FISHERIES RESEARCH BOARD
OF CANADA

MANUSCRIPT REPORT SERIES

(BIOLOGICAL)

No. 629

TITLE

# PRELIMINARY REPORT ON CANADIAN PELAGIC FUR SEAL RESEARCH IN 1959

AUTHORSHIP

G.C. Pike, D.J. Spalding, I.B. MacAskie and A. Craig

Establishment

Biological Station, Nanaimo, B. C.

Dated November, 1959

C O N T E N T S

Page

VIII MAPS SHOWING DISTRIBUTION AND DENSITY


M/V "PACIFIC OCEAN"

# PRELIMINARY REPORT ON CANADIAN PELAGIC FUR SEAL RESEARCH IN 1959

---

## I INTRODUCTION

Representatives of Canada, Japan, the U.S.S.R., and the U.S.A. met in Washington, D.C. from November 28, 1956 to February 9, 1957 to draft an "Interim Convention on Conservation of the North Pacific Fur Seals". The convention, which is effective for a period of six years, was entered into force on October 14, 1957, following ratification by all four signatories.

The first meeting of the North Pacific Fur Seal Commission took place in Washington, D.C. from January 13 to January 17, 1958. Agreement was reached on a coordinated scientific fur seal research program designed to produce and to maintain fur seal populations at maximum sustainable levels, and to study the extent to which fur seals affect other living marine resources. The second meeting was held in Washington, D.C. from December 8 to December 12, 1958.

Each of the four parties agreed to take a given number of fur seals pelagically, for research purposes, each year during the term of the Interim Convention. Canada's share was set at between 500 and 750 fur seals to be taken at sea each year in the Eastern North Pacific Ocean.

Specific studies are prescribed in Article II of the Convention. These include:

1) Migration routes of fur seals, and their wintering areas.

2) Numbers, by age and sex, of seals from each herd found on the migration routes and in wintering areas.

3) Extent to which the food habits of fur seals affect commercial fish catches, and the damage fur seals inflict on fishing gear.

This report describes Canada's efforts in 1959 in contributing to these studies and to the general aims of the Convention. During the course of six months' pelagic research, 491 seals were captured. The report is preliminary and presents mainly a compilation of data. Some superficial comparisons are made with the results of 1958 research. Extraction of firm conclusions requires more detailed analysis and the application of more refined statistical treatment.

The 1959 Canadian pelagic research program was conducted during the months of February to July, inclusive, and covered coastal waters from the mouth of the Columbia River to waters off Kodiak, Alaska. One vessel, the "Pacific Ocean", a 72-foot steel combination seine and halibut boat, powered by twin 145 horsepower inline General Motors diesels, was carried on charter during the months of March-July inclusive to collect seals. The M.V. "A.P. Knight", belonging to the Biological Station in Nanaimo, was used for a two-week period in January and February to collect seals in the Queen Charlotte Sound area.

The research team consisted of two biologists, G. C. Pike and D. J. Spalding; a permanent technician, I. B. MacAskie and a student assistant scientist, Miss A. Craig.

## II METHODS AND TECHNIQUES

### A. Hunting program

The hunting program was designed primarily to intercept seals moving northward on their breeding migration. Plans were made in accordance with the results of the 1958 research and the activities of the American research vessels operating farther south. Seals were mostly shot using 12-gauge shot-guns and S.S.G. ammunition from the dodger of the vessel. Some seals were shot using 30-06 or 303 rifles at times when they were difficult to approach at close range.

On one occasion, in the Gulf of Alaska, weather and sea conditions and a dense concentration of seals favoured the use of a skiff for hunting. Using shot-guns from a 12-foot fibre-glass skiff powered by an 18 horsepower motor, 75 seals were captured in a period of 7 hours.

From a total of 1374 seals seen during the course of the 1959 hunting program, 491 were captured. Attempts were not always made to capture seals when seen. Shooting was discontinued at times when an adequate sample had been taken from any one area. The entire quota of 500 seals might be taken within a few days when a large concentration is encountered under favourable weather conditions.

An aerial reconnaissance in May aboard an R.C.A.F. "Neptune" yielded few sightings even in areas where numbers of seals were known to be present. It is felt that the speed of this aircarft makes it unsuitable for this work. No future attempts at aerial reconnaissance will be made unless the use of a slower aircraft can be obtained.

B. Collection and study of specimens

No important changes were made in the collection and treatment of specimens aboard the vessel in 1959 (see: 1958 Report, page 4).

All ovaries and reproductive tracts were preserved in 10 per cent formalin in 1959 and returned to the laboratory for careful study.

Stomach contents were analysed at the laboratory according to weight and displacement volumes of individual food species.

Pelts from yearlings and from badly mutilated seals were disposed of at sea. One hundred ninety-three pelts were sold locally for a price of $998.50. Two pelts were retained at the laboratory for experimental purposes.

Ages were obtained by reference to rings in the dentine of the upper canine teeth. Ages were first read from external ridges at the base of the

teeth. These ridges show age clearly in female seals up to 8 years of age. Teeth bearing 7 ridges or more (i.e. 8 years of age or older) were ground longitudinally on a specially constructed tooth grinding machine (Fisher, H.D., 1954, J. Wildl. Management, No. 18). Ages were read to 10 years. Teeth from seals older than 10 years will be retained for specific age determination at a later date.

A special study of the reproductive cycle of the female is in progress. Reproductive conditions described in this report are based upon macroscopic examination of the ovaries and uterine horns. The terms "nulliparous", "primiparous" and "multiparous" refer to the history of the uterine horns and are based upon examination of the inner surfaces of the uteri. The external appearance of the uteri are not always reliable in diagnosing the reproductive condition. The history of the formation of a corpus luteum and its regression to a corpus albicans is being studied histologically. Recent corpora albicantia are not always revealed in macroscopic examination.

C. Distribution and density

The entire area of operations is again divided into five major divisions for the purpose of analysing the data on distribution and density.

Area A: Coast of Oregon and Washington to 48°N Lat.

Area B: West coast of Vancouver Island to 51°N Lat.

Area C: West coast of Queen Charlotte Islands to 55°N Lat.

Area D: Inside waters, including Dixon Entrance, Hecate Strait, Queen Charlotte Sound, Johnstone Straits, Georgia Straits and adjoining inlets.

Area E: Coast and Gulf of Alaska.

A finer division defines smaller areas in a grid composed of one degree squares beginning at 46°N Lat. and 122°W Long. as shown in the map figure on page 35. The numbers on the ordinate represent latitude, the numbers on the

abscissa represent longitude. For example: B0304 refers to the west coast of Vancouver Island from 48°-49°N and 124°-125°W.

Distribution of seals is described in this report by months according to the numbers seen and the numbers taken in each grid square. The lower figures describe the numbers killed with "yearlings" and "others" separated. Blank squares indicate the track of the vessel during daylight hours when no seals were sighted or taken.

A new system is used in this report to describe density. It is based upon the numbers of seals sighted per day. Each day is weighted to 10 hours. Circles represent general areas covered during days of good visibility and are bisected to show the first and second fortnightly periods in each month. The figures represent the numbers of seals seen per ten-hour day on good hunting days. The lower figures describe yearling seals; the upper figures describe seals other than yearlings. Identification of yearling seals at sea is not always accurate and may include a few 2 or 3 year-old animals. It is important, however, to attempt to distinguish between yearlings and "others", since yearlings (and probably many 2 and 3 year olds) do not participate in the northward migration. The 1958 data are included for purposes of comparison.

The system used in 1958 to estimate density has been abandoned. This system was based upon the number of seals seen according to the number of miles run and was qualified by a "visibility factor". It is useful when the vessel is engaged solely in observation and is travelling at a constant speed. Delays caused by hunting activities confuse such estimates. The system has been found impractical for our present purposes.

## III AGE, GROWTH AND REPRODUCTION

### A. Age distribution

The 1958 year-class of fur seals appeared in British Columbia coastal waters in December, 1958, but in smaller numbers than in 1957. Yearlings were less abundant throughout the spring of 1959 than in the previous year. The scarcity of yearlings in the Hecate Strait region (Area D) was especially noticeable during the months of March and July. Sightings from ocean-going vessels and from coastal vessels suggest that more yearlings remained offshore in 1959 than in 1958. The absence of yearlings and two year old females from a large catch of seals taken in the Gulf of Alaska during the first two weeks in June suggests that these young females do not accompany the main northward migrating herd. The increase in numbers of young females late in the season suggest that the juveniles follow the adult animals northward in progressively increasing numbers as they approach maturity.

The age distribution by month and area described in Figures 2, 3 and 4, suggests that the main herd migrated northward along the coast of British Columbia a month earlier in 1959 than in 1958. The 1958 data gave evidence that old females led the migrating herd. A catch consisting mostly of old mature females was taken off the Washington-Oregon coast in March, 1958. A similar catch was taken off the British Columbia coast in March, 1959. The catch from Washington in March, 1959 included a large proportion of younger females.

No large concentration of females was found off the British Columbia coast in May, 1959. Seals were less abundant, more scattered and consisted of relatively larger numbers of young animals, suggesting that the vanguard of the herd had already passed by.

Two year old seals were scarce in all areas as they were in 1958, supporting the conclusion that this age class is widely dispersed and does not enter the migration in strong numbers.

A comparison of the relative numbers of 2 and 3 year old females in the 1958 and 1959 catches suggests a weakness in the 1956 year class. Two year olds were poorly represented in 1958 catches and 3 year olds were poorly represented in 1959 catches.

Males taken off the coast of British Columbia in March, April and May were all yearlings or juveniles.

B. Growth

Length and weight of fetuses are described in Table III by month and sex. Males are slightly larger and heavier than females. Differences in length and weight between 1958 and 1959 fetuses are significant only for the month of June. Fetuses taken in the Gulf of Alaska in June, 1959 were significantly longer and heavier than those taken from the coast of British Columbia in June, 1958.

Length and weight of yearlings are described in Table IV by month and sex. Both males and females appear to be heavier and larger in 1959 than in 1958 but the differences are insufficient to be statistically significant.

C. Sexual maturity and pregnancy rate

Pregnancy rates for 306 females, 4 years and older, are presented by areas in Table VI. For all areas the rate among 4 years and older females is 81 per cent in 1959 (cf. 64 per cent in 1958). The rate among adult females is 89 per cent in 1959 (cf. 78 per cent in 1958). In each age group the rate is higher than in 1958. No explanation for the difference is apparent at this time.

Puberty, defined as the time of first ovulation, first occurs at 2 years of age. According to the present sample (Table VI), more than half of all females 3 years of age have reached puberty. Few females ovulate for the first time at ages greater than 5 years. One female 10+ years of age was still immature.

Sexual maturity, defined as the time of first conception, first occurs at an age of 3 years and the first pup is born at 4 years of age. According to this sample, 56 per cent of all females are pregnant during the 5th year; 71 per cent of all mature females are pregnant during the 5th year. Some 5 year olds are still immature and some have ovulated but failed to conceive.

D. Infertility

Table VII describes superficially the reproductive condition of 59 non-pregnant females aged 3 years or more. Nineteen, or approximately a third of this sample, had failed to ovulate in the preceding breeding season because of immaturity. The remaining 41 were non-pregnant for the following reasons:

1. Failure to ovulate.
2. Failure of ovum to implant.
3. Interruption of the pregnancy by the abortion or resorption of the fetus.

There is no value in considering the relative proportions of each of these conditions for all age groups combined since the relative numbers in each age group are not accurately represented. Some indication of the importance of each condition may be gained by considering the relative numbers in each age class, although selection will also condition these estimates to some extent.

Failure to ovulate is most apparent in young females which have not yet reached puberty or which have recently attained puberty. This condition may result when the timing of the migration and estrus cycle does not conform to the established pattern of the older animals. It sometimes occurs in females which have undergone one or more pregnancies.

Failure of the ovum to implant may occur as a result of failure to mate or failure of the male to successfully fertilize the ovum. It may also result from some physiological maladjustment. This condition accounts for most of

the mature non-pregnant females in this sample. It occurs in all 3 and 4 year old females which had ovulated in the preceding breeding season. It also occurs in older females, including 10+ year females.

Interruption of the pregnancy as a result of resorption or abortion of the fetus is probably the result of physical injury. This condition was the most important cause of infertility in 8, 9 and 10 year females in this sample. It appears to be less common in young, recently matured, females. We might speculate that young females arriving late at the rookery and hauling out in the less congested parts of the rookery may be less exposed to physical injury than are the older, peak-of-the-season, breeders.

## IV FEEDING HABITS

### A. General account

Stomachs of 485 fur seals were examined during pelagic research in 1959. Food occurred in 218, or 45 per cent of all stomachs examined. Individual food items are described by area and month, according to the number of stomachs in which each occurred, and the percentage by displacement volume which each item contributed to each total (Table VIII).

Twenty-seven seals were collected in Knight Inlet and Johnstone Straits between January 26 and February 4. Twenty-five of these were yearlings, one was a 2-year-old and one was a mature female. Whiting, sablefish and saury contributed 95 per cent to the total volume of food.

Nineteen stomachs, 11 of which contained food, were collected in Queen Charlotte and Hecate Straits in area D during March. Whiting and herring contributed 75 per cent to the total volume of food.

Fifty-six stomachs, 13 of which contained food, were collected in area B in March from waters between Amphitrite Point on Vancouver Island and Cape

Flattery. Rockfish, herring and squid contributed 90 per cent by volume. Salmon was found in 3 stomachs only.

Twenty-five stomachs were collected off the Washington coast, south of 48°N Lat. in March. Eleven of these contained food, of which squid, primarily Loligo opalescens, occurred in 8 stomachs and contributed 62 per cent by volume. Lanternfish occurred in 3 stomachs; salmon and rockfish each occurred only once.

Ninety stomachs, 42 containing food, were examined from waters south and east of Amphitrite Point in area B during April. Salmon found in 9 stomachs, and herring found in 14 stomachs, each contributed 25 per cent by volume. Sablefish, rockfish, stickleback and shad together contributed a further 42 per cent by volume to the total.

Forty-three stomachs, 22 containing food, were collected in area A during April. Rockfish, found in stomachs collected 35 to 40 miles off Cape Shoalwater, contributed 83 per cent by volume.

Ninety-four seals were collected in area B during May, the majority being taken east of 126°W. Ninety-three stomachs, 53 containing food, were examined and one stomach was lost. Salmon occurred in 6 stomachs and contributed 38 per cent by volume to the total. Herring in 17 stomachs, and sablefish in 11 stomachs together constituted an additional 49 per cent of the volume.

One hundred twenty-two seals were collected in Alaskan waters in the vicinity of Middleton Island during June. Forty-three of these stomachs contained food; 73 were empty and 6 were not examined. Twenty-two stomachs contained sandlance and 7 stomachs contained capelin. These together contributed 76 per cent to the volume. Salmon, herring and squid constituted an additional 20 per cent by volume.

Three stomachs, all containing food, were collected in area C during June. Squid constituted 89 per cent of the total volume. One stomach collected in area D in June contained ratfish. Four stomachs, 2 of which contained food,

were collected in area B in June. In the latter 2 stomachs only ratfish was identified.

