140	30.7	170	27.1

	GROUP IV POPULATION			
	CARNARVON		ALBANY	
Year	Total Catch	% Females	Total Catch	% Females
1956	1000	38.3	119	50.4
1957	1018	48.4	101	42.6
1958	885	46.6	82	56.1
1959	541	52.7	159	52.8
1960	440	52.5	105	41.0
1961	475	46.5	105	49.5

TABLE 8

LENGTH FREQUENCY DISTRIBUTION OF VARIOUS CATCHES

FROM THE GROUP V HUMPBACK WHALES IN 1961

Body Length (feet)	Males				Females			
	Antarctic Area V	East. Aus.		Norfolk Island	Antarctic Area V	East. Aus.		Norfolk Island
		Tangalooma	Byron Bay			Tangalooma	Byron Bay	
32		3				3		
33	1	1			1	2		
34		1	1	2	2	2	2	
35	3	44	3	2	1	37	1	2
36	5	34	7	2	2	19	2	4
37	9	40	6	6	7	23	5	4
38	25	52	7	8	17	29	3	5
39	27	43	7	10	19	29	4	2
40	19	40	11	18	18	18	5	2
41	9	37	10	23	12	23	1	1
42	11	34	17	23	17	19	6	8
43	4	8	17	18	16	8	4	4
44	14	5	8	5	12	6	1	3
45	4	6	2	6	8	16	2	4
46	3	2	1	1	6	3	2	1
47	1	1			10	2	1	2
48					3		4	2
49					5	1		
50					1			2
51					1			
Total Catch	135	351	97	124	158	240	43	46

TABLE 9

MEAN LENGTHS OF MALE HUMPBACK WHALES

IN RECENT CATCHES AT AUSTRALIAN STATIONS

	GROUP V POPULATION					
	TANGALOOMA		BYRON BAY		NORFOLK ISLAND	
Year	Number	Mean length (ft)	Number	Mean length (ft)	Number	Mean length (ft)
1956	407	40.63	78	40.74	92	41.31
1957	422	40.50	70	39.67	93	41.24
1958	426	40.81	85	41.71	63	41.35
1959	446	40.80	97	41.97	90	40.75
1960	418	40.28	78	41.51	96	40.48
1961	351	38.65	97	40.57	124	40.85

	GROUP IV POPULATION			
	CARNARVON		ALBANY	
Year	Number	Mean length (ft)	Number	Mean length (ft)
1956	617	40.52	59	38.53
1957	525	39.89	58	38.78
1958	473	39.48	36	37.57
1959	256	37.70	75	38.71
1960	209	38.04	62	37.72
1961	253	36.87	53	37.37

TABLE 10

MEAN LENGTHS OF FEMALE HUMPBACK WHALES

IN RECENT CATCHES AT AUSTRALIAN STATIONS

GROUP V POPULATION

Year	TANGALOOMA		BYRON BAY		NORFOLK ISLAND	
	Number	Mean length (ft)	Number	Mean length (ft)	Number	Mean length (ft)
1956	193	41.73	42	42.40	58	42.09
1957	178	41.83	51	40.23	27	42.47
1958	174	42.09	35	42.47	57	43.40
1959	214	41.94	53	43.32	60	43.47
1960	242	41.72	72	42.43	74	42.10
1961	240	38.93	43	40.88	46	41.46

GROUP IV POPULATION

Year	CARNARVON		ALBANY	
	Number	Mean length (ft)	Number	Mean length (ft)
1956	383	42.38	60	41.95
1957	493	41.71	43	40.62
1958	412	41.51	46	39.65
1959	285	39.72	84	40.44
1960	231	39.75	43	39.63
1961	220	38.31	52	38.53

TABLE 11

MEAN LENGTHS OF SAMPLES OF PUBERAL FEMALE HUMPBACK WHALES FROM AUSTRALIAN COASTS

Year	Number	Range (ft)	Mean (ft)	S.D.	S.E.
EAST COAST					
1952-54	60	34.50 - 42.17	38.51	1.73	.22
1956-59	15	36.33 - 43.00	39.38	1.81	.47
1960	11	37.17 - 40.67	39.21	1.27	.38
1961	39	35.17 - 40.50	38.09	1.50	.24
WEST COAST					
1949-54	77	35.25 - 43.50	38.50	1.66	.18
1956	17	35.25 - 45.50	40.15	3.04	.74
1957	42	35.75 - 44.50	39.49	2.18	.34
1958	59	35.00 - 43.25	39.08	1.11	.14
1959	43	35.00 - 40.50	37.96	1.45	.22
1960	33	35.75 - 40.50	38.00	1.29	.23
1961	42	34.50 - 40.50	37.29	1.43	.22

TABLE 12

IMMATURE WHALES IN SAMPLES OF RECENT AUSTRALIAN CATCHES

Based on Examination of Gonads

Year	MALES			FEMALES		
	Total whose testes weighed	Testes weight 4 kg. No.	Testes weight 4 kg. %	Total whose ovaries examined	Immature and puberal No.	Immature and puberal %
EAST COAST						
1952	233	32	13.7	102	24	23.5
1953	200	25	12.5	120	37	30.8
1954	298	36	12.1	148	49	33.1
1955	-	-	-	114	24	21.1
1956	60	2	3.3	139	25	18.0
1957	215	13	6.1	183	49	26.8
1958	205	17	8.3	121	29	24.0
1959	273	8	2.9	205	46	22.4
1960	293	22	7.5	212	44	20.8
1961	446	151	33.9	263	143	54.4
NORFOLK ISLAND						
1956	44	6	13.6	48	16	33.3
1957	52	6	11.5	-	-	-
1958	-	-	-	-	-	-
1959	-	-	-	46	4	8.7
1960	26	2	7.7	68	16	23.5
1961	123	13	10.6	41	16	39.0
WEST COAST						
1951	395	36	9.1	90	20	22.2
1952	161	35	21.7	278	59	21.2
1953	111	37	33.3	246	93	37.8
1954	-	-	-	150	44	29.3
1955	-	-	-	-	-	-
1956	-	-	-	279	34	12.2
1957	488	66	13.5	521	134	25.7
1958	439	79	18.0	438	114	26.0
1959	254	88	34.6	352	124	35.2
1960	208	54	26.0	263	120	45.6
1961	291	137	47.1	263	157	59.7

TABLE 13

DISTRIBUTION OF NUMBERS OF OVULATIONS IN FEMALE HUMPBACK WHALES SAMPLED ON THE EAST COAST OF AUSTRALIA AND AT NORFOLK ISLAND IN 1961

Previous Ovulations	TANGALOOMA		BYRON BAY		TOTAL		NORFOLK ISLAND	
	Number	%	Number	%	Number	%	Number	%
Immature	93	42.3	11	25.6	104	39.5	13	31.7
Puberal	36	16.4	3	7.0	39	14.8	3	7.3
1	24	10.9	5	11.6	29	11.0	1	2.4
2	18	8.2	6	14.0	24	9.1	0	
3	10	4.6	4	9.3	14	5.3	4	9.8
4	7	3.2	3	7.0	10	3.8	1	2.4
5	5	2.3	1	2.3	6	2.3	2	4.9
6	7	3.2	0	0.0	7	2.7	2	4.9
7	2	0.9	1	2.3	3	1.1	1	2.4
8	5	2.3	1	2.3	6	2.3	0	
9	1	0.5	1	2.3	2	0.8	0	
10	2	0.9	1	2.3	3	1.1	1	2.4
11	0	0.0	1	2.3	1	0.4	0	
12	3	1.4	1	2.3	4	1.5	1	2.4
13	0	0.0	1	2.3	1	0.4	0	
14	0	0.0	0	0.0	0	0.0	0	
15	2	0.9	0	0.0	2	0.8	0	
16	0	0.0	0	0.0	0	0.0	1	2.4
17	1	0.5	1	2.3	2	0.8	2	4.9
18	0	0.0	0	0.0	0	0.0	0	
19	1	0.5	1	2.3	2	0.8	1	2.4
20	1	0.5	0	0.0	1	0.4	0	
20+	2	0.9	1	2.3	3	1.1	8	19.5
Females sampled	220		43		263		41	

TABLE 14

AGE DISTRIBUTION (FROM EAR PLUGS) WITHIN SAMPLES OF MALE HUMPBACKS TAKEN ON THE EAST COAST OF AUSTRALIA AND AT NORFOLK ISLAND IN 1961

Age (yrs) (Laminations x $\frac{1}{2}$)	TANGALOOMA		BYRON BAY		TOTAL		NORFOLK ISLAND	
	Number	%	Number	%	Number	%	Number	%
2	2	0.9			2	0.7		
3	31	14.0	2	3.1	33	11.5	4	4.3
4	32	14.4	6	9.2	38	13.2	6	6.5
5	24	10.8	3	4.6	27	9.4	4	4.3
6	26	11.7	3	4.6	29	10.1	4	4.3
7	25	11.3	6	9.2	31	10.8	1	1.1
8	17	7.7	3	4.6	20	7.0	3	3.3
9	16	7.2	6	9.2	22	7.7	6	6.5
10	3	1.4	3	4.6	6	2.1	8	8.7
11	4	1.8	1	1.5	5	1.7	5	5.4
12	13	5.9	3	4.6	16	5.6	5	5.4
13	0		8	12.3	8	2.8	9	9.8
14	1	0.5	3	4.6	4	1.4	5	5.4
15	2	0.9	3	4.6	5	1.7	3	3.3
16	3	1.4	1	1.5	4	1.4	4	4.3
17	4	1.8	2	3.1	6	2.1	1	1.1
18	4	1.8	2	3.1	6	2.1	3	3.3
19	1	0.5	0		1	0.3	2	2.2
20	2	0.9	0		2	0.7	2	2.2
20+	12	5.4	10	15.4	22	7.7	17	18.5
Total in sample	222		65		287		92	

TABLE 15

AGE DISTRIBUTION (FROM EAR PLUGS) WITHIN SAMPLES OF FEMALE HUMPBACKS TAKEN ON THE EAST COAST OF AUSTRALIA AND AT NORFOLK ISLAND IN 1961

Age (yrs) (Laminations x $\frac{1}{2}$)	TANGALOOMA		BYRON BAY		TOTAL		NORFOLK ISLAND	
	Number	%	Number	%	Number	%	Number	%
2	1	0.7	0		1	0.6	0	
3	33	23.9	3	9.4	36	21.2	0	
4	22	15.9	3	9.4	25	14.7	3	11.1
5	19	13.8	4	12.5	23	13.5	0	
6	14	10.1	8	25.0	22	12.9	3	11.1
7	14	10.1	2	6.3	16	9.4	2	7.4
8	10	7.2	2	6.3	12	7.1	1	3.7
9	4	2.9	1	3.1	5	2.9	0	
10	2	1.5	0		2	1.2	2	7.4
11	4	2.9	2	6.3	6	3.5	2	7.4
12	4	2.9	1	3.1	5	2.9	1	3.7
13	1	0.7	0		1	0.6	0	
14	2	1.5	0		2	1.2	0	
15	1	0.7	0		1	0.6	1	3.7
16	1	0.7	0		1	0.6	1	3.7
17	1	0.7	2	6.3	3	1.8	0	
18	1	0.7	1	3.1	2	1.2	1	3.7
19	0		0		0		1	3.7
20	1	0.7	0		1	0.6	1	3.7
20+	3	2.2	3	9.4	6	3.5	8	29.6
Total in sample	138		32		170		27	

TABLE 16

MEAN AGES OF ADULT HUMPBACKS (OVER 5 YRS.) IN SAMPLES FROM THE EAST AND WEST COASTS OF AUSTRALIA

(Based on ear plug laminations)

		ADULT MALES		ADULT FEMALES	
		No. Examined	Mean Age (yrs.)	No. Examined	Mean Age (yrs)
EAST COAST	1957	157	14.82	75	14.07
	1958	80	14.63	46	11.28
	1959	214	12.76	105	12.85
	1960	204	11.89	138	12.06
	1961	187	11.87	85	10.66
WEST COAST	1957	111	10.47	143	10.69
	1958	136	8.80	149	10.66
	1959	91	8.02	137	10.08
	1960	52	8.81	82	10.66
	1961	65	7.45	82	8.74