Two yearlings found dead in the vicinity of Queen Charlotte Straits in early February, and one yearling found dead on Long Beach in May, were found to have empty stomachs. These data have not been included in the calculations.

B. Comparison of yearlings with other ages

Differences between yearlings and older seals appear to be great by reference to Table IX and Figure 5. Squid, sablefish and Osmeridae formed a greater per cent by volume of the food examined in the younger group, while the sub-adult and adult group took salmon, whiting, rockfish and shad, in addition to herring. However, a further analysis of feeding habits (as indicated by frequency occurrence of food species relating to age of the seals) has shown that there is no major change between the feeding habits of successive age groups. Both Table IX and Figure 5 and the detailed analysis show that larger prey is taken by larger predators. The 5 per cent frequency of occurrence of Salmonidae, Gadidae and Sebastodes sp. in yearlings gradually increases to 27 per cent in the 10+ age group. Small, schooling fish: Clupeidae, Osmeridae, saury and stickleback, appear to form a consistent part of the diet in all age groups at a level of approximately 50 per cent frequency of occurrence. Sablefish also remains constant for all age groups. Squid decreases in frequency of occurrence from 33 per cent in yearlings to 15 per cent in the 10+ age group. These data have not been presented in tabular form as they represent material from only 327 stomachs collected in British Columbia waters during the last 2 years.

C. Comparison between three major areas (Figure 4)

In Alaskan waters and Washington waters results are similar to those obtained in 1958. In area A rockfish predominated, although squid assumed

relatively greater importance this year than last. In the sample from area E, collected in the area of Middleton Island on June 8th and 9th, sandlance was the predominating species this year with 53 per cent by volume occurrence; capelin, with 23 per cent by volume was second in importance. In 1958, one sample from the Portlock and Albatross Bank indicated that capelin was the most important species in the diet in July.

In British Columbia waters herring and salmon contributed 23 per cent and 21 per cent by volume, respectively, in 1959. These two species, plus sablefish, whiting and rockfish, constituted 82 per cent of the total volume examined.

D. Relationship to commercial fisheries

Species of commercial importance constituted 85 per cent of the total volume in stomachs examined in British Columbia. Herring occurring in 30 per cent of stomachs containing food, and salmon occurring in 13 per cent, contributed approximately equal volumes totalling 45 per cent. Sablefish, contributing 18 per cent to the total volume, and found in 13 per cent of the stomachs, were all small fish measuring 10 to 14 inches. Whiting and rockfish, neither of great commercial value in British Columbia, each occurred 6 times and together constituted 20 per cent by volume. Flatfish occurred only twice.

Species of no commercial importance, including: squid, shad, stickleback, ratfish and lamprey, combined, formed less than 15 per cent by volume of all contents examined. Unidentified squid and Loligo opalescens occurred in 54 and 6 stomachs, respectively, but represented only 5 per cent of the total volume. Shad, although not found last year, was identified in 6 stomachs this year and contributed 4 per cent to the total. Stickleback, ratfish and lamprey together contributed only 3 per cent to the total volume examined.

E. Comparison with previous studies

When comparing results of 1958 stomach analyses of seals collected in

British Columbia waters (Figure 14, 1958 report) with the 1959 analyses (Figure 4) it appears that considerable differences exist between food habits from year to year: herring have decreased from 70 per cent to 24 per cent by volume; salmon and sablefish have both increased from 4 per cent to 20 per cent. Saury was not identified in 1959, but it is presumed that this species did not move into the waters under consideration. Oceanographic surveys have indicated that water temperatures were lower in 1959 than in 1958 off Vancouver Island.

Apparent differences in feeding habits from year to year may result from differences in the areas sampled. In 1958, 358 seals were collected in area B and 113 of these, or 81 per cent of stomachs containing food, were collected west of 126°W Long. In 1959, of 245 seals collected in area B, 85, or 80 per cent of those stomachs containing food, were taken east of 126°W Long. To compensate for these differences only seals collected in waters between 48°40'N and 49°20'N were compared (Table X). Salmon have increased in importance and herring have decreased slightly, but it is apparent from this that the major differences have resulted primarily from differences in areas sampled.

F. Relation of feeding to time of day

The 1959 data were treated in a similar manner to the 1958 data and results were essentially the same: average volume in stomachs is at a maximum when seals are first collected in the morning and this gradually decreases until late afternoon. No increase has been noted in food intake towards nightfall.

The Japanese suggestion of assigning different degrees of digestion to individual stomach components was followed. However, results have not been tabulated as the frequency of occurrence of the major food items in any area was not sufficient to show any trend. Results of 2 or more years will be grouped in order to give information on the selectivity of fur seal feeding habits to time of day.

## V MIGRATION, DENSITY AND DISTRIBUTION

Fur seal hunting commenced in 1959 during the last week in February. The search for seals in the region of the Queen Charlotte Straits and adjoining inlets resulted in a catch of 20 yearlings and one adult, pregnant, female in 3 days hunting.

Hunting in March extended from the mouth of the Columbia River to Cape Cook and mostly offshore to the 100-fathom contour. Few seals were found north of Barkley Sound. Some, mostly yearlings, were taken near the mouth of Juan de Fuca Strait. A fairly heavy concentration of adults was found off the lower Washington coast within 20 miles of shore. A 200 mile offshore cruise just north of the Columbia River showed a few scattered seals up to 130 miles from shore. The density of this concentration is about the same as that found in March, 1958.

The same area was hunted in April. Few seals were found between Cape Cook and Barkley Sound, chiefly because of poor weather. The vessel was directed south to the Washington coast during the last two weeks of the month. Concentrations of seals off lower Washington had decreased slightly from the previous month. A 200 mile offshore cruise showed no seals farther than 40 miles from shore. Seals were concentrated up to 20 miles from Cape Flattery during the last two weeks in April in approximately equal numbers to that found off the Washington coast.

No large concentrations of seals were found along the Washington and Vancouver Island coast in May. The very heavy concentration of seals found during the last two weeks in May, 1958, off Barkley Sound and Esperanza Inlet were not found in 1959. It is strongly suggested that the main herd had passed the Vancouver Island coast during the last two weeks in April at a time when hunting was restricted in this area because of poor weather. Finding the main

herd in the Gulf of Alaska, some 800 miles to the north during the early part of June lends support to this suspicion.

Early in June the vessel was directed northward through the inside passage to Alaska. Travelling westward from Cape Spencer few seals were seen east of 142°W Long. A small concentration was found 30 miles south of Cape Yakataga. A large concentration estimated at about 50 per square mile was located on June 9th in the gulley about 10 miles north of Middleton Island. Seals were found scattered thinly from Middleton Island to Portlock Bank, but for a small concentration south of Cape Cleare. Portlock and Albatross Banks were traversed at night. The few seals taken between Albatross Bank and the north end of the Queen Charlottes were either males or juveniles.

The relationship of a concentration of adult females found in Hecate Strait during the first week in March to the main herd is obscure. These seals may have wintered in British Columbia.

Yearling seals are present in British Columbia waters from December to August, and probably later. They appear to disperse seaward during the late summer months. Logbooks carried aboard ocean-going vessels report fur seals throughout the Gulf of Alaska in all months of the year. These are mostly thought to be yearlings. The weather ship stationed at 50°N Lat. and 145°W Long. reports most seals seen during the months of May, June and July. These are mostly "small" seals. Yearling seals were less abundant in coastal waters of British Columbia in 1959 than in 1958.

The local distribution of fur seals and the timing of their migrations may be related to oceanographic conditions. An intrusion of warm water along the coast of Washington and British Columbia during 1957, 1958 and 1959 reached its maximum expanse in 1958 and began to decay from January to May 1959. It continued to intensify near the Vancouver Island coast through the winter of

1958-59. This phenomenon may have some bearing on the differences in the abundance of yearlings and the migration and distribution of adults in 1958 and 1959.

Table I. Age and sex distribution of 474 fur seals taken along the west coast of North America in 1959, according to month and area.

a. British Columbia, January 27 - February 3.

| Age | Male | Female | | | Both Sexes |
|---|---|---|---|---|---|
| | | Immature | Mature | | |
| | | | Pregnant | Non-pregnant | |
| 1 | 14 | 13 | | | 27 |
| 2 | 1 | | | | 1 |
| 10+ | | | 1 | | 1 |
| Totals | 15 | 13 | 1 | | 29 |

b. British Columbia, March.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 11 | 15 | | | 26 |
| 2 | 1 | 1 | | | 2 |
| 3 | 1 | | | | 1 |
| 4 | | 3 | | | 3 |
| 5 | | 1 | 3 | 1 | 5 |
| 6 | | | 3 | 1 | 4 |
| 7 | | | 4 | 2 | 6 |
| 8 | | | 3 | | 3 |
| 9 | | | 8 | | 8 |
| 10 | | | 1 | | 1 |
| 10+ | | | 12 | 1 | 13 |
| Totals | 13 | 20 | 34 | 5 | 72 |

c. Washington, March.

| | | | | | |
|---|---|---|---|---|---|
| 1 | | 2 | | | 2 |
| 2 | 1 | 1 | | | 2 |
| 3 | 1 | | | | 1 |
| 4 | | 1 | 1 | | 2 |
| 5 | | 1 | 1 | 1 | 3 |
| 6 | | | | | |
| 7 | 1 | | 1 | 1 | 3 |
| 8 | | | 4 | | 4 |
| 9 | | | 1 | | 1 |
| 10 | | | 2 | | 2 |
| 10+ | | | 4 | | 4 |
| Totals | 3 | 5 | 14 | 2 | 24 |

Table I (cont'd)

d. British Columbia, April.

| Age | Male | Female | | | Both Sexes |
|---|---|---|---|---|---|
| | | Immature | Mature | | |
| | | | Pregnant | Non-pregnant | |
| 1 | 8 | 7 | | | 15 |
| 2 | 5 | 8 | | | 13 |
| 3 | 1 | | | | 1 |
| 4 | | 1 | | | 1 |
| 5 | | 1 | 5 | 2 | 8 |
| 6 | | | 11 | 1 | 12 |
| 7 | | | 10 | | 10 |
| 8 | | | 8 | 3 | 11 |
| 9 | | | 6 | | 6 |
| 10 | | | 1 | | 1 |
| 10+ | | | 8 | | 8 |
| Totals | 14 | 17 | 49 | 6 | 86 |

e. Washington, April

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 7 | | | 8 |
| 2 | 1 | 2 | | | 3 |
| 3 | | | | | |
| 4 | 1 | 2 | 2 | | 5 |
| 5 | | 1 | | | 1 |
| 6 | | | 2 | | 2 |
| 7 | | | 3 | | 3 |
| 8 | | | 3 | | 3 |
| 9 | | | 4 | | 4 |
| 10 | | | 4 | | 4 |
| 10+ | | | 8 | 1 | 9 |
| Totals | 3 | 12 | 26 | 1 | 42 |

f. British Columbia, May; (includes 3 seals from Washington)

| | | | | | |
|---|---|---|---|---|---|
| 1 | 12 | 19 | | | 31 |
| 2 | 5 | 7 | | | 12 |
| 3 | | 4 | | | 4 |
| 4 | | 5 | 1 | 1 | 7 |
| 5 | | 1 | 6 | 2 | 9 |
| 6 | | | 9 | 1 | 10 |
| 7 | | | 6 | 1 | 7 |
| 8 | | | 4 | | 4 |
| 9 | | | 3 | 1 | 4 |
| 10 | | | 2 | | 2 |
| 10+ | | | 5 | 1 | 6 |
| Totals | 17 | 36 | 36 | 7 | 96 |

Table I (cont'd)

g. Alaska, June

| Age | Male | Female | | | Both Sexes |
|---|---|---|---|---|---|
| | | Immature | Mature | | |
| | | | Pregnant | Non-pregnant | |
| 1 | 1 | | | | 1 |
| 2 | 3 | | | | 3 |
| 3 | | | | | - |
| 4 | 2 | 2 | | | 4 |
| 5 | 1 | 1 | | | 2 |
| 6 | 1 | | 11 | 3 | 15 |
| 7 | 1 | 1 | 18 | 2 | 22 |
| 8 | | 1 | 16 | 1 | 18 |
| 9 | | | 12 | | 12 |
| 10 | 1 | | 12 | 1 | 14 |
| 10+ | 1 | | 22 | 3 | 26 |
| Totals | 11 | 5 | 91 | 10 | 117 |

h. British Columbia, June

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | 1 | | | 3 |
| 4 | | 2 | | | 2 |
| 7 | | | 1 | | 1 |
| 10+ | 1 | 1 | | | 2 |
| Totals | 3 | 4 | 1 | | 7 |

i. All areas, January 27 - June 23

| Age | Male | Female | | | Both Sexes | |
|---|---|---|---|---|---|---|
| | | Immature | Mature | | Number | Per cent |
| | | | Pregnant | Non-pregnant | | |
| 1 | 47 | 63 | | | 110 | 23.2 |
| 2 | 19 | 20 | | | 39 | 8.2 |
| 3 | 3 | 4 | | | 7 | 1.5 |
| 4 | 3 | 16 | 4 | 1 | 24 | 5.1 |
| 5 | 1 | 6 | 15 | 6 | 28 | 5.9 |
| 6 | 1 | 0 | 36 | 6 | 43 | 9.1 |
| 7 | 2 | 1 | 43 | 6 | 52 | 10.9 |
| 8 | 0 | 1 | 38 | 4 | 43 | 9.1 |
| 9 | 0 | 0 | 34 | 1 | 35 | 7.4 |
| 10 | 1 | 0 | 22 | 1 | 24 | 5.1 |
| 10+ | 2 | 1 | 60 | 6 | 69 | 14.5 |
| Totals | 79 | 112 | 252 | 31 | 474 | 100.0 |

Table II. Length and weight of 450 fur seals taken off the west coast of North America in 1959, according to sex and age.