TABLE 17

OPERATIONS OF CATCHERS AT NORFOLK ISLAND

IN VARIOUS YEARS

Year	Vessel	Whaling Season: Hunting commenced	Whaling Season: Hunting ceased	No. of days hunting	Total humpbacks killed	Av. catch per catcher day
1956	Byrond I	18/8	26/10	58	150	2.59
1957	Norfolk Whaler	(13/6 (30/9	16/8 12/10	63	120	1.90
1958	Norfolk Whaler	3/8	14/10	55	120	2.18
1961	Norfolk Whaler	19/6	31/10	106	170	1.60

TABLE 18

OPERATIONS OF CATCHER "NORFOLK WHALER"

NORFOLK ISLAND 1961

7 days ending	No. days whaling	Total hours steaming	Total hours hunting	Total humpbacks sighted	Total humpbacks killed	Humpbacks sighted per 100 hunting hours	Humpbacks killed per 100 hunting hours
June 11	3	29½	24	5	-	21	-
18 *	6	60	48	29	-	60	-
25	5	52¼	30¼	50	5	165	17
July 2	6	68¾	46¾	150	9	321	19
9	4	43	23¾	72	7	303	29
16	6	79½	44¼	186	16	420	36
23	3	39	21½	62	7	288	33
30	6	72¼	44	108	9	245	20
Aug. 6	6	74¼	47¼	66	9	140	19
13	5	60	56	4	1	7	2
20	5	47½	43	2	1	5	2
27	4	46	38	5	1	13	3
Sep. 3	7	77¼	68½	6	0	9	0
10	7	71	59	6	3	10	5
17	7	77½	58¾	75	16	128	27
24	5	53½	38	74	10	195	26
Oct. 1	2	26½	19	46	5	242	26
8	7	87	55¾	98	15	176	27
15	5	53¾	34¼	67	11	196	32
22	7	82¾	56¼	128	15	228	27
29	7	110	88½	170	20	192	23
30-31	2	34	21½	53	10		
Total - (19/6-31/10)	106	1255¾	894½	1428	170		

Av. humpbacks killed per catcher day 1.60
Av. humpbacks killed per hunting hour 0.19
Catch as percentage of all humpbacks sighted 11.9%

* Reconnaissance only up to June 18. Catching from June 19.

TABLE 19

ANNUAL CATCHES OF HUMPBACK WHALES AT CARNARVON STATION SHOWING PERCENTAGES TAKEN OUTSIDE SHARK BAY

Year	Total Catch	Catch Outside Shark Bay	
		No.	%
1951	650	14	2.2
1952	600	7	1.2
1953	600	6	1.0
1954	600	4	0.7
1955	500	4	0.8
1956	1000	25	2.5
1957	1018	53	5.2
1958	885	213	24.1
1959	541	282	52.1
1960	440	336	76.4
1961	475	414	87.2

TABLE 20

SUMMARY OF HUMPBACK OPERATIONS BY CATCHERS

AT ALBANY STATION IN 1961

CATCHER "KOS VII"

7 days ending	No. days whaling	Total hours steaming	Total hours hunting	Total humpbacks sighted	Total humpbacks killed	Humpbacks sighted per 100 hours hunting	Humpbacks killed per 100 hours hunting
June 11	6	49¾	41¾	17	5	41	12
18	2	17¾	15¾	6	1	38	6
25	6	84	53¾	42	15	78	28
July 2	6	56¾	47¼	22	5	47	11
9	7	95½	60¼	40	16	66	27
16	6	73	44½	38	16	85	36
Whole of season	33	376¾	263¼	165	58		

CATCHER "MINILYA"

June 11	4	32¾	23¼	4	1	17	4
18	4	55¼	39¼	6	2	15	5
25	5	64¾	45¾	32	6	70	13
July 2	6	61	45¾	19	5	42	11
9	7	92	56	22*	18	39	32
16	6	75½	48¾	23*	15	47	31
Whole of season	32	381¼	258¾	106	47		

* Sightings not recorded every day

TABLE 21

LENGTH FREQUENCY DISTRIBUTION OF HUMPBACK WHALES

TAKEN ON THE WEST COAST OF AUSTRALIA IN 1961

Body Length ft.	MALES Carnarvon No.	Albany No.	Total No.	%	FEMALES Carnarvon No.	Albany No.	Total No.	%
30	1		1	0.3				
31								
32	2		2	0.7		1	1	0.4
33	3		3	1.0	5	1	6	2.2
34	4	2	6	2.0				
35	46	10	56	18.3	28	6	34	12.5
36	45	6	51	16.7	32	7	39	14.3
37	48	10	58	19.0	31	4	35	12.9
38	50	9	59	19.3	30	5	35	12.9
39	32	9	41	13.4	24	7	31	11.4
40	15	3	18	5.9	20	8	28	10.3
41	5	1	6	2.0	8	5	13	4.8
42		3	3	1.0	16	3	19	7.0
43	1		1	0.3	9	3	12	4.4
44	1		1	0.3	8	1	9	3.3
45					6	1	7	2.6
46					1		1	0.4
47					1		1	0.4
48					1		1	0.4
Total in sample	253	53	306		220	52	272	

TABLE 22

DISTRIBUTION OF NUMBERS OF OVULATIONS IN FEMALE HUMPBACK WHALES SAMPLED ON THE WEST COAST OF AUSTRALIA IN 1961

		Carnarvon		Albany		Total	
		No.	%	No.	%	No.	%
Immature		89	41.6	26	53.1	115	43.7
Puberal		42	19.6			42	16.0
Previous Ovulations	1	24	11.2	6	12.2	30	11.4
	2	17	7.9	6	12.2	23	8.8
	3	11	5.1	6	12.2	17	6.5
	4	7	3.3			7	2.7
	5	5	2.3			5	1.9
	6	5	2.3			5	1.9
	7	2	0.9	1	2.0	3	1.1
	8	3	1.4	2	4.1	5	1.9
	9	1	0.5			1	0.4
	10	1	0.5			1	0.4
	11	2	0.9			2	0.8
	12						
	13						
	14	2	0.9	1	2.0	3	1.1
	15						
	16						
	17	1	0.5			1	0.4
	18						
	19						
	20	2	0.9			2	0.8
	20+			1	2.0	1	0.4
Total in sample		214		49		263	

TABLE 23

AGE DISTRIBUTION (FROM EAR PLUGS) WITHIN SAMPLES OF HUMPBACKS TAKEN ON THE WEST COAST OF AUSTRALIA IN 1961

Age (yrs.) (Laminations x ½)	MALES				FEMALES			
	Carnarvon No.	Albany No.	Total No.	%	Carnarvon No.	Albany No.	Total No.	%
2	2	1	3	1.4	2	1	3	1.5
3	41	8	49	22.6	40	6	46	23.6
4	51	8	59	27.2	29	3	32	16.4
5	35	6	41	18.9	27	5	32	16.4
6	19	10	29	13.4	23	6	29	14.9
7	16	2	18	8.3	11	2	13	6.7
8	5		5	2.3	7	1	8	4.1
9	5		5	2.3	4	2	6	3.1
10	4		4	1.8	5		5	2.6
11					8		8	4.1
12					6		6	3.1
13	1	1	2	0.9	1		1	0.5
14								
15					2		2	1.0
16	1		1	0.5				
17	1		1	0.5				
18					1		1	0.5
19								
20								
20+					1	2	3	1.5
Total in sample	181	36	217		167	28	195	

TABLE 24

WHALE MARKS RECOVERED FROM HUMPBACK WHALES AT AUSTRALIAN WHALING STATIONS DURING 1961

Whale Mark No.	RELEASE			RECOVERY		
	Date	Location	Remarks	Date	Location	Remarks
11906	2. 8.55	25°12'S. 113° 7'E.	est. 38 ft.	8. 7.61	24°33'S. 113°05'E.	Female 39'6" pregnant
14202	11. 9.57	25°S. 113°15'E.		4. 8.61	24°53'S. 113°38'E.	In cooker
15105	6. 8.58	Norfolk Island	small bull	6. 7.61	28°50'S. 167°54'E.	Male 41'8"
16453	17. 6.56	27°S. 153°30'E.	est. 37 ft.	24. 6.61	27°08'S. 153°32'E.	Female 38'7"
16790	5. 7.56	27°S. 153°30'E.	est. 30 ft.	2. 8.61	26°54'S. 153°29'E.	Female 39'0"
17190	1958	Cook St., N.Z.	Missfire	17. 7.61	27°07'S. 153°28'E.	Male 40'3"
18020		Antarctic *		3.11.61	28°37'S. 153°38'E.	In grax tank
18036		Antarctic *		18. 9.61	28°37'S. 153°38'E.	In cooker
19541	19. 9.58	27°S. 153°30'E.	Modified mark	28. 6.61	27°07'S. 153°28'E.	Male 40'3"
19658	3. 7.59	33°57'S. 151°18'E.		3. 9.61	26°35'S. 153°30'E.	Male 42'0"
S19964	5. 8.57	Fiji Islands 17°40'S. 178°55'E.	est. 40 ft.	9.10.61	26°56'S. 153°26'E.	Female 44'10"
21013	25.12.58	64°27'S. 148°27'E.	est. 36 ft.	6. 7.61	28°38'S. 153°40'E.	Male 38'10"
21877	3. 7.59	Cook St., N.Z.	Adult	12. 6.61	27°10'S. 153°29'E.	Male 38'4"
21936	19. 6.60	Cook St., N.Z.	est. 38 ft.	13. 9.61	26°41'S. 153°30'E.	Male 39'6"
22082		Antarctic		27.10.61	28°37'S. 153°42'E.	Male 43'8"
23835)	28. 7.61	27°00'S. 153°30'E.	est. 34 ft.	24. 8.61	26°40'S. 153°15'E.	Male 40'0"
23836)	Same whale	as 23835	"	"	"	"
23929	28. 6.61	28°50'S. 153°40'E.	est. 35 ft.	30. 6.61	26°59'S. 153°30'E.	Male 35'11"
USSR375		* Antarctic		28. 8.61	26°48'S. 153°13'E.	Female 35'2"
USSR593		"		3.10.61	28°33'S. 153°41'E.	Female 36'5"
598		"		23. 6.61	27°10'S. 153°30'E.	Male 36'
600		"		7.10.61	27°S. 153°30'E.	In grax tank
631		"		19.10.61	26°55'S. 153°28'E.	Male 39'10"
930		"		7.10.61	27°S. 153°30'E.	In grax tank