| Age | Length in cm | | | | Weight in kg | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | Range | Mean | S.D. | Number | Range | Mean | S.D. |
| Males: | | | | | | | | |
| 1 | 44 | 67-88 | 78 | ±5.7 | 44 | 7.1-14.0 | 10.0 | ±1.7 |
| 2 | 18 | 83-98 | 90 | ±5.1 | 18 | 14.0-18.6 | 16.0 | ±1.4 |
| 3 | 3 | 90-109 | 97 | ±8.2 | 3 | 14.7-21.8 | 18.7 | ±3.1 |
| 4 | 3 | 110-124 | 116 | ±5.8 | 3 | 23.1-34.0 | 28.8 | ±4.4 |
| 5 | 1 | - | 130 | - | 1 | - | 52.2 | - |
| Females, Non-pregnant: | | | | | | | | |
| 1 | 62 | 68-92 | 75 | ±6.3 | 62 | 5.4-11.4 | 7.0 | ±2.0 |
| 2 | 19 | 81-98 | 89 | ±4.4 | 19 | 12.2-15.5 | 13.9 | ±1.0 |
| 3 | 4 | 102-105 | 103 | ±1.0 | 4 | 18.2-22.2 | 20.0 | ±1.4 |
| 4 | 16 | 92-114 | 102 | ±6.3 | 16 | 17.7-28.5 | 21.6 | ±3.0 |
| 5 | 17 | 94-119 | 121 | ±5.5 | 17 | 20.9-34.0 | 26.2 | ±4.0 |
| 6 | 6 | 106-127 | 115 | ±6.9 | 6 | 24.5-34.0 | 29.0 | ±3.7 |
| 7 | 8 | 112-137 | 120 | ±7.6 | 8 | 37.2-28.0 | 32.6 | ±3.4 |
| 8 | 5 | 112-118 | 114 | ±5.1 | 5 | 23.6-30.4 | 27.4 | ±2.8 |
| 9 | 1 | - | 121 | - | 1 | - | 31.7 | - |
| 10 | 2 | 120-124 | 122 | - | 2 | 31.7-41.0 | 35.2 | - |
| 10+ | 10 | 122-140 | 127 | ±3.1 | 10 | 32.5-54.5 | 45.0 | ±6.7 |
| Females, Pregnant: | | | | | | | | |
| 4 | 6 | 100-114 | 109 | ±4.8 | 6 | 23.0-35.5 | 28.0 | ±3.4 |
| 5 | 11 | 111-121 | 114 | ±4.3 | 11 | 24.0-33.6 | 33.0 | ±3.8 |
| 6 | 32 | 107-130 | 118 | ±5.9 | 32 | 25.9-52.0 | 35.8 | ±6.4 |
| 7 | 41 | 111-137 | 120 | ±6.8 | 41 | 28.1-52.5 | 38.0 | ±7.1 |
| 8 | 38 | 110-142 | 121 | ±6.8 | 38 | 31.3-55.0 | 40.5 | ±6.6 |
| 9 | 33 | 111-142 | 121 | ±7.6 | 33 | 34.0-52.5 | 42.3 | ±5.8 |
| 10 | 18 | 116-133 | 124 | ±5.3 | 18 | 32.2-59.0 | 43.8 | ±7.2 |
| 10+ | 52 | 115-142 | 125 | ±4.0 | 52 | 32.6-63.5 | 43.2 | ±6.4 |

Table III. Length and weight of 240 fur seal fetuses collected off the west coast of North America in 1959

| | Length in cm | | | | Weight in kg | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | Range | Mean | S.D. | Number | Range | Mean | S.D. |
| Males: | | | | | | | | |
| March | 25 | 35-43 | 39.5 | ±3.0 | 25 | 1.1-2.5 | 1.6 | ±0.31 |
| April | 40 | 35-48 | 42.3 | ±6.4 | 40 | 1.5-3.8 | 2.3 | ±0.54 |
| May | 17 | 41-54 | 48.0 | ±3.4 | 17 | 2.6-4.5 | 3.7 | ±0.54 |
| June | 35 | 65-76 | 70.7 | ±6.3 | 35 | 4.5-6.7 | 5.4 | ±0.60 |
| Females: | | | | | | | | |
| March | 21 | 32-43 | 36.9 | ±3.3 | 21 | 1.0-2.0 | 1.4 | ±0.97 |
| April | 31 | 36-49 | 41.3 | ±3.0 | 31 | 1.3-3.0 | 2.1 | ±0.42 |
| May | 17 | 38-51 | 45.1 | ±4.0 | 17 | 2.1-4.0 | 3.1 | ±0.60 |
| June | 56 | 54-79 | 57.9 | ±5.2 | 56 | 3.5-6.3 | 4.9 | ±0.52 |

Table IV. Length and weight of 106 yearling fur seals taken off the coast of British Columbia in 1959

| | Length in cm | | | | Weight in kg | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | Range | Mean | S.D. | Number | Range | Mean | S.D. |
| Males: | | | | | | | | |
| Jan-Feb | 14 | 67-80 | 73.0 | ±4.3 | 14 | 6.1-11.9 | 8.9 | ±1.4 |
| March | 11 | 72-88 | 79.0 | ±5.8 | 11 | 6.9-14.5 | 10.6 | ±2.0 |
| April | 9 | 75-88 | 81.0 | ±1.7 | 9 | 9.1-14.5 | 10.8 | ±1.4 |
| May | 10 | 70-87 | 80.0 | ±1.7 | 10 | 8.6-14.0 | 10.6 | ±1.4 |
| Females: | | | | | | | | |
| Jan-Feb | 13 | 66-84 | 73.0 | ±5.1 | 13 | 5.9-11.5 | 8.0 | ±1.4 |
| March | 17 | 67-89 | 77.0 | ±5.8 | 17 | 6.1-11.5 | 8.5 | ±1.0 |
| April | 12 | 70-83 | 74.0 | ±4.2 | 12 | 7.3-10.5 | 8.6 | ±1.0 |
| May | 20 | 68-92 | 76.0 | ±6.4 | 20 | 6.0-12.2 | 9.1 | ±1.4 |

Table V. Reproductive condition of 215 female fur seals taken along the west coast of North America in 1959

| Age | March | | | | | April | | | | | May | | | | | June | | | | | March-June Totals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | non-pregnant | | | pregnant | | non-pregnant | | | pregnant | | non-pregnant | | | pregnant | | non-pregnant | | | pregnant | | non-pregnant | | | pregnant | |
| | *N | P | M | P | M | N | P | M | P | M | N | P | M | P | M | N | P | M | P | M | N | P | M | P | M |
| 1 | 17 | | | | | 14 | | | | | 19 | | | | | | | | | | 50 | | | | |
| 2 | 2 | | | | | 10 | | | | | 17 | | | | | 1 | | | | | 30 | | | | |
| 3 | | | | | | | | | | | 4 | | | | | | | | | | 4 | | | | |
| 4 | 4 | | | 1 | | 3 | | | 2 | | 6 | | | 1 | | 4 | | | | | 17 | | | 4 | |
| 5 | 2 | 1 | 1 | 2 | 2 | 2 | | 2 | 5 | | 3 | | | 4 | | 1 | | | | | 8 | 1 | 3 | 11 | 2 |
| 6 | | | 1 | | 3 | 1 | | | 4 | 9 | 1 | | | 7 | | | 3 | | 2 | 9 | 2 | 3 | 1 | 6 | 28 |
| 7 | | | 1 | | 5 | | | | 1 | 12 | | | | 7 | | 1 | | 2 | | 18 | 1 | | 3 | 1 | 42 |
| 8 | | | | | 6 | | | 3 | | 11 | | | | 4 | | 1 | | 1 | 1 | 15 | 1 | | 4 | 1 | 36 |
| 9 | | | | | 6 | | | | | 11 | | | 1 | 3 | | | | | 1 | 11 | | | 1 | 1 | 31 |
| 10 | | | | | 6 | | | | | 4 | | | | 3 | | | | 1 | | 9 | | | 1 | | 22 |
| 10+ | | | 2 | | 12 | | | 1 | | 16 | | | 1 | 4 | | 1 | | 3 | 1 | 22 | 1 | | 7 | 1 | 54 |
| | 25 | 1 | 5 | 3 | 40 | 30 | | 6 | 12 | 63 | 50 | | 2 | 5 | 28 | 9 | 3 | 7 | 5 | 84 | 114 | 4 | 20 | 25 | 215 |

* N = nulliparous
P = primiparous
M = multiparous

Table VI. Pregnancy rates of females 4 years and older from the west coast of North America in 1959

| Age | Oregon and Washington March-April | | | British Columbia March-May | | | Alaska June | | | All Areas March-June | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Number pregnant | Per cent pregnant | Number | Number pregnant | Per cent pregnant | Number | Number pregnant | Per cent pregnant | Number | Number pregnant | Per cent pregnant |
| 4 | 6 | 3 | 50 | 13 | 1 | 8 | 2 | | 0 | 21 | 4 | 19 |
| 5 | 4 | 1 | 25 | 22 | 14 | 64 | 1 | | 0 | 27 | 15 | 56 |
| 6 | 2 | 2 | 100 | 26 | 23 | 88 | 14 | 11 | 79 | 42 | 36 | 86 |
| 7 | 5 | 3 | 60 | 24 | 20 | 83 | 21 | 18 | 86 | 50 | 41 | 82 |
| 8 | 7 | 7 | 100 | 18 | 15 | 83 | 18 | 16 | 89 | 43 | 38 | 88 |
| 9 | 5 | 5 | 100 | 18 | 17 | 94 | 12 | 12 | 100 | 35 | 34 | 97 |
| 10 | 6 | 6 | 100 | 4 | 4 | 100 | 13 | 12 | 92 | 23 | 22 | 96 |
| 10+ | 13 | 12 | 92 | 27 | 25 | 93 | 25 | 22 | 88 | 65 | 57 | 88 |
| | 48 | 39 | 81 | 152 | 119 | 79 | 106 | 91 | 86 | 306 | 247 | 81 |

Table VII. Reproductive condition of 59 non-pregnant female fur seals from the west coast of North America in 1959.

| Reproductive history | Failed to ovulate | | | | Ovulated but ovum failed to implant | | | | Pregnancy interrupted by abortion or resorption of embryo | | | Total mature non-pregnant females | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Condition of ovaries | No fresh corpus luteum | | | | A fresh corpus luteum not associated with a pregnancy or an interrupted pregnancy | | | | A fresh corpus luteum associated with an interrupted pregnancy (abortion or resorption) | | | | | | |
| Condition of* uterine horns | Nulli | Primi | Multi | Total | Nulli | Primi | Multi | Total | Primi | Multi | Total | Nulli | Primi | Multi | Total |
| Age | | | | | | | | | | | | | | | |
| 3 | 3 | | | 3 | 1 | | | 1 | | | | 1 | | | 1 |
| 4 | 11 | | | 11 | 6 | | | 6 | | | | 6 | | | 6 |
| 5 | 4 | | | 4 | 4 | | | 4 | 1 | 3 | 4 | 4 | 1 | 3 | 8 |
| 6 | | 2 | | 2 | 2 | | | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 6 |
| 7 | | | 1 | 1 | 1 | | 3 | 4 | | | | 1 | | 4 | 5 |
| 8 | | | | | 1 | | | 1 | | 4 | 4 | 1 | | 4 | 5 |
| 9 | | | | | | | | | | 1 | 1 | | | 1 | 1 |
| 10 | | | | | | | | | | 1 | 1 | | | 1 | 1 |
| 10+ | 1 | | | 1 | | | 5 | 5 | | 2 | 2 | | | 7 | 7 |
| | 19 | 2 | 1 | 22 | 15 | 0 | 8 | 23 | 2 | 12 | 14 | 15 | 4 | 21 | 40 |

* Nulliparous indicates no previous pregnancy
Primiparous indicates one previous pregnancy
Multiparous indicates 2 or more previous pregnancies

Table VIII. Analysis of 141 fur seal stomachs taken off the coast of British Columbia in 1959, according to volume, percent volume and frequency of occurrence of individual food items by month and area. Empty stomachs were found in 154 seals.

| Month | Food Item | Area B | | | Area C | | | Area D | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Vol.[1] | %[2] | F[3] | Vol. | % | F | Vol. | % | F |
| January<br>February | Squid | | | | | | | 363.9 | 5.8 | 9 |
| | Sablefish (Anoplopoma fimbria) | | | | | | | 1885.0 | 30.4 | 5 |
| | Whiting (Theragra chalcogramma) | | | | | | | 3710.0 | 59.6 | 1 |
| | Osmeridae | | | | | | | 224.0 | 3.6 | 2 |
| | Clupeidae | | | | | | | 20.0 | 0.3 | 1 |
| | Decapoda | | | | | | | 0.5 | 0.1 | 1 |
| | Bark | | | | | | | 7.0 | 0.1 | 1 |
| | Unidentified | | | | | | | 14.0 | 0.2 | 4 |
| | Totals | | | | | | | 6224.4 | 100.1 | |
| March | Squid - unidentified | 1166.0 | 14.9 | 5 | | | | 13.0 | 0.1 | 2 |
| | Loligo opalescens | 410.0 | 5.2 | 1 | | | | 216.0 | 4.5 | 1 |
| | Herring (Clupea pallasii) | 2651.8 | 33.8 | 8 | | | | 1445.0 | 30.1 | 3 |
| | Shad (Alosa sapidissima) | 43.0 | 0.5 | 1 | | | | | | |
| | Eulachon (Thaleichthys pacificus) | | | | | | | 187.0 | 3.9 | 1 |
| | Sablefish (Anoplopoma fimbria) | 121.0 | 1.5 | 1 | | | | 640.0 | 13.3 | 4 |
| | Pleuronectidae | | | | | | | 50.0 | 1.0 | 1 |
| | Rockfish (Sebastodes sp.) | 2843.0 | 36.3 | 3 | | | | | | |
| | Salmon (unidentified) | 325.0 | 4.1 | 3 | | | | 40.0 | 1.0 | 1 |
| | Whiting (Theragra chalcogramma) | | | | | | | 2189.0 | 45.6 | 3 |
| | Lamprey (Entosphenus tridentatus) | 273.0 | 3.5 | 2 | | | | | | |
| | Pebbles | | | | | | | 2.0 | 0.1 | 1 |
| | Unidentified | 1.1 | 0.1 | 2 | | | | 18.9 | 0.4 | 3 |
| | Totals | 7833.9 | 100.0 | | | | | 4800.9 | 100.0 | |
| April | Squid - unidentified | 194.8 | 1.0 | 8 | | | | | | |
| | Herring (Clupea pallasii) | 4657.5 | 24.5 | 14 | | | | | | |
| | Shad (Alosa sapidissima) | 1422.5 | 7.5 | 4 | | | | | | |
| | Osmeridae | 143.5 | 0.7 | 2 | | | | | | |

cont'd on page 26

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sablefish (Anoplopoma fimbria) | 3587.5 | 18.9 | 7 | | | | | |
| April | Sablefish (?) | 10.0 | 0.1 | 1 | | | | | |
| | Rockfish (Sebastodes sp.) | 1721.0 | 9.1 | 3 | | | | | |
| | Rockfish (?) | 13.0 | 0.2 | 1 | | | | | |
| | Salmon - unidentified | 4753.0 | 25.0 | 9 | | | | | |
| | Stickleback (Gasterosteus aculeatus) | 1373.0 | 7.2 | 4 | | | | | |
| | Bird - unidentified | 810.0 | 4.3 | 1 | | | | | |
| | Unidentified | 293.0 | 1.5 | 12 | | | | | |
| | Totals | 18978.8 | 100.0 | | | | | | |
| | Squid - unidentified | 276.7 | 1.5 | 17 | | | | | |
| | Loligo opalescens | 364.0 | 2.0 | 4 | | | | | |
| | Herring (Clupea pallasii) | 4979.6 | 27.3 | 17 | | | | | |
| | Shad (Alosa sapidissima) | 606.0 | 3.3 | 1 | | | | | |
| May | Osmeridae | 180.9 | 1.0 | 4 | | | | | |
| | Sablefish (Anoplopoma fimbria) | 39550.0 | 21.7 | 11 | | | | | |
| | Whiting (Theragra chalcogramma) | 258.0 | 1.4 | 1 | | | | | |
| | Hake (Merluccius productus) | 491.0 | 2.7 | 2 | | | | | |
| | Salmon - unidentified | 1220.2 | 6.7 | 4 | | | | | |
| | Coho (Oncorhynchus kisutch) | 2210.0 | 12.1 | 1 | | | | | |
| | Spring (Oncorhynchus tshawytscha) | 3550.0 | 19.5 | 1 | | | | | |
| | Arrow-toothed halibut (Atheresthes stomias) | 94.0 | 0.5 | 1 | | | | | |
| | Decapoda | 5.6 | 0.1 | 1 | | | | | |
| | Unidentified | 42.1 | 0.2 | 20 | | | | | |
| | Totals | 18233.1 | 100.0 | | | | | | |
| | Squid - unidentified | | | | 30.1 | 3.9 | 3 | | |
| | Whiting (Theragra chalcogramma) | | | | 687.0 | 89.2 | 1 | | |
| | Ratfish (Hydrolagus colliei) | | | | 15.0 | 2.0 | 1 | 470.0 | 100.0 1 |
| June | Lamprey (Entosphenus tridentatus) | | | | 38.0 | 4.9 | 1 | | |
| | Hake (Merluccius productus) | 22.0 | 52.5 | 1 | | | | | |
| | Unidentified | 20.0 | 47.5 | 1 | | | | | |
| | Totals | 42.0 | 100.0 | | 770.1 | 100.0 | | 470.0 | 100.0 |

[1] Volume in c.c.

[2] Percent of total volume.

[3] Frequency of occurrence.

Table IX . Comparison of stomach contents of 41 yearling with 100 adult or sub-adult fur seals taken off the coast of British Columbia in 1959.

| Species | Yearlings | | | Adults or sub-adults | | |
|---|---|---|---|---|---|---|
| | Volume[1] | %[2] | F[3] | Volume | % | F |
| Squid - unidentified | 414.7 | 5.7 | 16 | 1625.1 | 3.2 | 28 |
| Loligo opalescens | 841.0 | 11.6 | 4 | 149.0 | 0.3 | 2 |
| Sablefish | 3383.0 | 46.6 | 11 | 6805.5 | 13.6 | 17 |
| Sablefish (?) | .. | .. | .. | 10.0 | 0.1 | 1 |
| Clupeidae | 20.0 | 0.3 | 1 | .. | .. | .. |
| Herring | 1601.6 | 22.1 | 12 | 12132.3 | 24.3 | 30 |
| Shad | .. | .. | .. | 2071.5 | 4.1 | 6 |
| Osmeridae | 403.9 | 5.6 | 5 | 144.5 | 0.3 | 3 |
| Eulachon | 187.0 | 2.6 | 1 | .. | .. | .. |
| Whiting | .. | .. | .. | 6844.0 | 13.7 | 6 |
| Hake | 95.0 | 1.3 | 1 | 418.0 | 0.8 | 2 |
| Rockfish | .. | .. | .. | 4564.0 | 9.1 | 6 |
| Rockfish (?) | .. | .. | .. | 13.0 | 0.1 | 1 |
| Stickleback | 231.5 | 3.2 | 2 | 1141.5 | 2.3 | 2 |
| Flatfish | .. | .. | .. | 50.0 | 0.1 | 1 |
| Salmon | 40.0 | 0.6 | 1 | 12058.2 | 24.2 | 18 |
| Lamprey | .. | .. | .. | 185.0 | 0.4 | 2 |
| Arrow-toothed halibut | .. | .. | .. | 94.0 | 0.2 | 1 |
| Ratfish | .. | .. | .. | 485.0 | 1.0 | 2 |
| Bird | .. | .. | .. | 810.0 | 1.6 | 1 |
| Pebbles, Decapoda | 7.5 | 0.1 | 2 | 8.1 | 0.1 | 2 |
| Unidentified | 20.5 | 0.3 | 9 | 368.6 | 0.7 | 33 |
| | 7245.7 | 100.0 | | 49977.3 | 100.2 | |

[1]Volume in c.c.

[2]Percent of total volume.

[3]Frequency of occurrence.

Table X. . Comparison of stomachs containing food collected between latitude 48°40' N and 49°20' N. Numbers collected and dates are: 44 stomachs between March 18 and June 23, 1959; 116 stomachs between March 10 and March 23, 1958; 193 stomachs between March 29 and June 27, 1935.

| Main food item[1] | 1935 % by volume | 1958 % by volume | 1959 % by volume |
|---|---|---|---|
| Herring | 84.0 | 75.4 | 61.7 |
| Salmon | 5- | 5.2 | 15.2 |
| Salmon (?) | 2 | .. | .. |
| Saury | .. | 4.5 | .. |
| Blackcod | .. | 3.2 | 1.2 |
| Squid | 1- | 3.2 | 10.2 |
| Hake | .. | .. | 6.4 |
| Stickleback | 0.5- | 2.7 | 2.2 |
| Rockfish | 1.0 | 2.1 | .. |
| Eulachon | 3 | .. | .. |
| Osmeridae | .. | .. | 2.3 |
| Hexagrammid | 1- | .. | .. |
| Sandlance | 2- | .. | .. |

[1]Unidentified species and species less than 0.5% not included.

**Table XI.** Analysis of stomach contents of 482[1] fur seals collected off the coast of North America in 1959, according to percent by volume and frequency of occurrence of individual food items by month and area.

| | Area A | | | | | | Area B, C & D | | | | | | | | | | Area E | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | March | | April | | May | | Jan.-Feb. | | March | | April | | May | | June | | June | |
| Food Item | %[2] | F[3] | % | F | % | F | % | F | % | F | % | F | % | F | % | F | % | F |
| Squid - unidentified | 1.1 | 3 | 0.8 | 4 | .. | .. | 5.8 | 9 | 9.3 | 7 | 1.0 | 8 | 1.5 | 17 | 2.3 | 3 | 4.8 | 2 |
| Loligo opalescens | 61.3 | 5 | 2.0 | 1 | .. | .. | .. | .. | 4.9 | 2 | .. | .. | 2.0 | 4 | .. | .. | .. | .. |
| Sablefish (Anoplopoma fimbria) | .. | .. | 7.8 | 2 | .. | .. | 30.4 | 5 | 6.0 | 5 | 18.9 | 7 | 21.7 | 11 | .. | .. | .. | .. |
| Sablefish (?) | .. | .. | 0.2 | 1 | .. | .. | .. | .. | .. | .. | 0.1 | 1 | .. | .. | .. | .. | .. | .. |
| Herring (Clupea pallasii) | 2.7 | 1 | .. | .. | 90.2 | 1 | .. | .. | 32.4 | 11 | 24.5 | 14 | 27.3 | 17 | .. | .. | 11.0 | 7 |
| Shad (Alosa sapidissima) | .. | .. | 1.6 | 2 | .. | .. | .. | .. | 0.3 | 1 | 7.5 | 4 | 3.3 | 1 | .. | .. | .. | .. |
| Anchovy (Engraulis mordax) | .. | .. | 1.5 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Clupeidae | .. | .. | .. | .. | .. | .. | 0.3 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Clupeidae (?) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 0.1 | 1 |
| Eulachon (Thaleichthys pacificus) | .. | .. | .. | .. | .. | .. | .. | .. | 1.5 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Osmeridae | 3.7 | 1 | 2.0 | 1 | .. | .. | 3.6 | 2 | .. | .. | 0.7 | 2 | 1.0 | 4 | .. | .. | .. | .. |
| Salmon - unidentified | 0.3 | 1 | .. | .. | .. | .. | .. | .. | 2.9 | 3 | 25.0 | 9 | 6.7 | 4 | .. | .. | 4.5 | 2 |
| Steelhead (Salmo gairdnerii) | 19.0 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Coho (Oncorhynchus kisutch) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 12.1 | 1 | .. | .. | .. | .. |
| Spring (Oncorhynchus tshawytscha) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 19.5 | 1 | .. | .. | .. | .. |
| Rockfish (Sebastodes sp.) | 6.6 | 1 | 83.5 | 10 | .. | .. | .. | .. | 22.5 | 3 | 9.1 | 3 | .. | .. | .. | .. | .. | .. |
| Rockfish (?) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 0.2 | 1 | .. | .. | .. | .. | .. | .. |
| Whiting (Theragra chalcogramma) | .. | .. | .. | .. | .. | .. | 59.6 | 1 | 17.4 | 3 | .. | .. | 1.4 | 1 | 53.5 | 1 | 0.1 | 2 |
| Hake (Merluccius productus) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2.7 | 2 | 1.7 | 1 | .. | .. |
| Flatfish (Pleuronectidae) | .. | .. | .. | .. | .. | .. | .. | .. | 0.4 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Arrow-toothed halibut (Atheresthes stomias) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 0.5 | 1 | .. | .. | .. | .. |
| Sandlance (Ammodytes tobianus) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 56.0 | 22 |
| Capelin (Mallotus catervanius) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 22.8 | 7 |
| Capelin (?) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 0.4 | 1 |
| Stickleback (Gasterosteus aculeatus) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 7.2 | 4 | .. | .. | .. | .. | .. | .. |
| Lantern fish (Myctophidae) | 5.2 | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Bird - unidentified | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 4.3 | 2 | .. | .. | .. | .. | .. | .. |
| Ratfish (Hydrolagus colliei) | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 37.8 | 2 | .. | .. |
| Lamprey (Entosphenus tridentatus) | .. | .. | .. | .. | .. | .. | .. | .. | 2.2 | 2 | .. | .. | .. | .. | 3.0 | 1 | .. | .. |
| Decapoda | .. | .. | .. | .. | .. | .. | 0.1 | 1 | .. | .. | .. | .. | 0.1 | 1 | .. | .. | .. | .. |
| Pebbles, bark | .. | .. | .. | .. | 9.8 | 1 | 0.1 | 1 | 0.1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Unidentified | 0.1 | 1 | 0.5 | 7 | .. | .. | 0.2 | 4 | 0.1 | 5 | 1.5 | 12 | 0.2 | 20 | 1.6 | 1 | 0.3 | 7 |
| | 100.0 | | 99.9 | | 100.0 | | 100.1 | | 100.0 | | 100.0 | | 100.0 | | 99.9 | | 100.0 | |

[1]Does not include 3 yearlings found dead on the shore with empty stomachs, and 7 stomachs lost at sea.

[2]Percent of total volume.

[3]Number of stomachs containing each item.

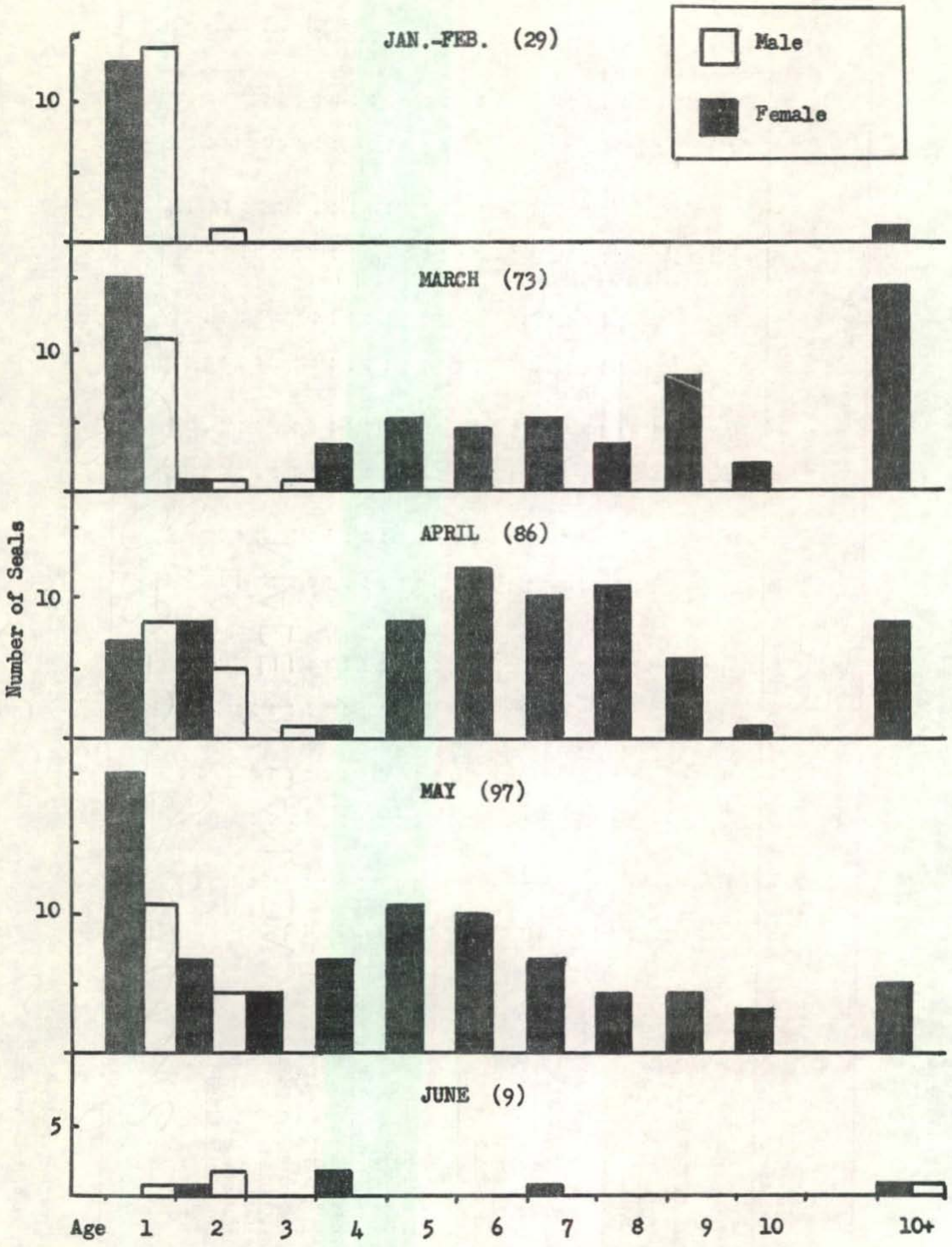



Fig. 1. Age and sex composition of 294 seals taken off the coast of British Columbia in 1959.