* Details not yet available

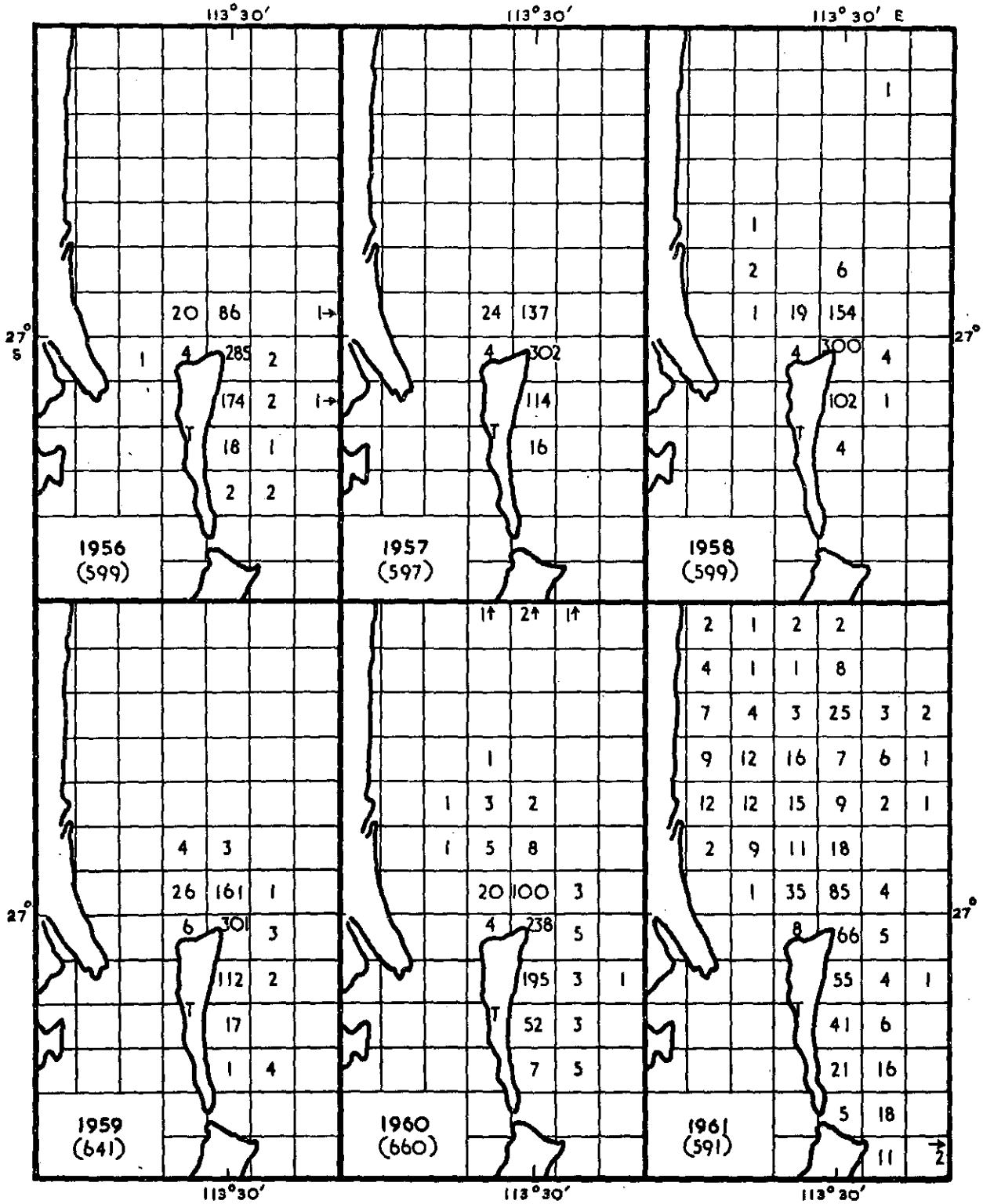

Fig. 1.- Area off Tangalooma Whaling Station (T) marked in squares, 5 x 5 nautical miles, showing in each square numbers of humpback whales killed each year between 1956 and 1961.

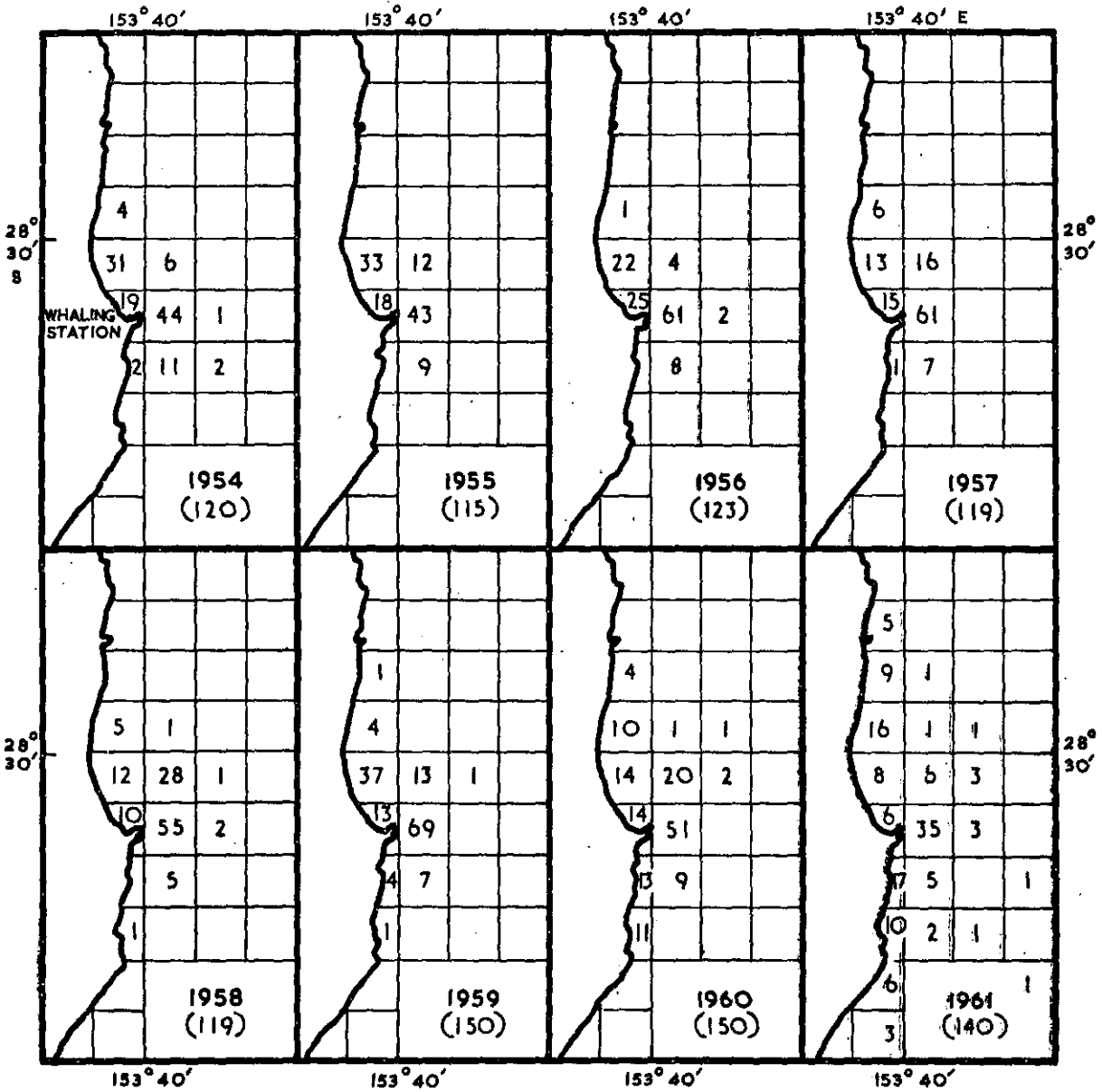

Fig. 2.- Area off Cape Byron marked in squares, 5 x 5 nautical miles, showing in each square numbers of humpback whales killed each year between 1956 and 1961.

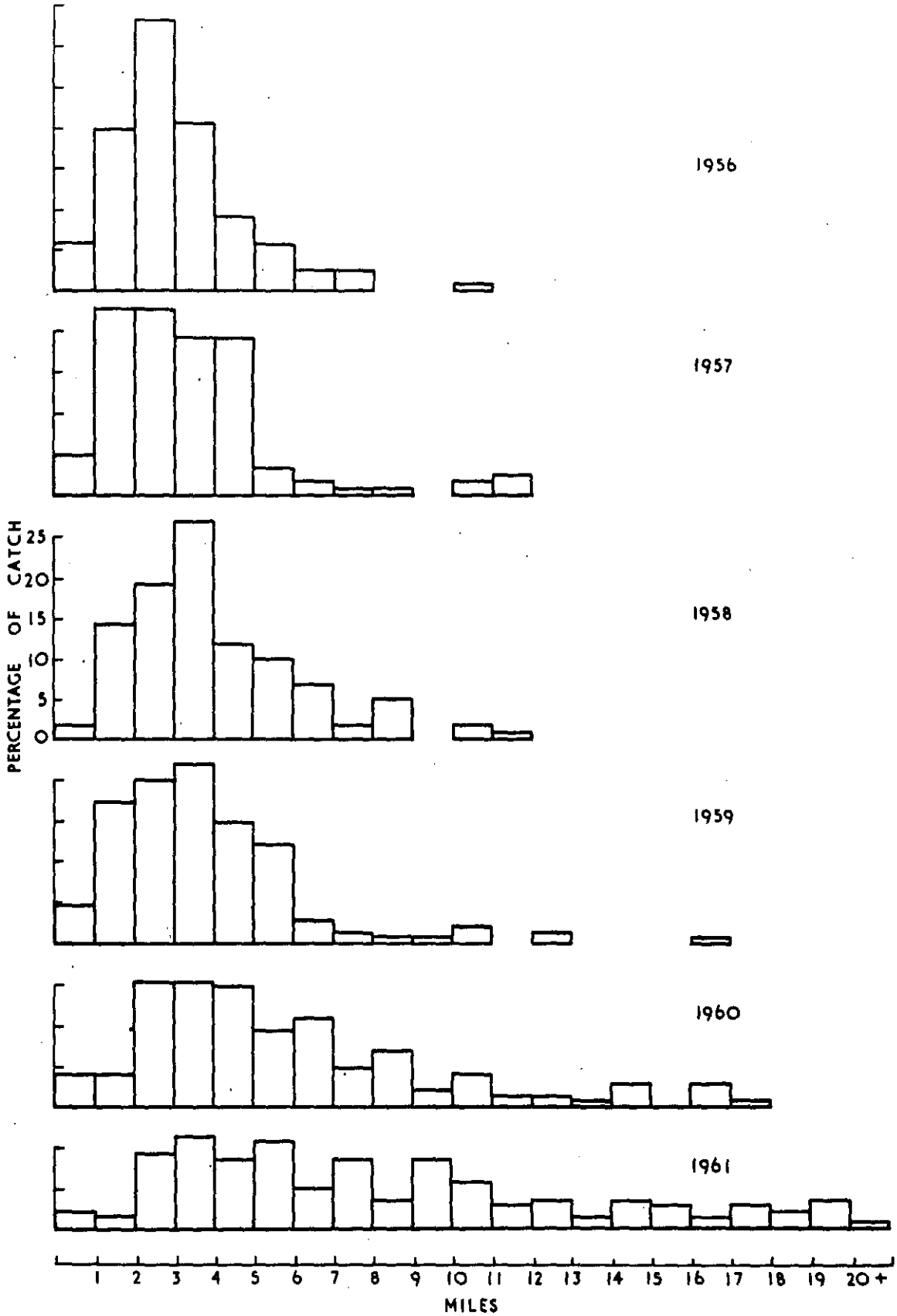

Fig. 3.- Percentage of whale catch taken within each interval of one mile, from Cape Byron, in each year 1956-1961.