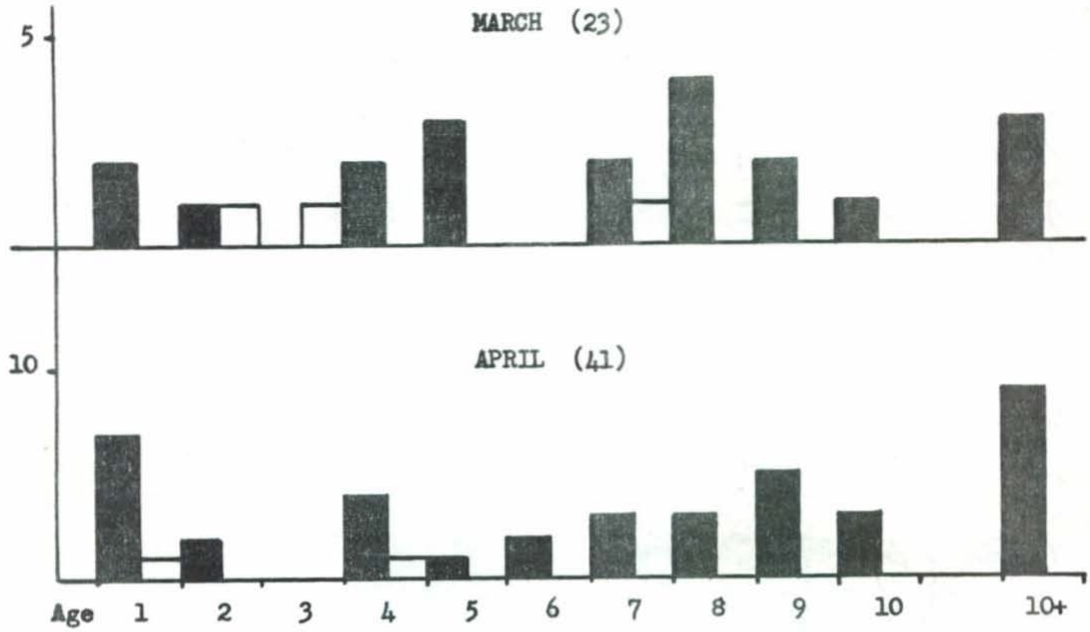



Fig. 2. Age and sex composition of 64 seals taken off the coasts of Washington and Oregon in 1959.

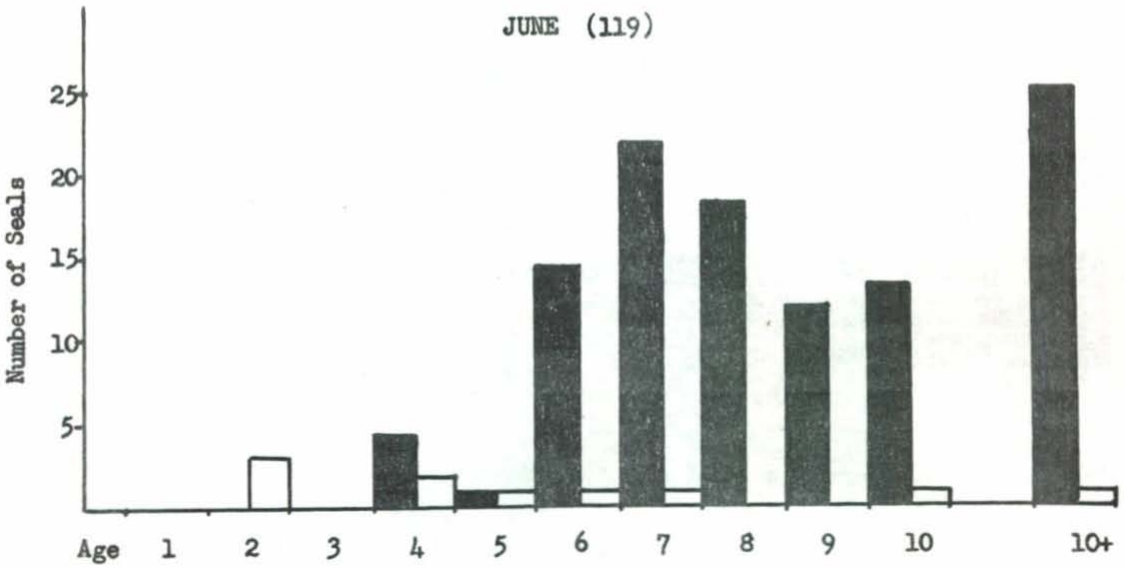



Fig. 3. Age and sex composition of 119 seals taken in the Gulf of Alaska in 1959.

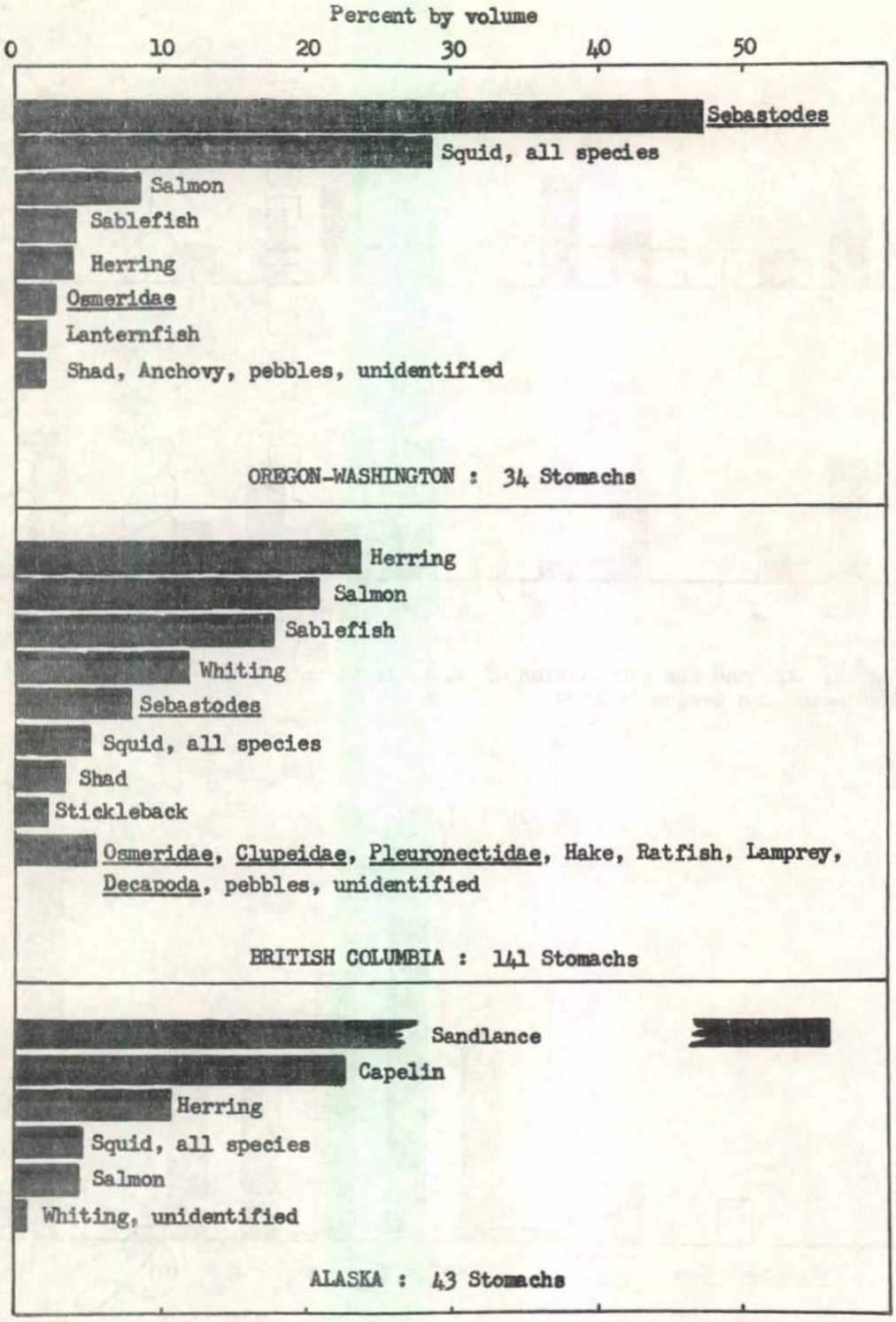



Fig. 4. Contents of 218 fur seal stomachs collected off the coast of North America in 1959, expressed as percentage of food species by volume.

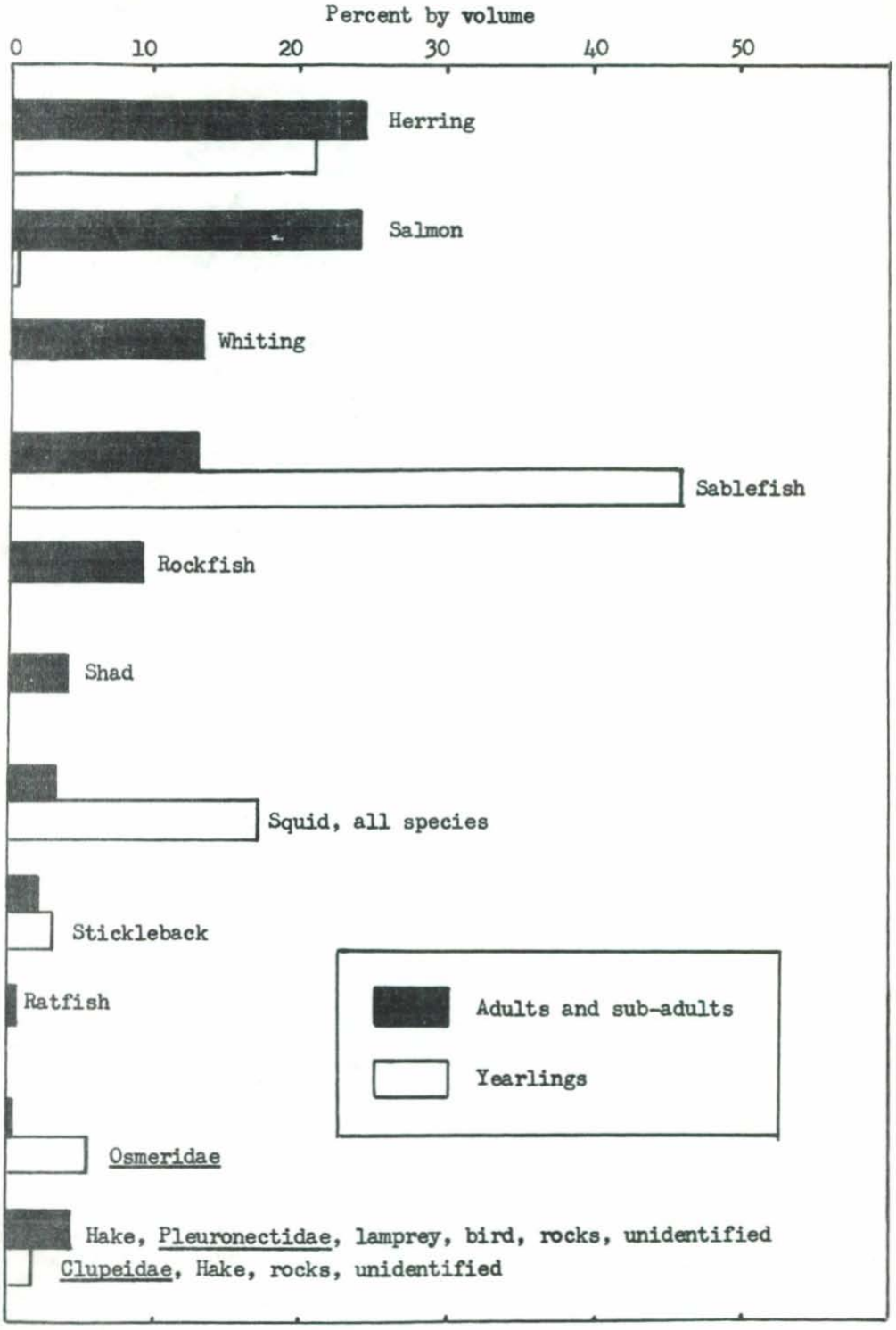
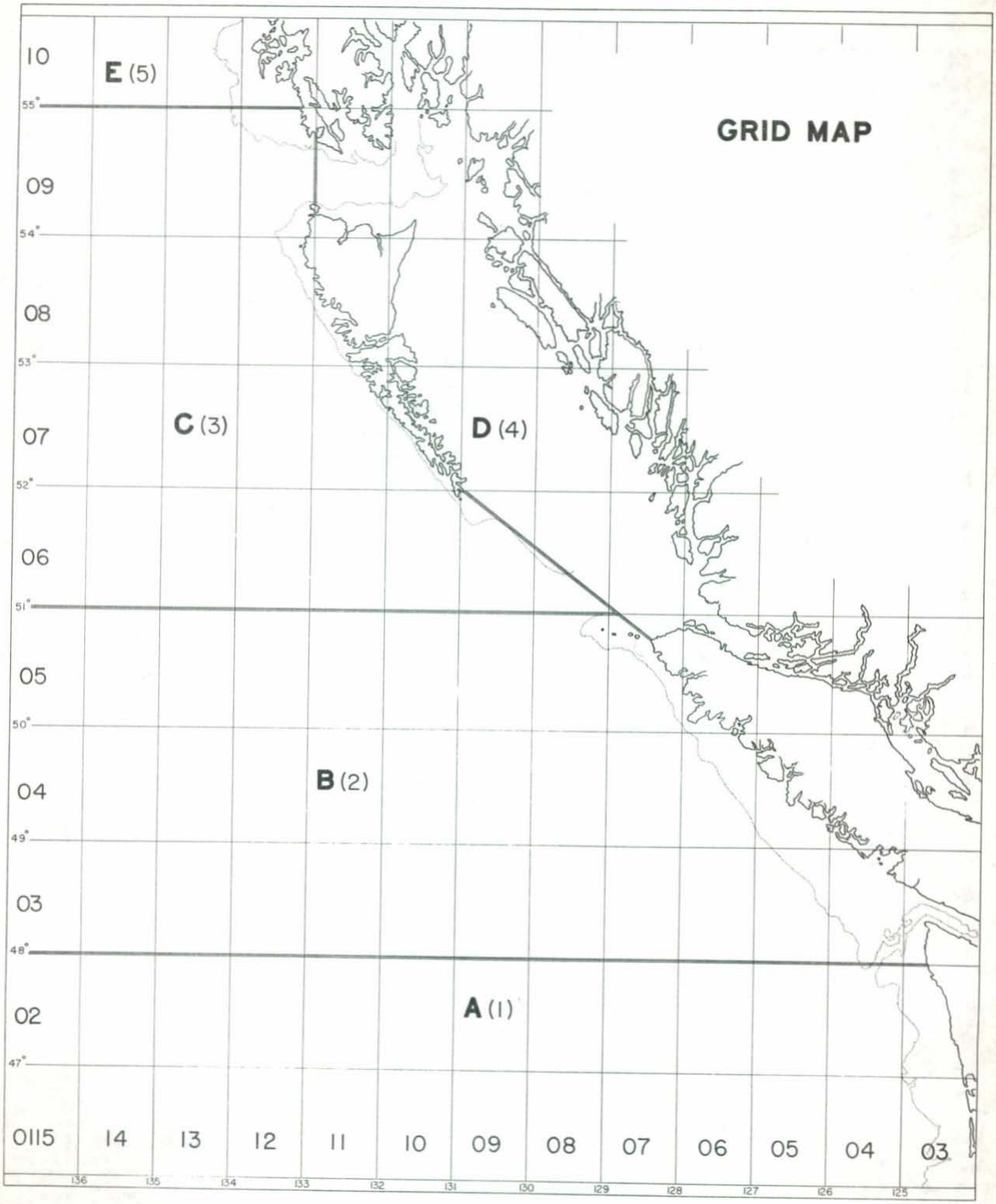
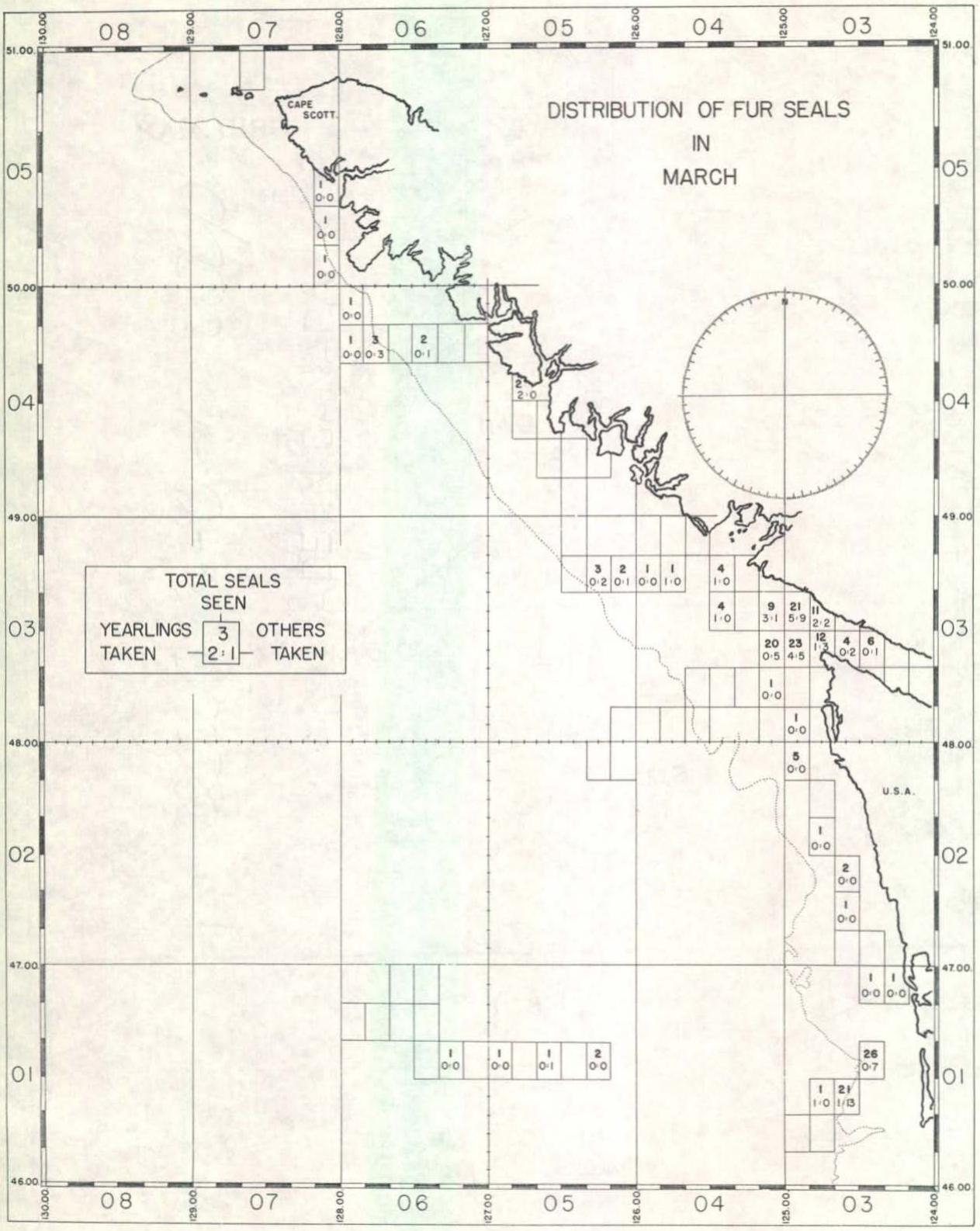
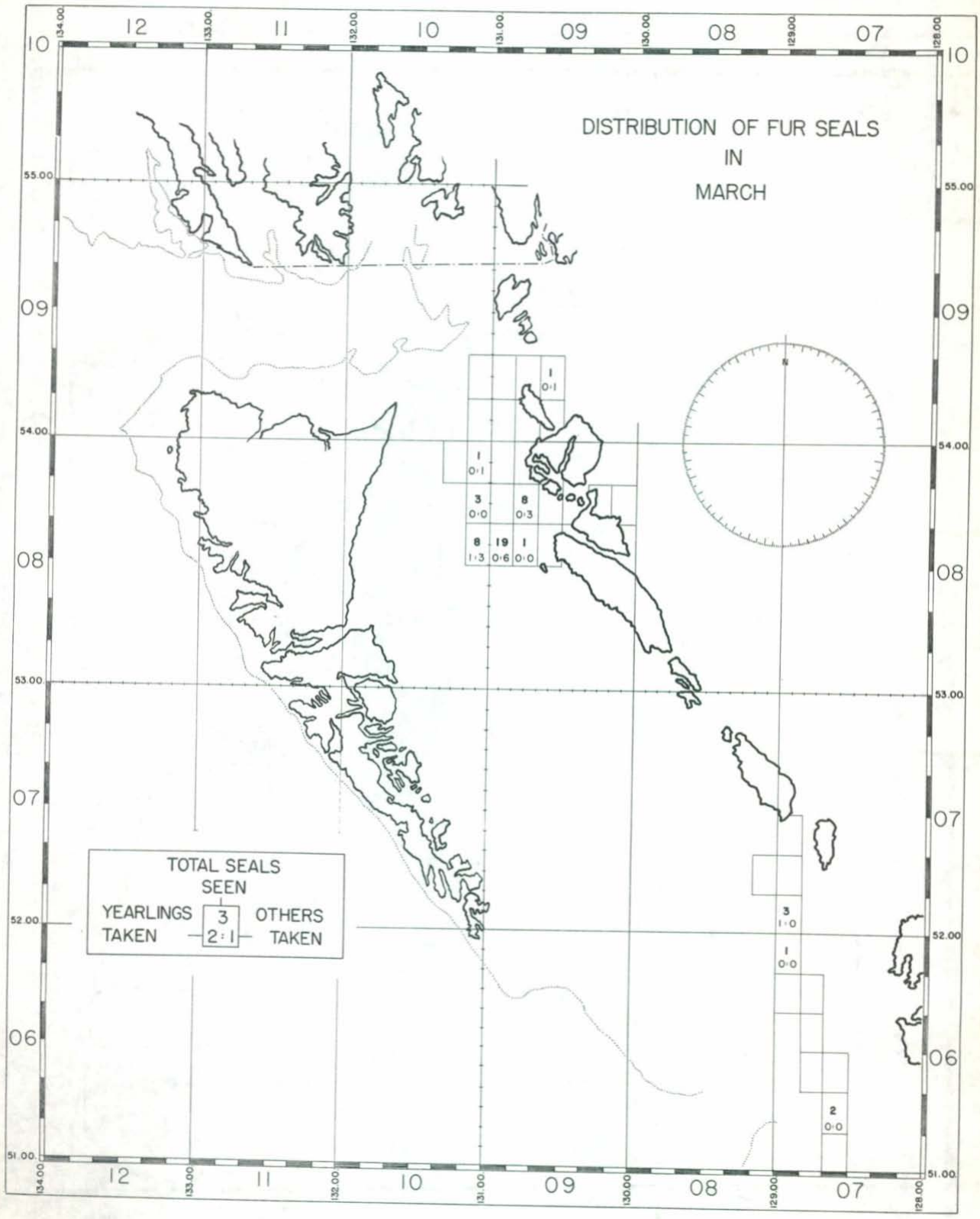
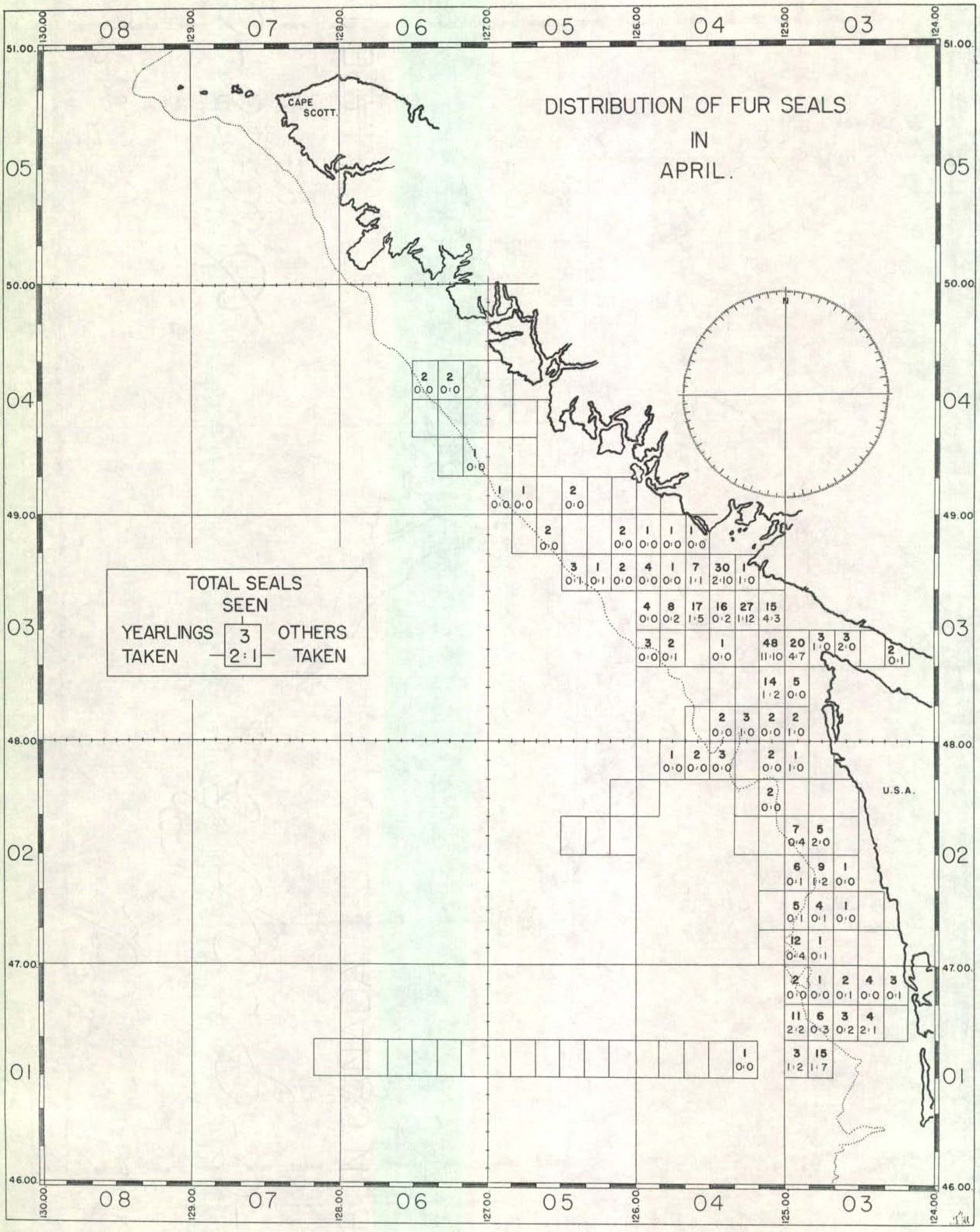


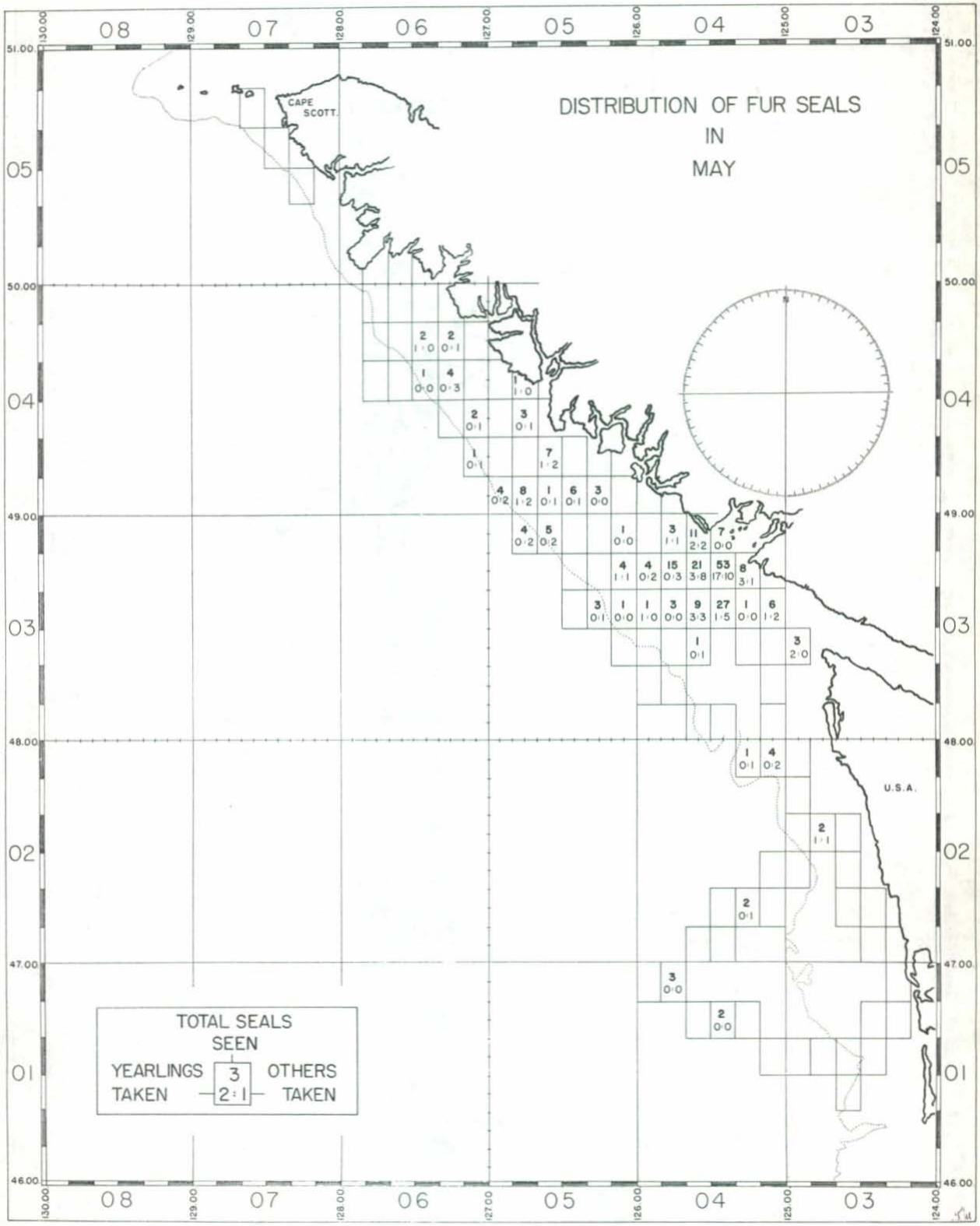

Fig. 5. Comparison of stomach contents of 41 yearlings with 100 adult or sub-adult fur seals taken off the coast of British Columbia in 1959.