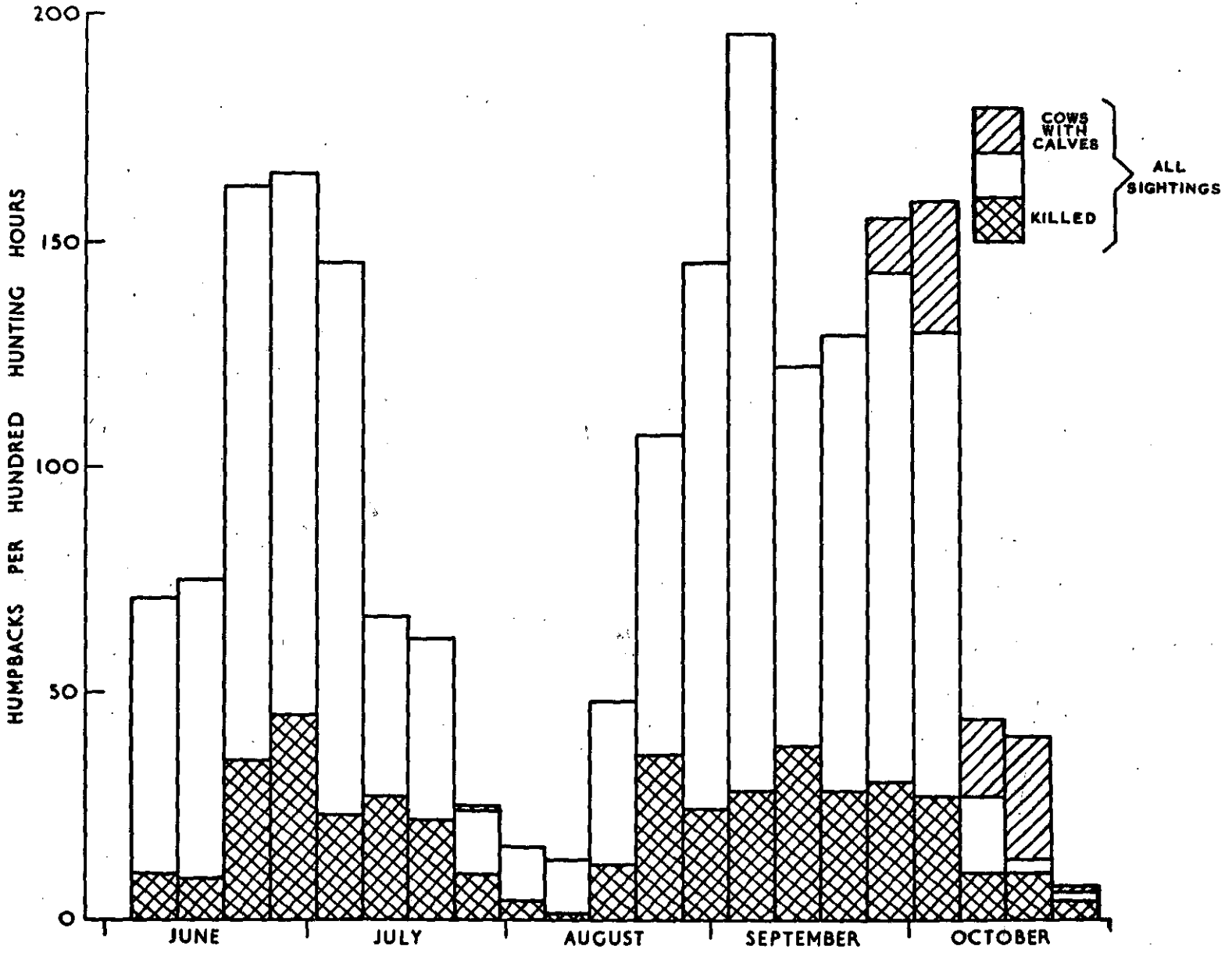

Fig. 4.- Humpbacks sighted and captured per 100 hunting hours each week by whale catcher Kos I off Moreton I. in 1961.

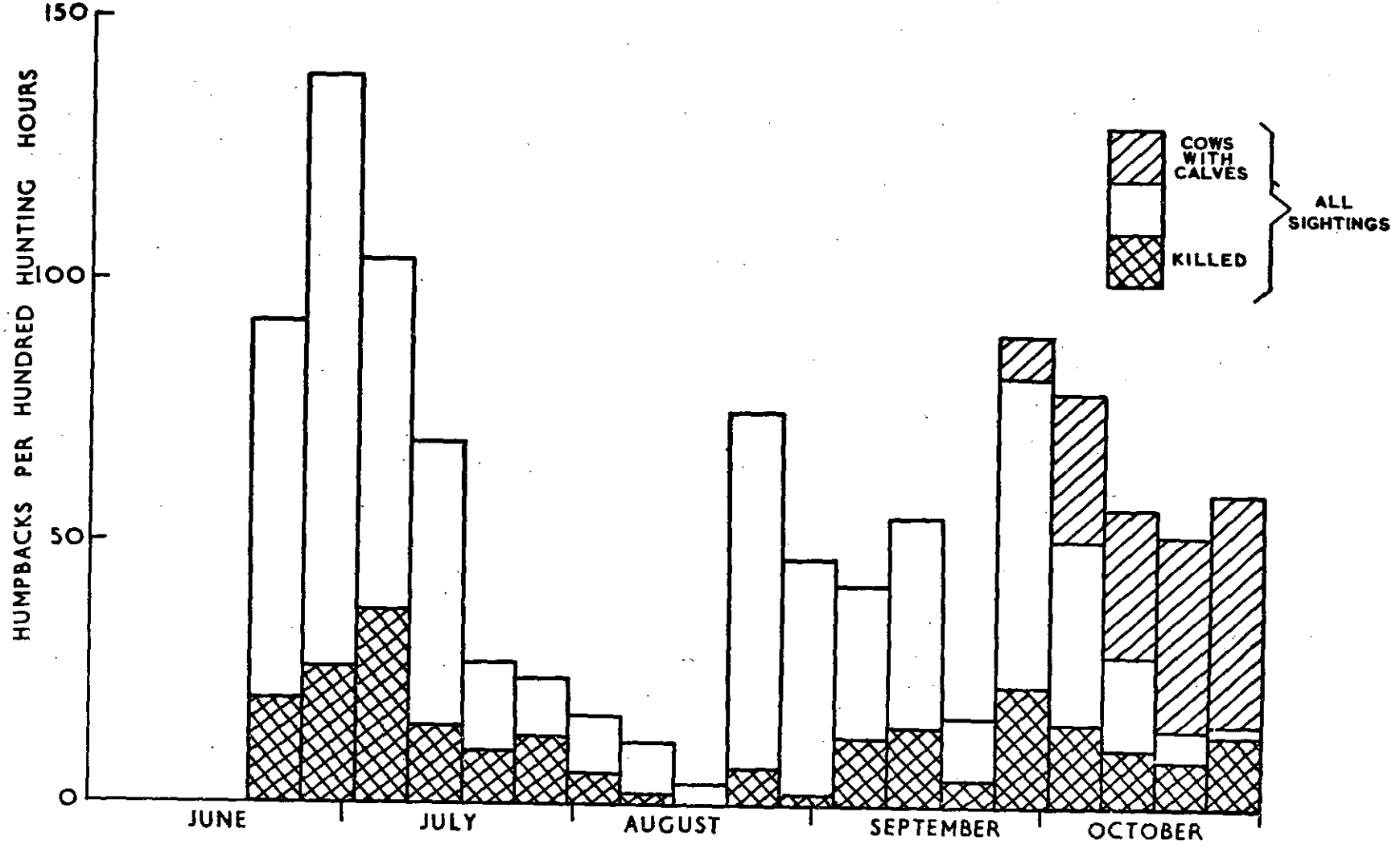

Fig. 5.- Humpbacks sighted and captured per 100 hunting hours each week by whale catcher Byrond I off Byron Bay in 1961.

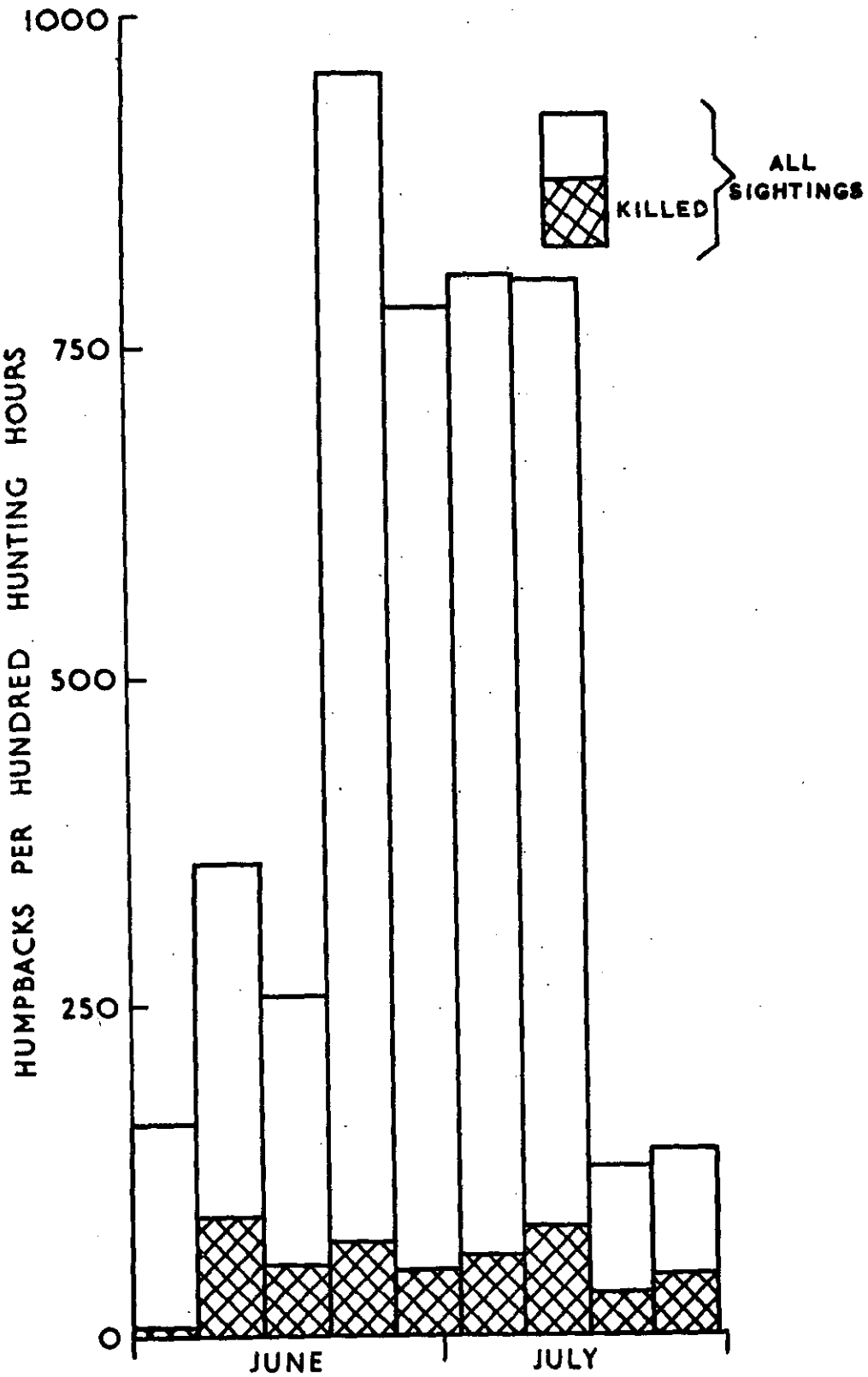

Fig. 6.- Humpbacks sighted and captured per 100 hunting hours each week by whale catcher Byrond I off Byron Bay in 1959.

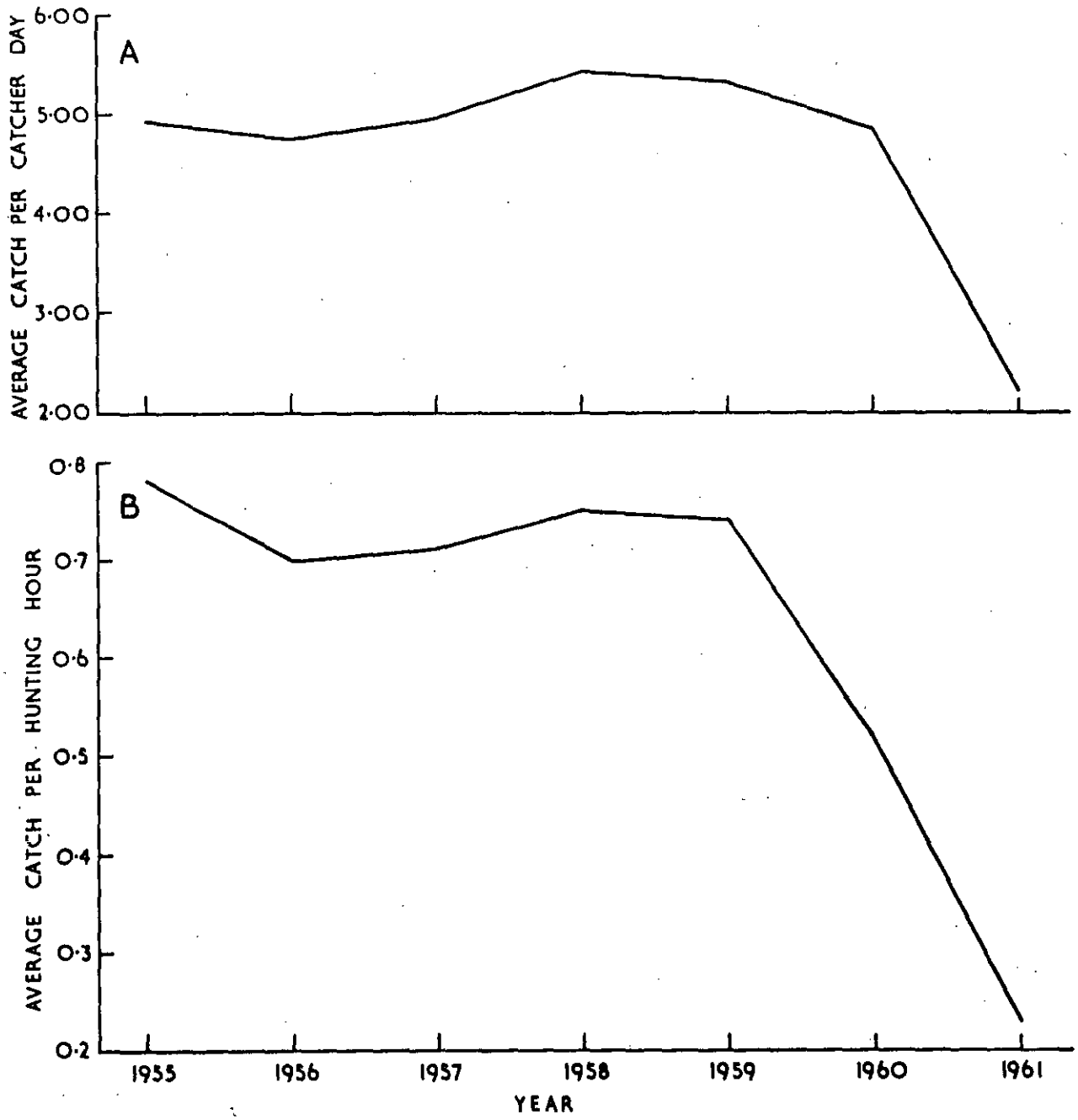

Fig. 7.- Average catch per unit effort during period June 10 To August 5 in each year, 1955-61 at *Tangalooma*.