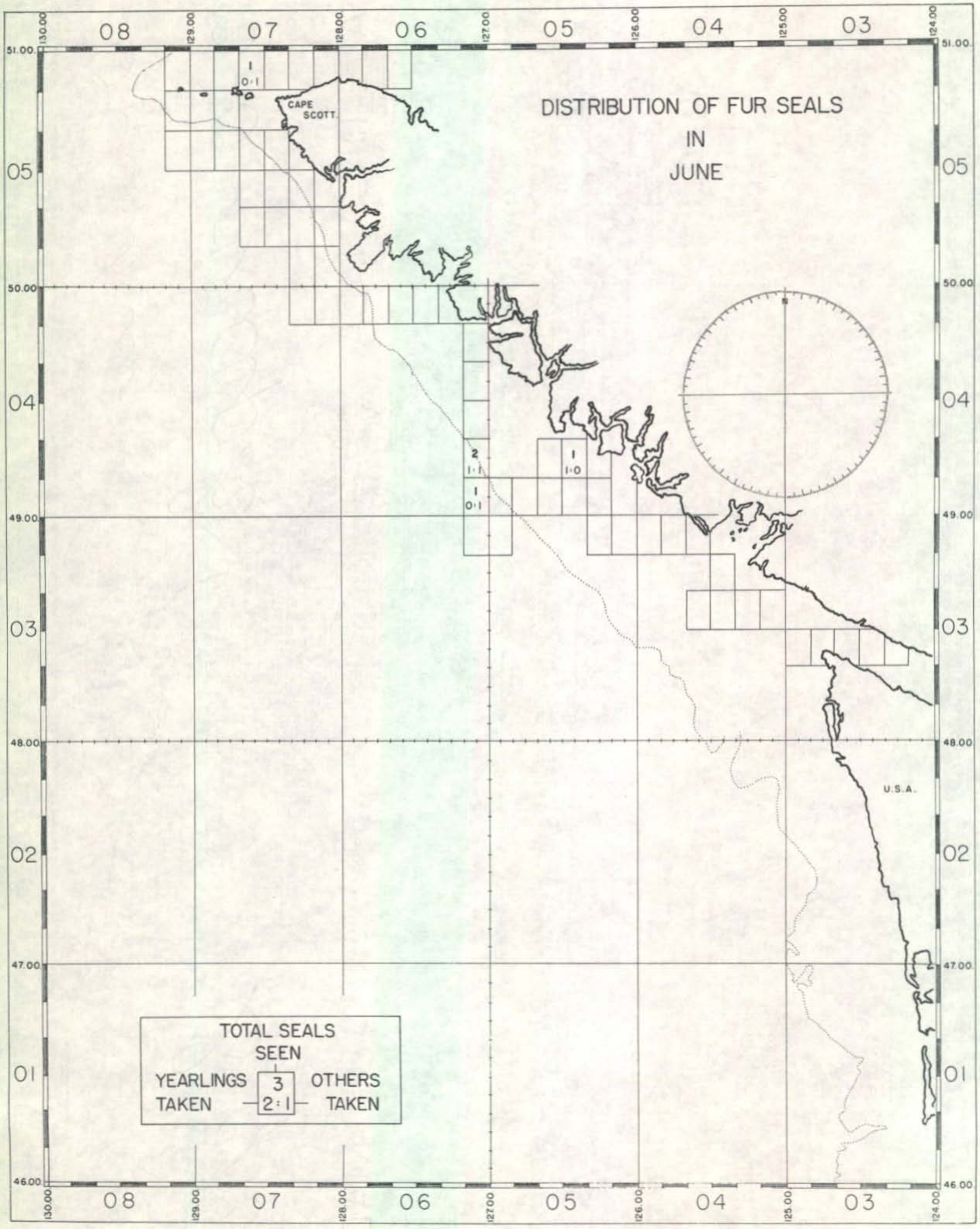

GRID MAP
E (5)
C (3)
D (4)
B (2)
A (1)
10
09
08
07
06
05
04
03
02
55°
54°
53°
52°
51°
50°
49°
48°
47°
0115
14
13
12
11
10
09
08
07
06
05
04
03
136
135
134
133
132
131
130
129
128
127
126
125

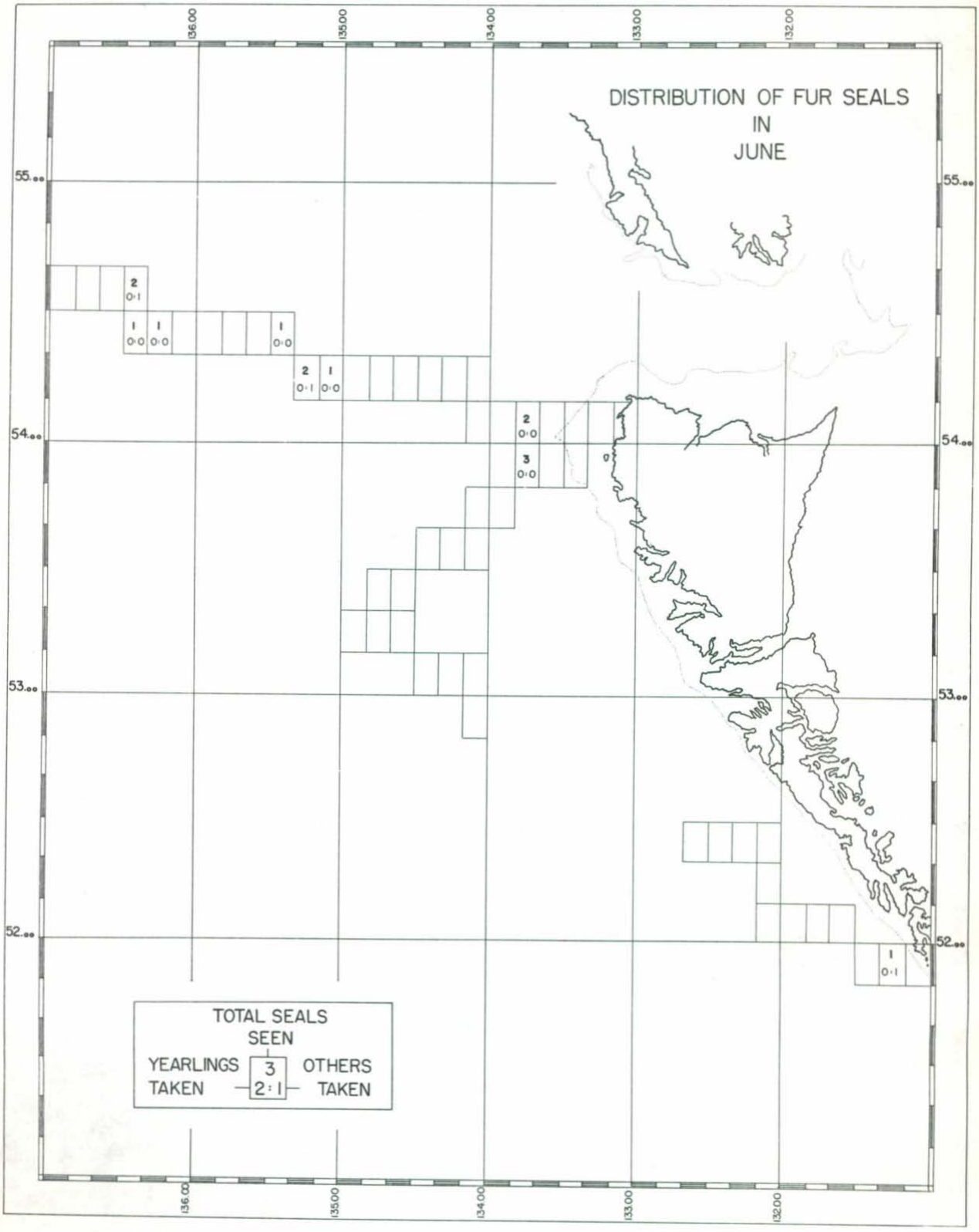

DISTRIBUTION OF FUR SEALS
IN
MARCH
CAPE SCOTT
U.S.A.
TOTAL SEALS SEEN
YEARLINGS TAKEN
OTHERS TAKEN
3
2:1
08
07
06
05
04
03
01
02
130.00
129.00
128.00
127.00
126.00
125.00
124.00
51.00
50.00
49.00
48.00
47.00
46.00

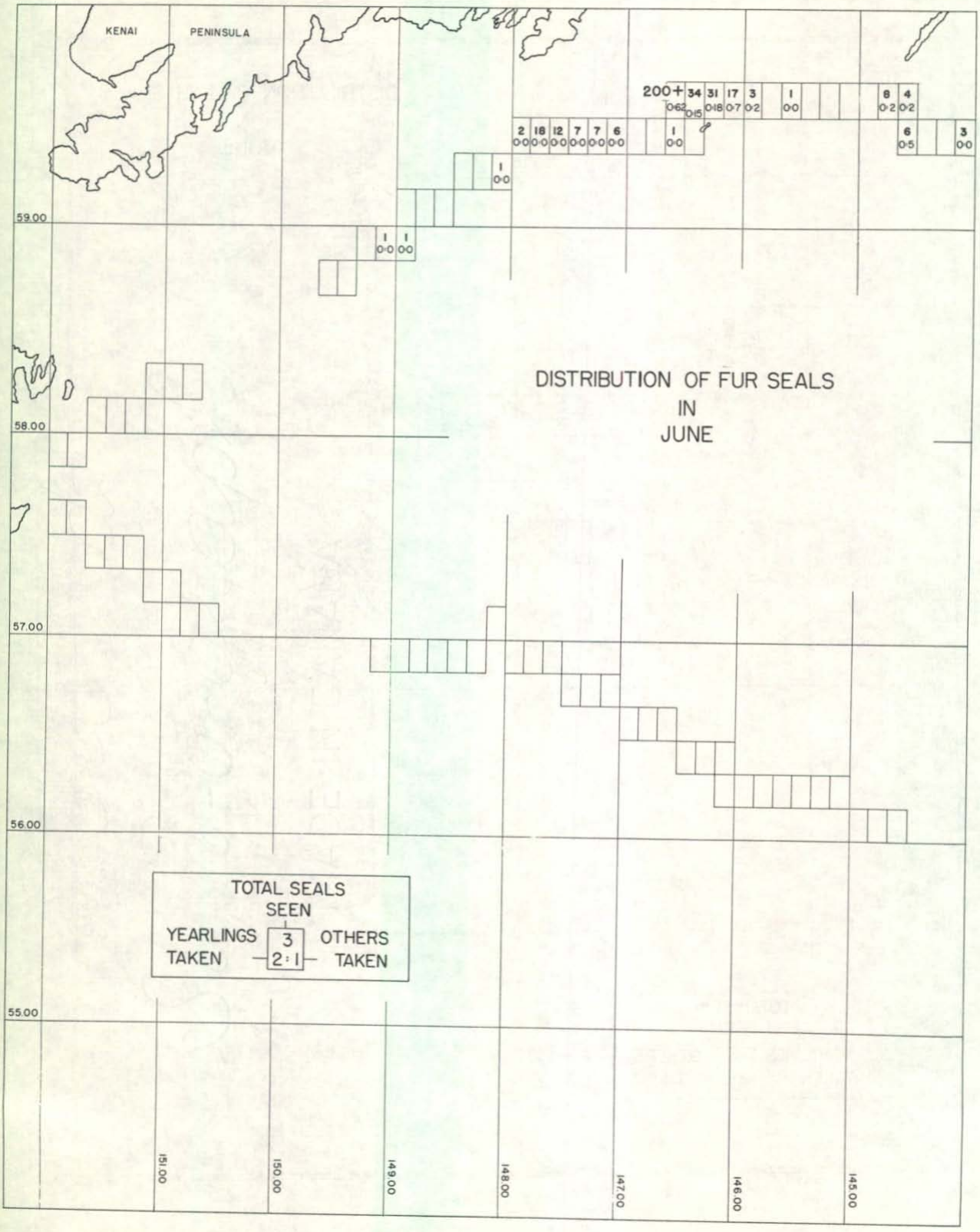

DISTRIBUTION OF FUR SEALS
IN
MARCH
TOTAL SEALS SEEN
YEARLINGS TAKEN
3
2:1
OTHERS TAKEN
1
0:1
1
0:1
3
0:0
8
0:3
8
1:3
19
0:6
1
0:0
3
1:0
1
0:0
2
0:0
134.00
133.00
132.00
131.00
130.00
129.00
128.00
55.00
54.00
53.00
52.00
51.00
12
11
10
09
08
07
06