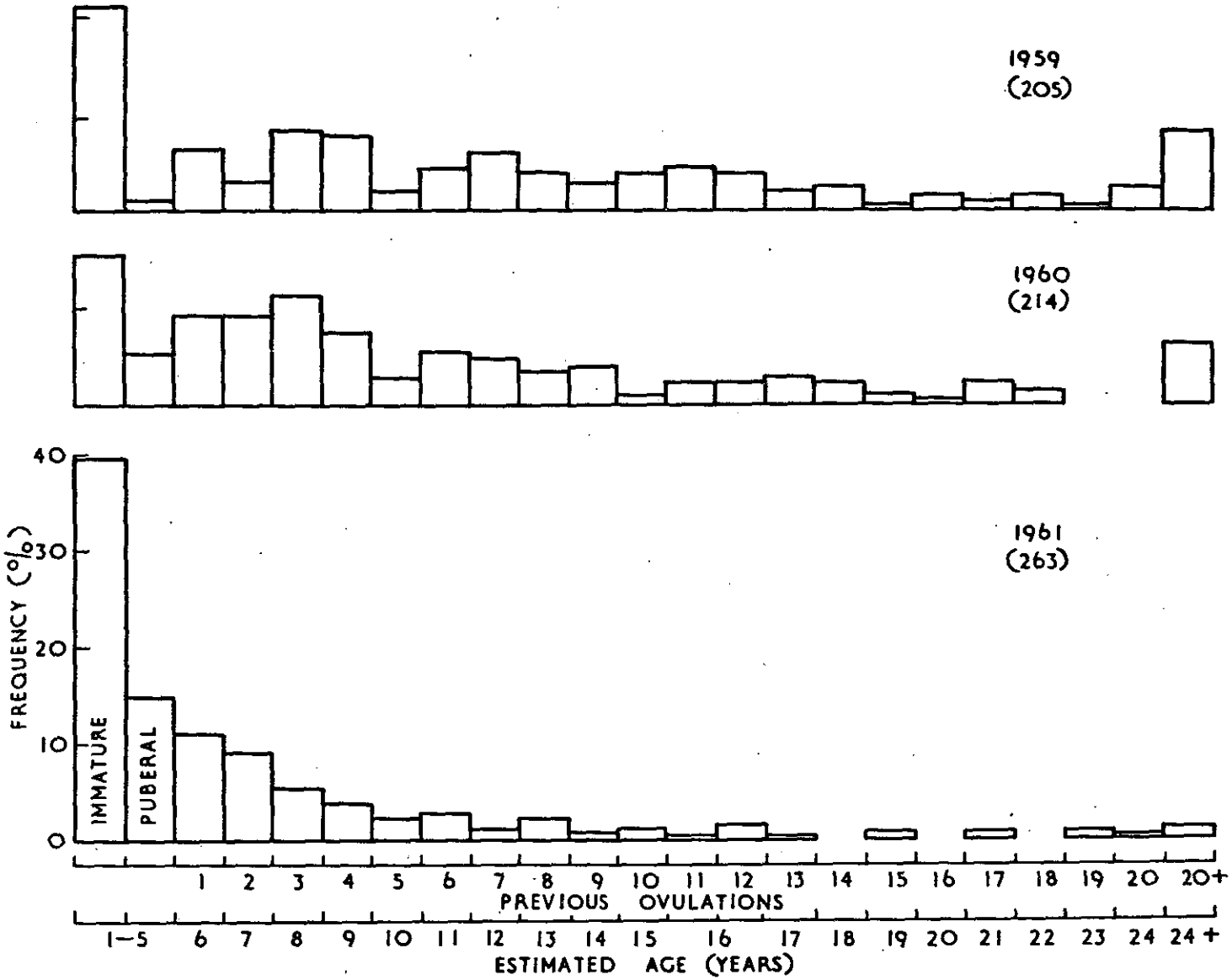

Fig. 8.- Percentage age frequency distribution (estimated from ovulation counts) of female humpbacks sampled on the east coast of Australia, 1959–61.

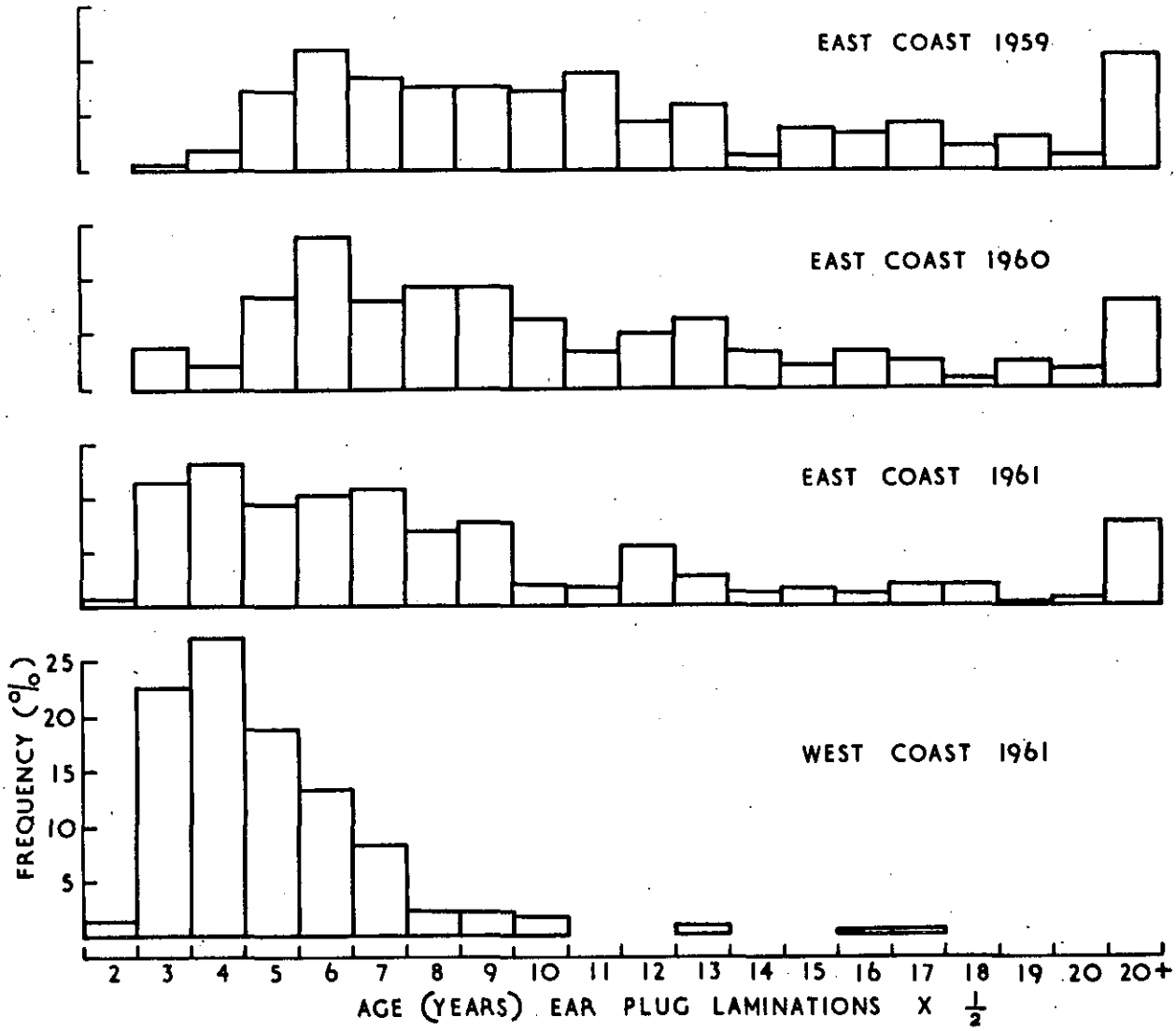

Fig. 9.- Percentage age frequency distribution (estimated from ear plug laminations) of male humpbacks sampled on the east coast 1959-61, and on the west coast in 1961.

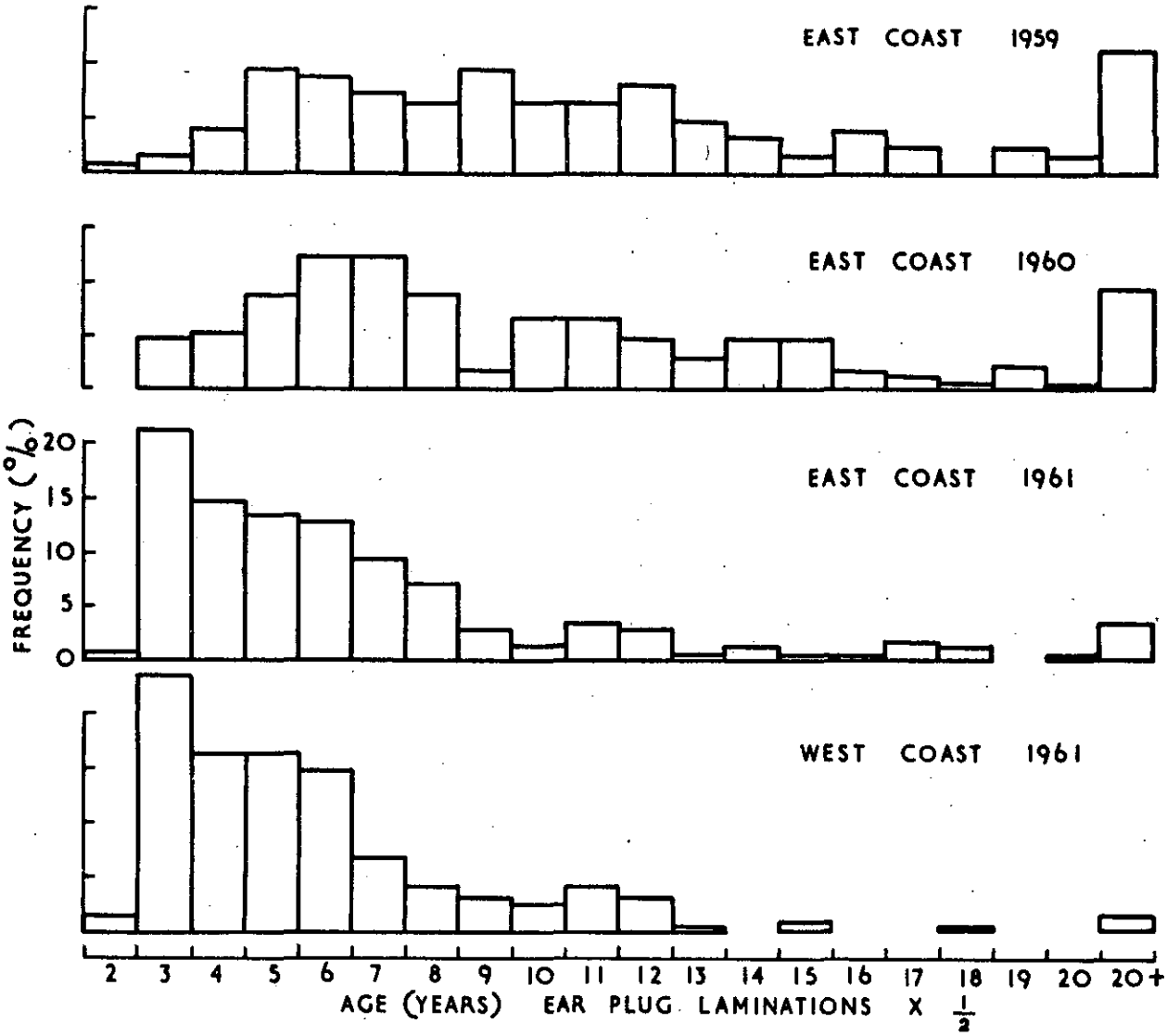

Fig. 10.- Percentage age frequency distribution (estimated from ear plug laminations) of female humpbacks sampled on the east coast, 1959-61, and on the west coast in 1961.

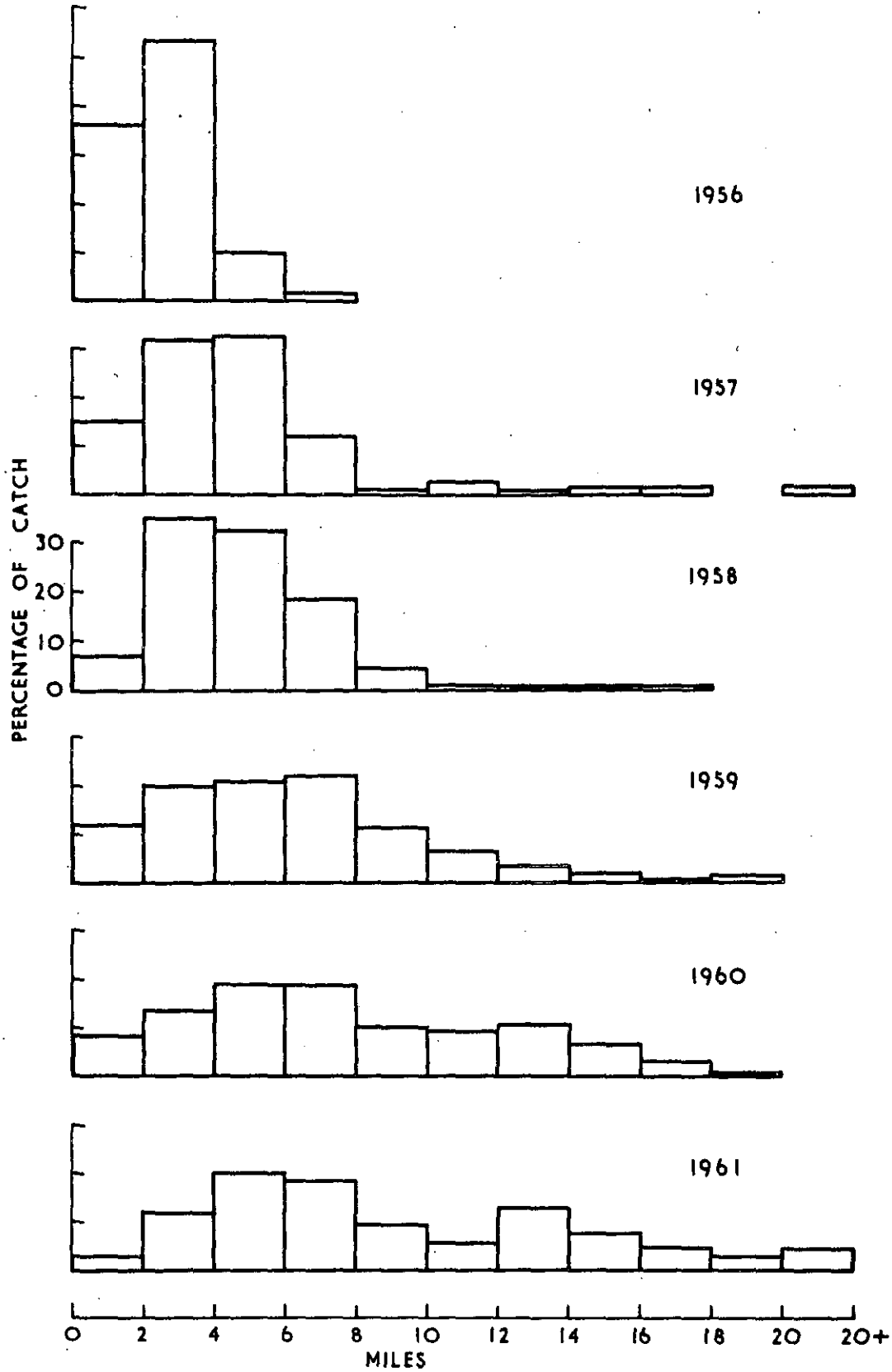

Fig. 11.- Percentage of whale catch taken within each interval of two miles, offshore from Norfolk I. in seasons 1956-61.

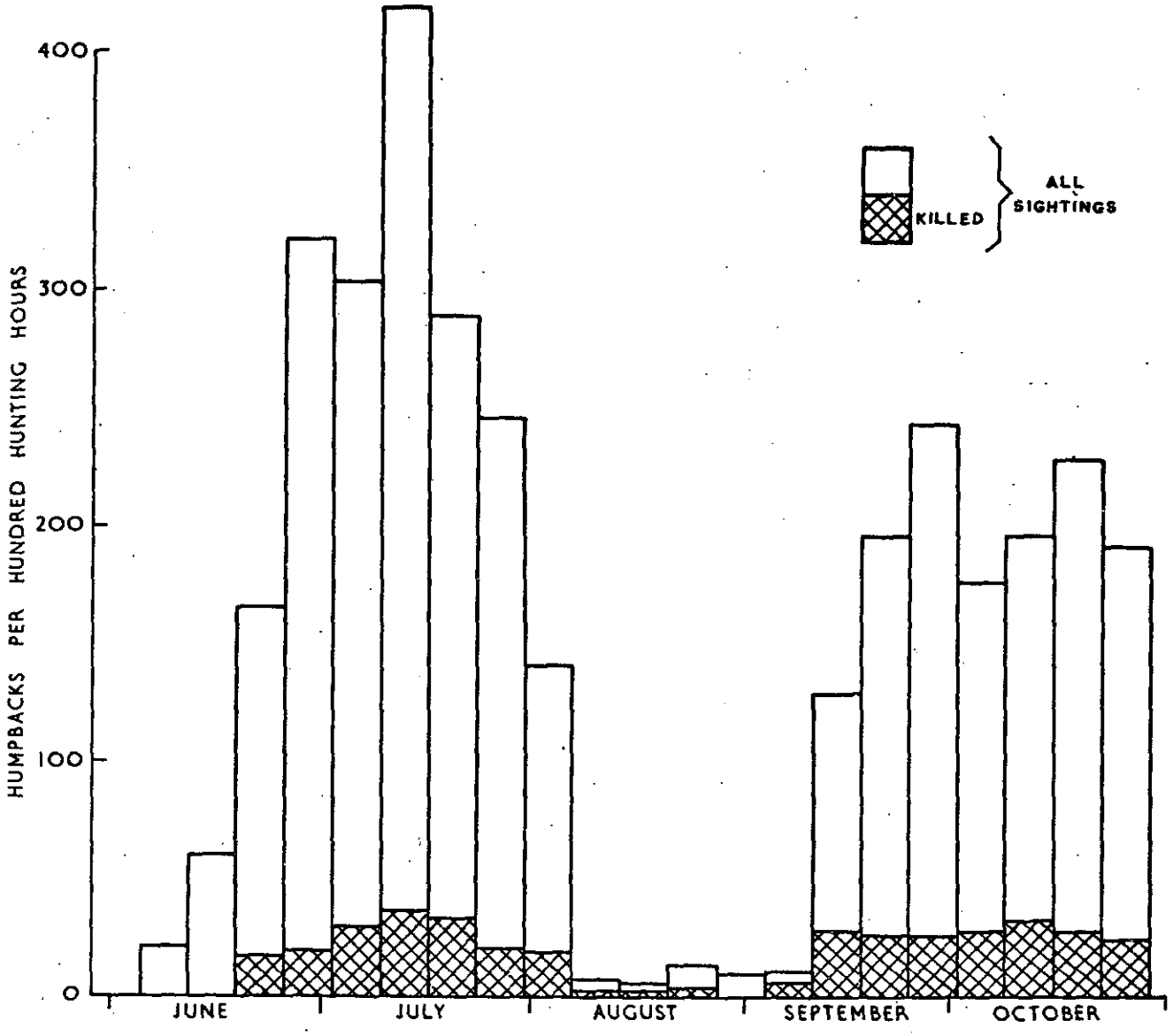

Fig. 12.- Humpbacks sighted and captured per 100 hunting hours each week by whale catcher Norfolk Whaler off Norfolk I. in 1961.

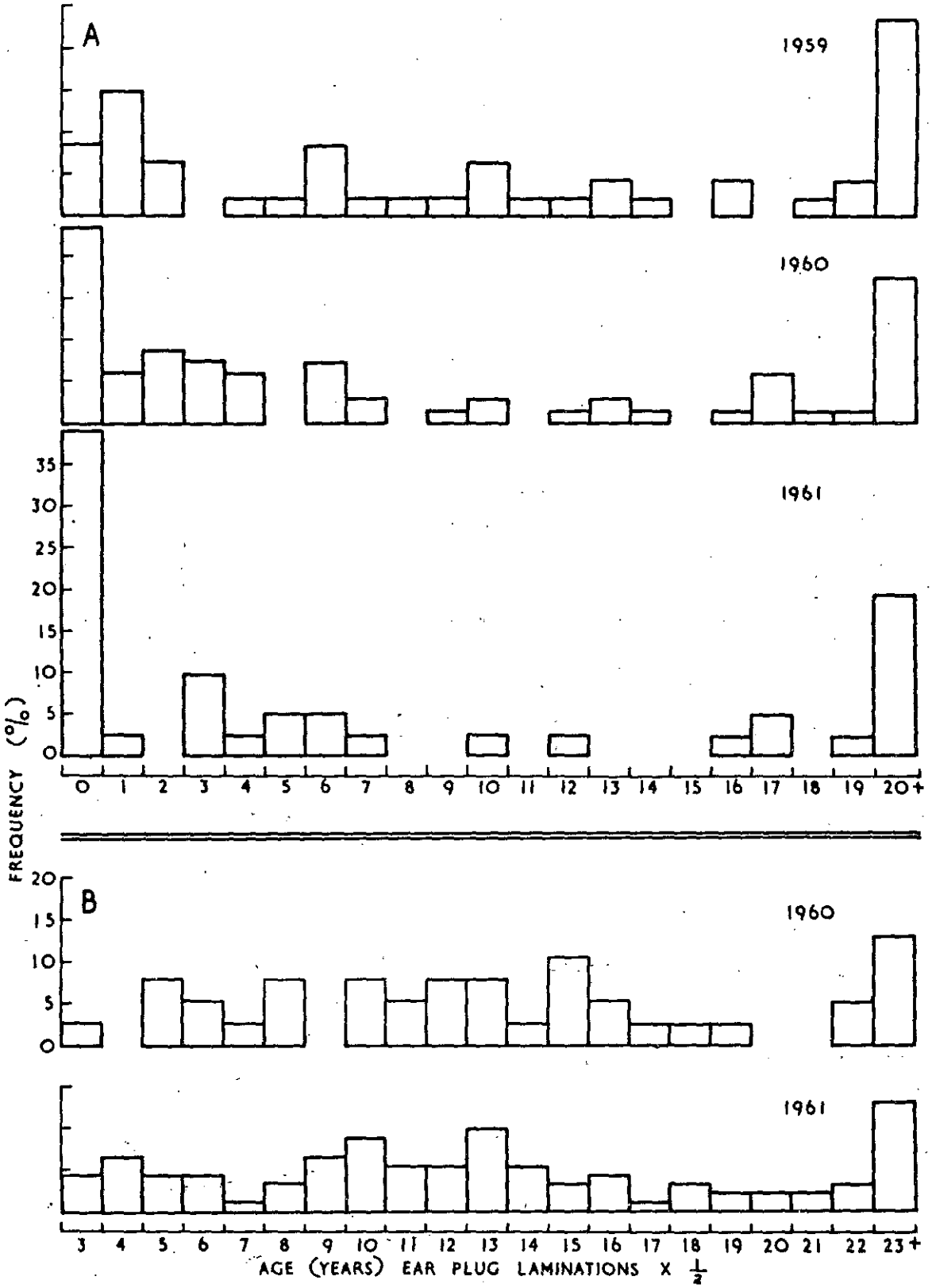

Fig. 13.- A. Percentage frequency of ovulations in female humpbacks sampled at Norfolk I. from 1959-61.

B. Percentage age frequency (estimated from ear plug laminations) of male humpbacks sampled at Norfolk I. in 1960-61.

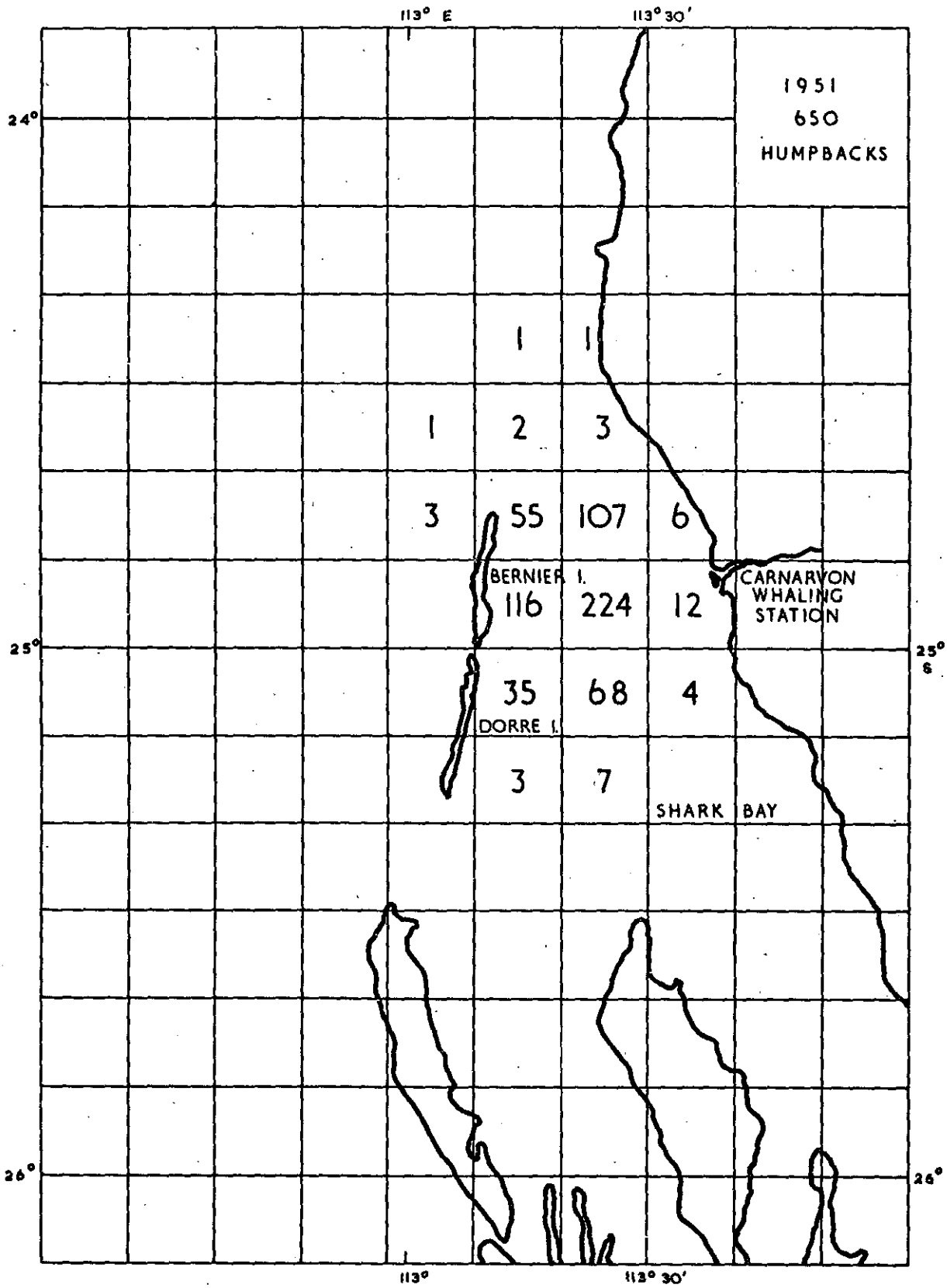

Fig. 14.- Area off Carnarvon Whaling Station marked in squares, 10 x 10 nautical miles, showing in each square number of humpbacks killed in 1951.

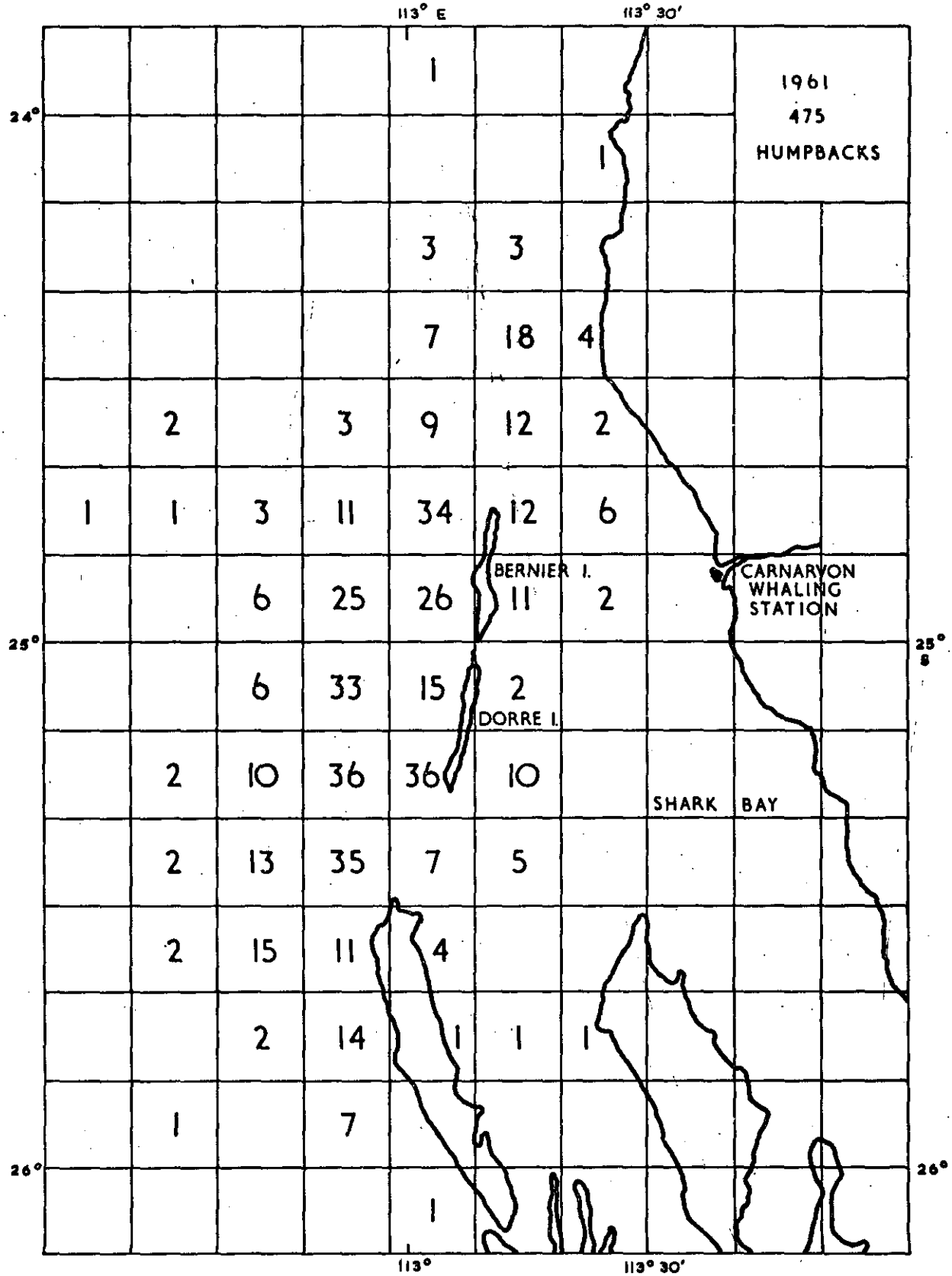

Fig. 15.- Area off Carnarvon Whaling Station marked in squares, 10 x 10 nautical miles, showing in each square number of humpbacks killed in 1961.

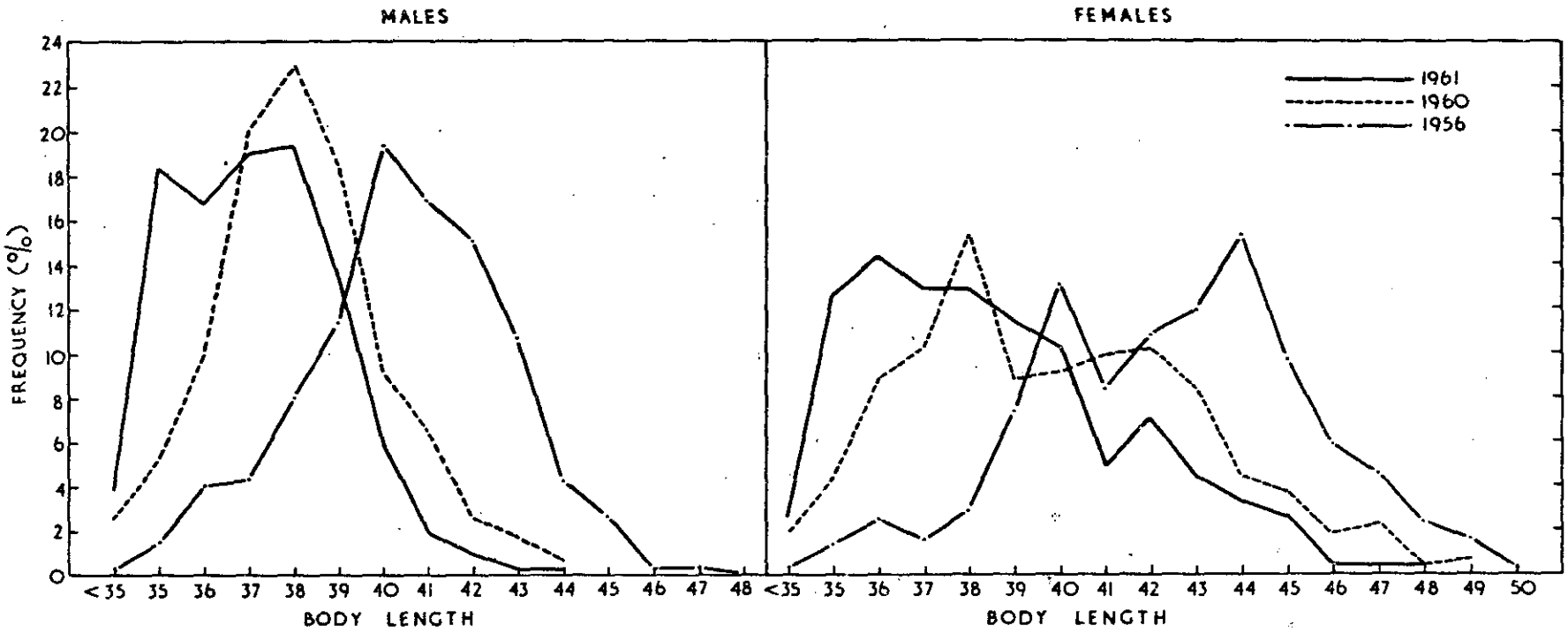

Fig. 16.- Length frequency distribution of male and female humpbacks caught in 1956, 1960, and 1961 on the west coast of Australia.

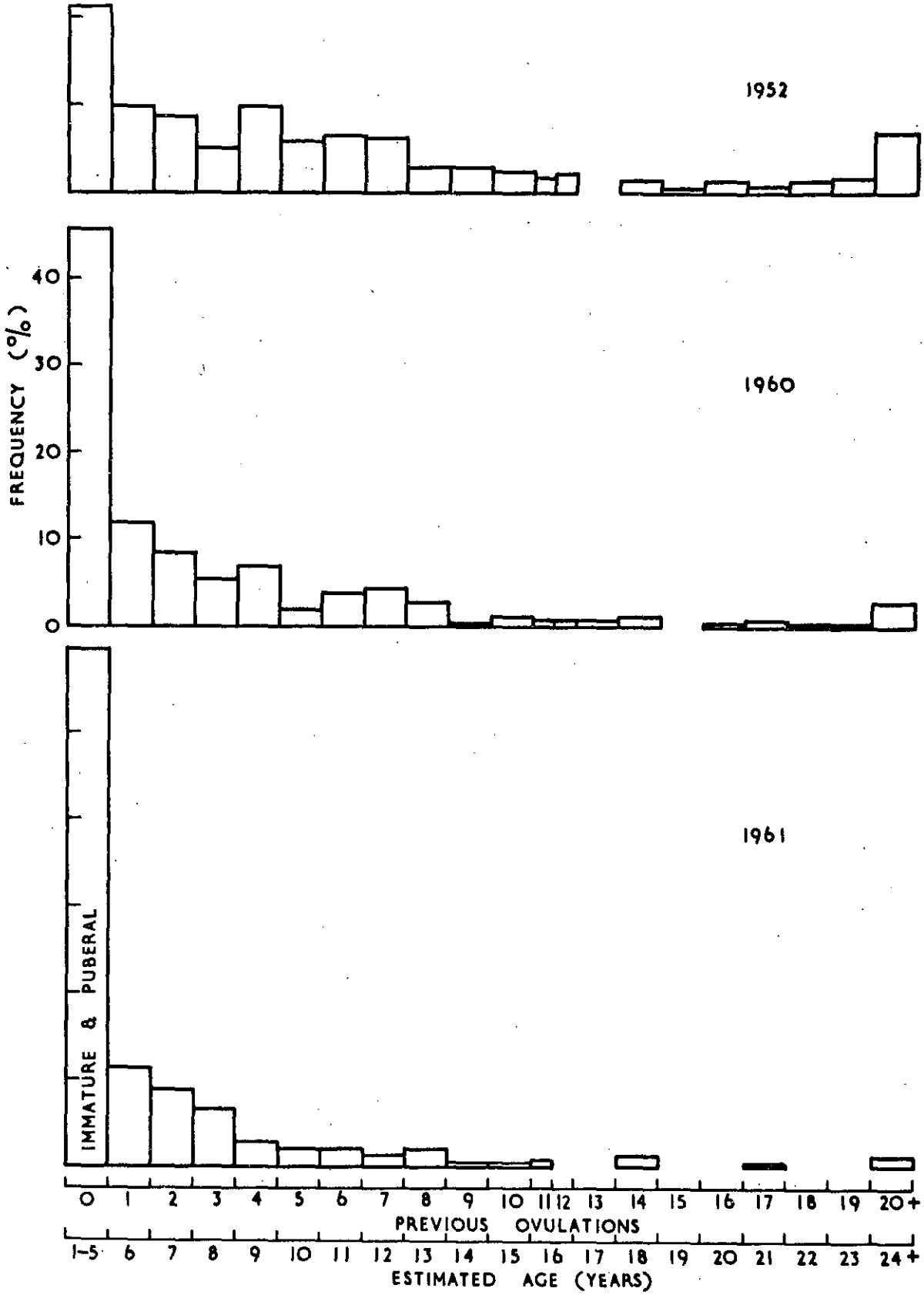

Fig. 17.- Percentage age frequency distribution (estimated from ovarian data) of female humpbacks caught on the west coast of Australia, 1957, 1960, 1961.

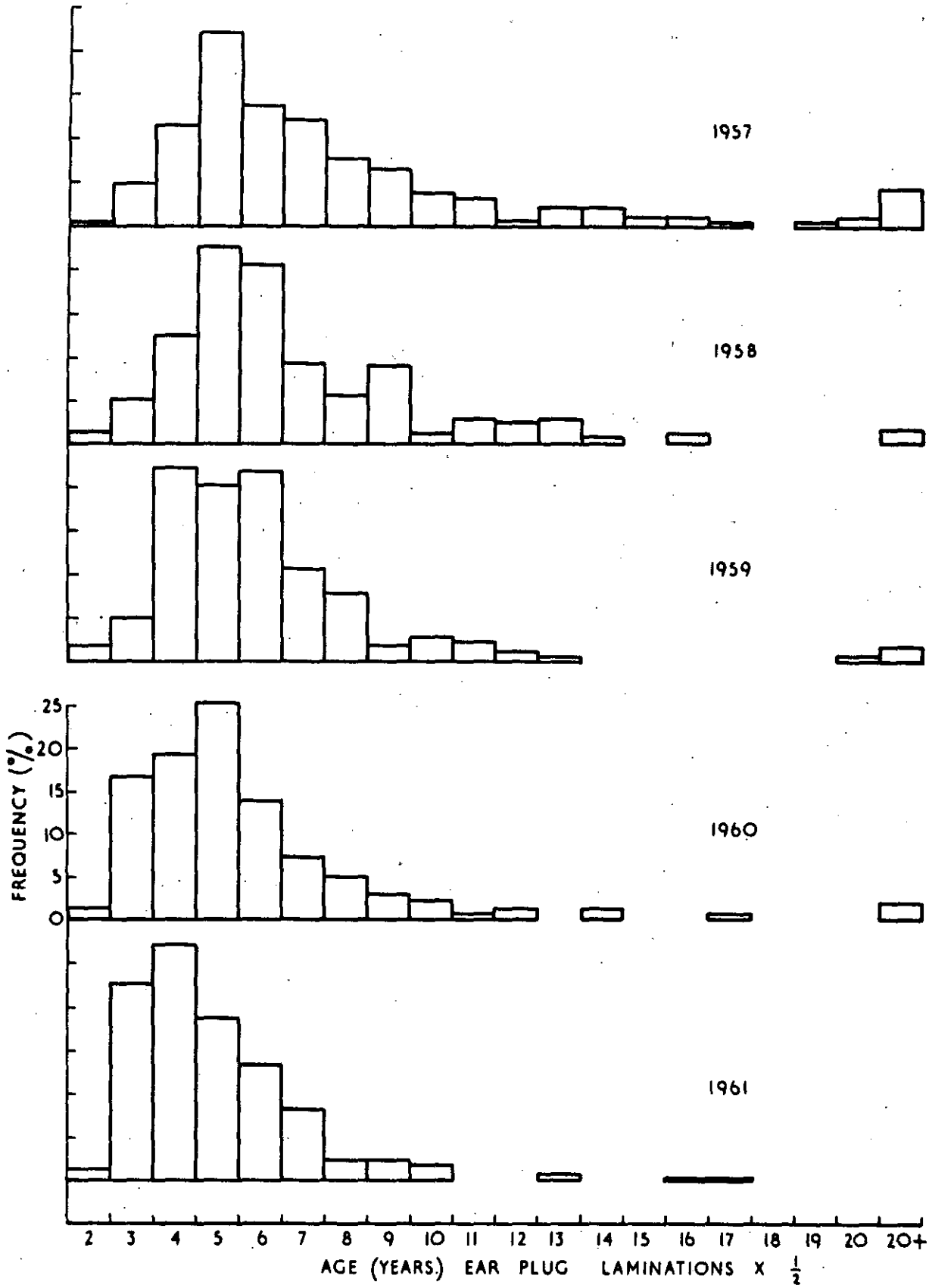

Fig. 18.- Percentage age frequency distribution (estimated from ear plug laminations) of male humpbacks caught on the west coast of Australia, 1957-61.

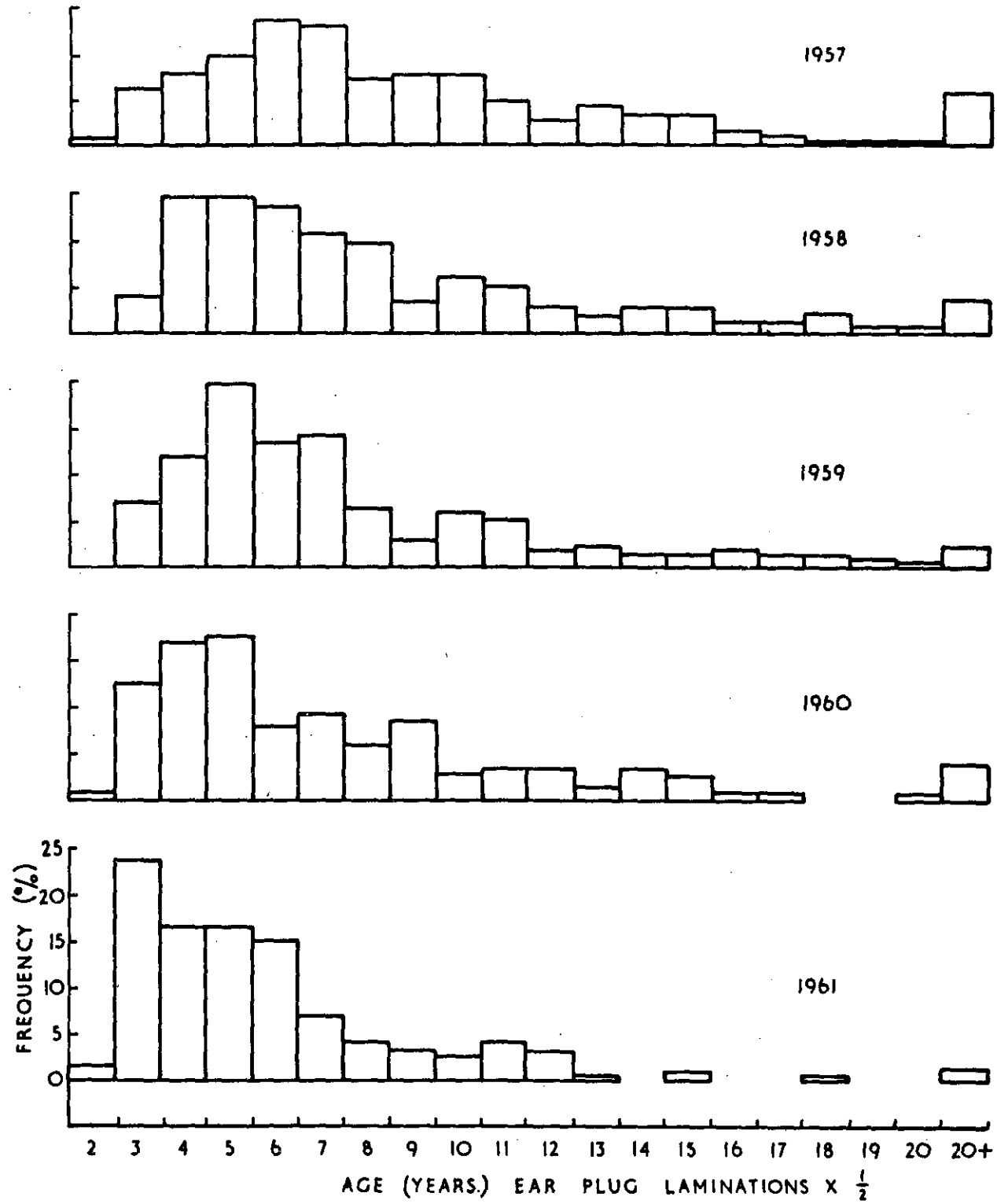

Fig. 19.- Percentage age frequency distribution (estimated from ear plug laminations) of female humpbacks caught on the west coast of Australia, 1957-61.

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