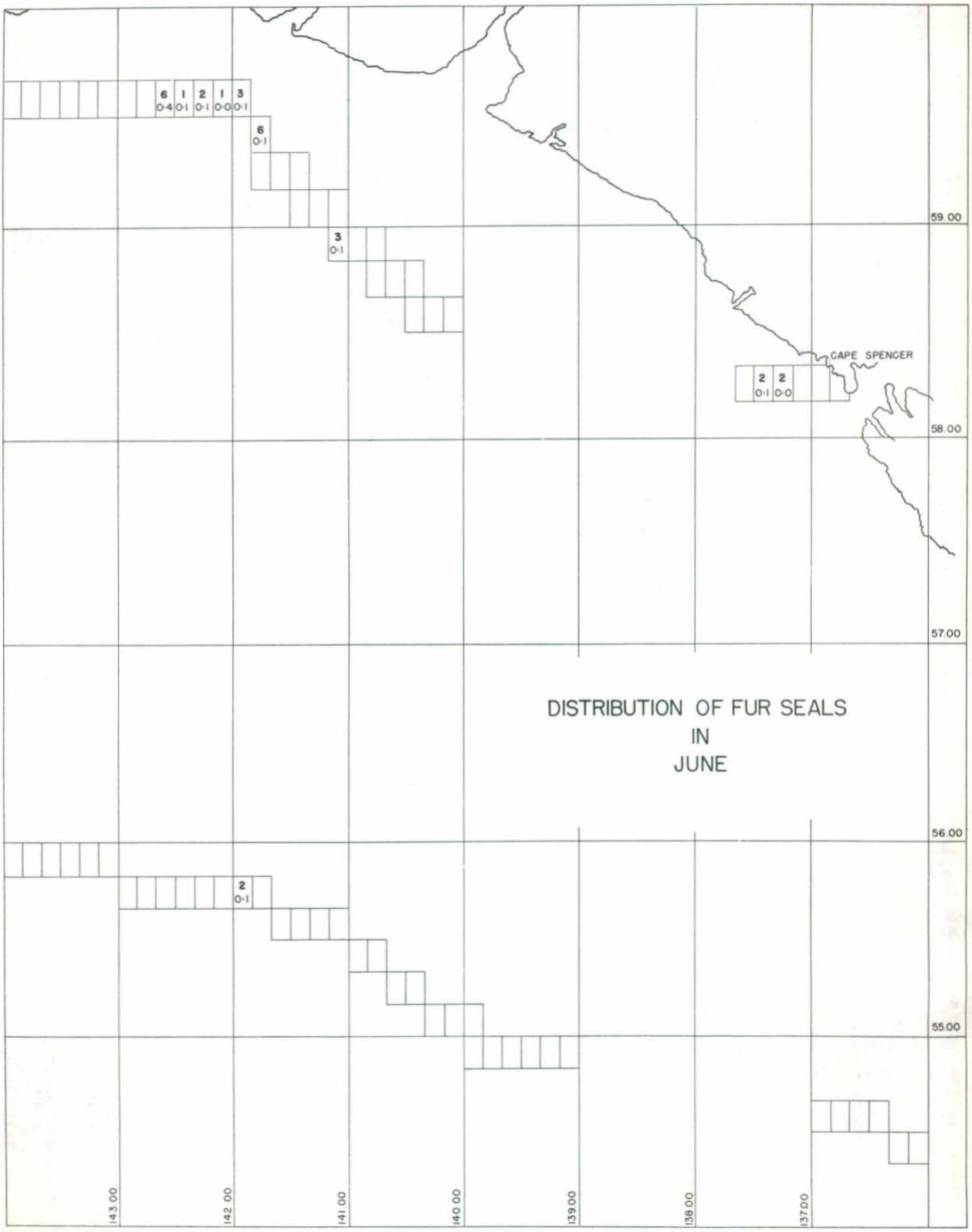

DISTRIBUTION OF FUR SEALS
IN
APRIL.
CAPE SCOTT.
U.S.A.
TOTAL SEALS SEEN
YEARLINGS TAKEN
OTHERS TAKEN
130.00
129.00
128.00
127.00
126.00
125.00
124.00
08
07
06
05
04
03
51.00
50.00
49.00
48.00
47.00
46.00
01
02

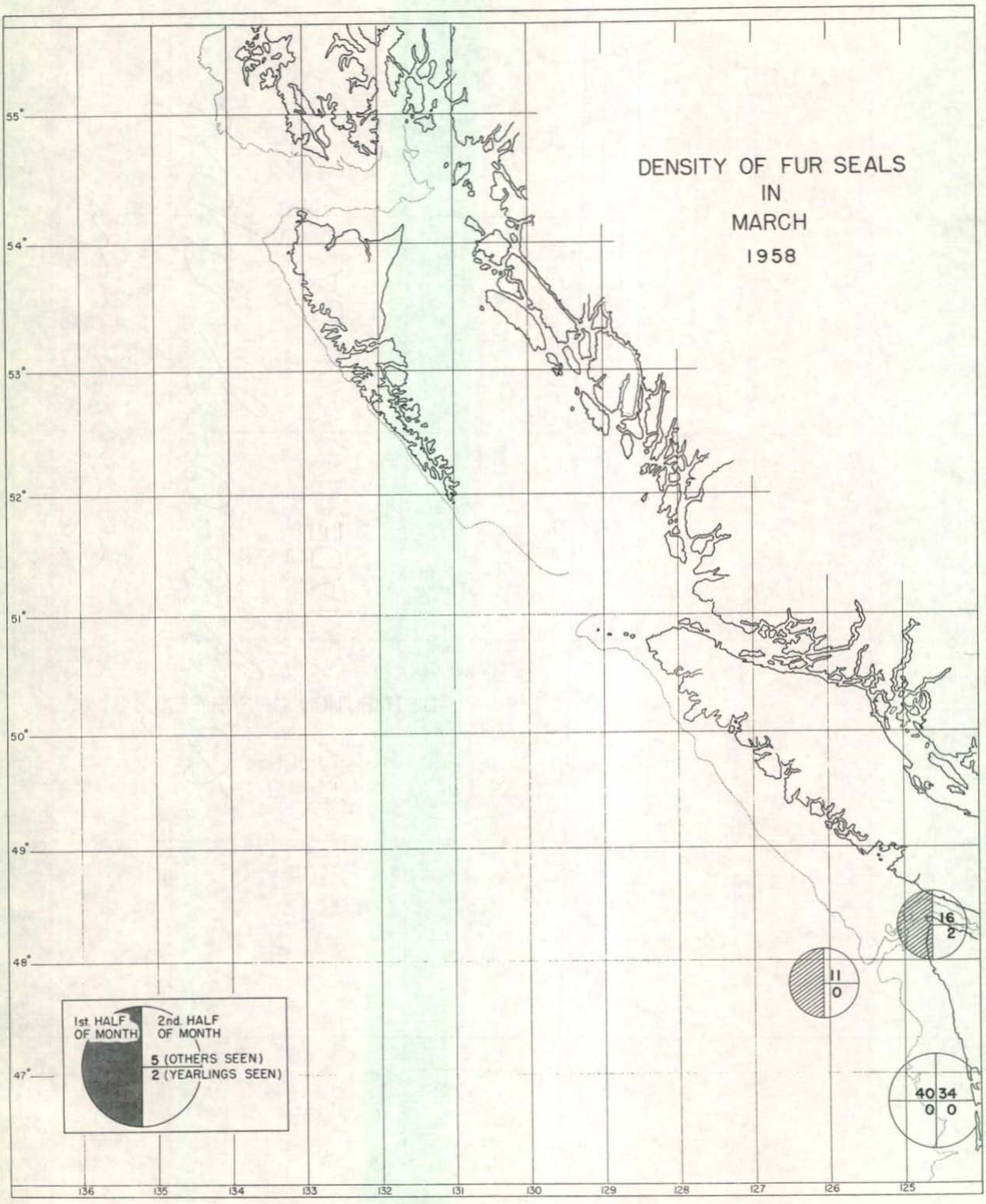

DISTRIBUTION OF FUR SEALS
IN
MAY
CAPE SCOTT
U.S.A.
TOTAL SEALS SEEN
YEARLINGS TAKEN
OTHERS TAKEN
3
2:1
130.00
129.00
128.00
127.00
126.00
125.00
124.00
08
07
06
05
04
03
51.00
50.00
49.00
48.00
47.00
46.00
05
04
03
02
01

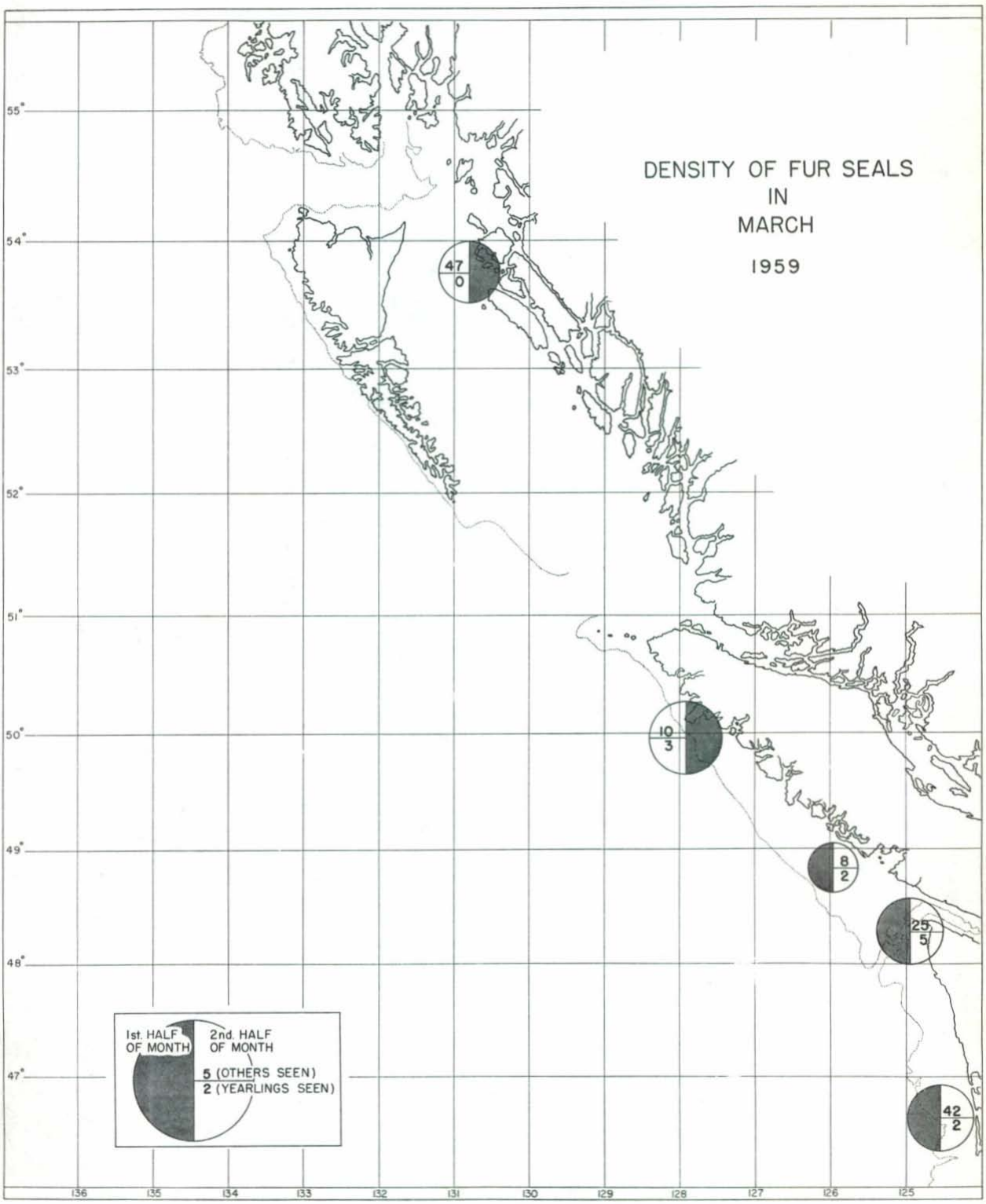

DISTRIBUTION OF FUR SEALS
IN
JUNE
CAPE SCOTT
U.S.A.
TOTAL SEALS SEEN
YEARLINGS TAKEN
OTHERS TAKEN
3
2:1
1
0:1
2
1:1
1
1:0
1
0:1
130.00
129.00
128.00
127.00
126.00
125.00
124.00
08
07
06
05
04
03
51.00
50.00
49.00
48.00
47.00
46.00
05
04
03
02
01

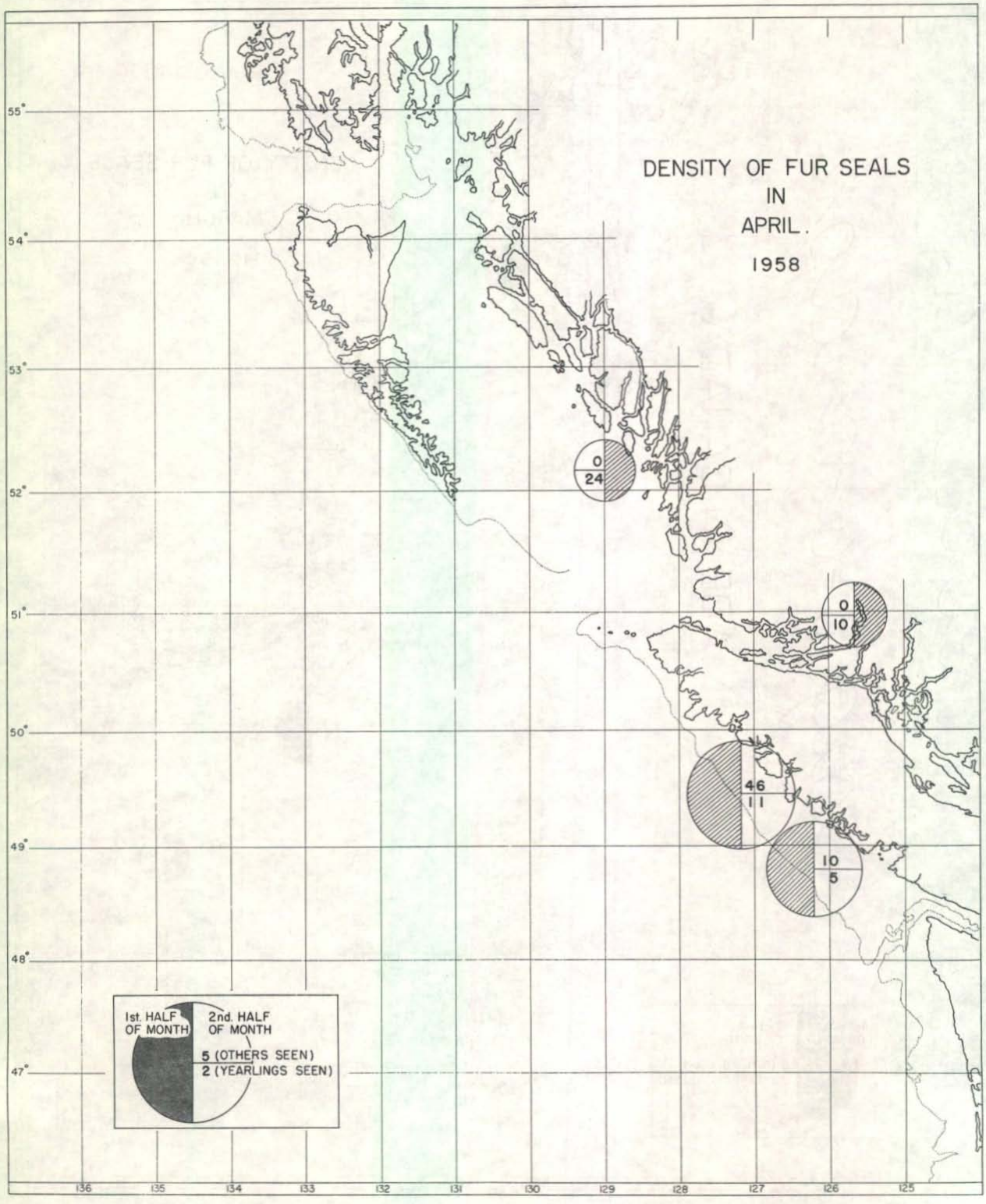

DISTRIBUTION OF FUR SEALS
IN
JUNE
136.00
135.00
134.00
133.00
132.00
55.00
54.00
53.00
52.00
2
0·1
1
0·0
1
0·0
1
0·0
2
0·1
1
0·0
2
0·0
3
0·0
1
0·1
TOTAL SEALS
SEEN
YEARLINGS
TAKEN
3
2:1
OTHERS
TAKEN

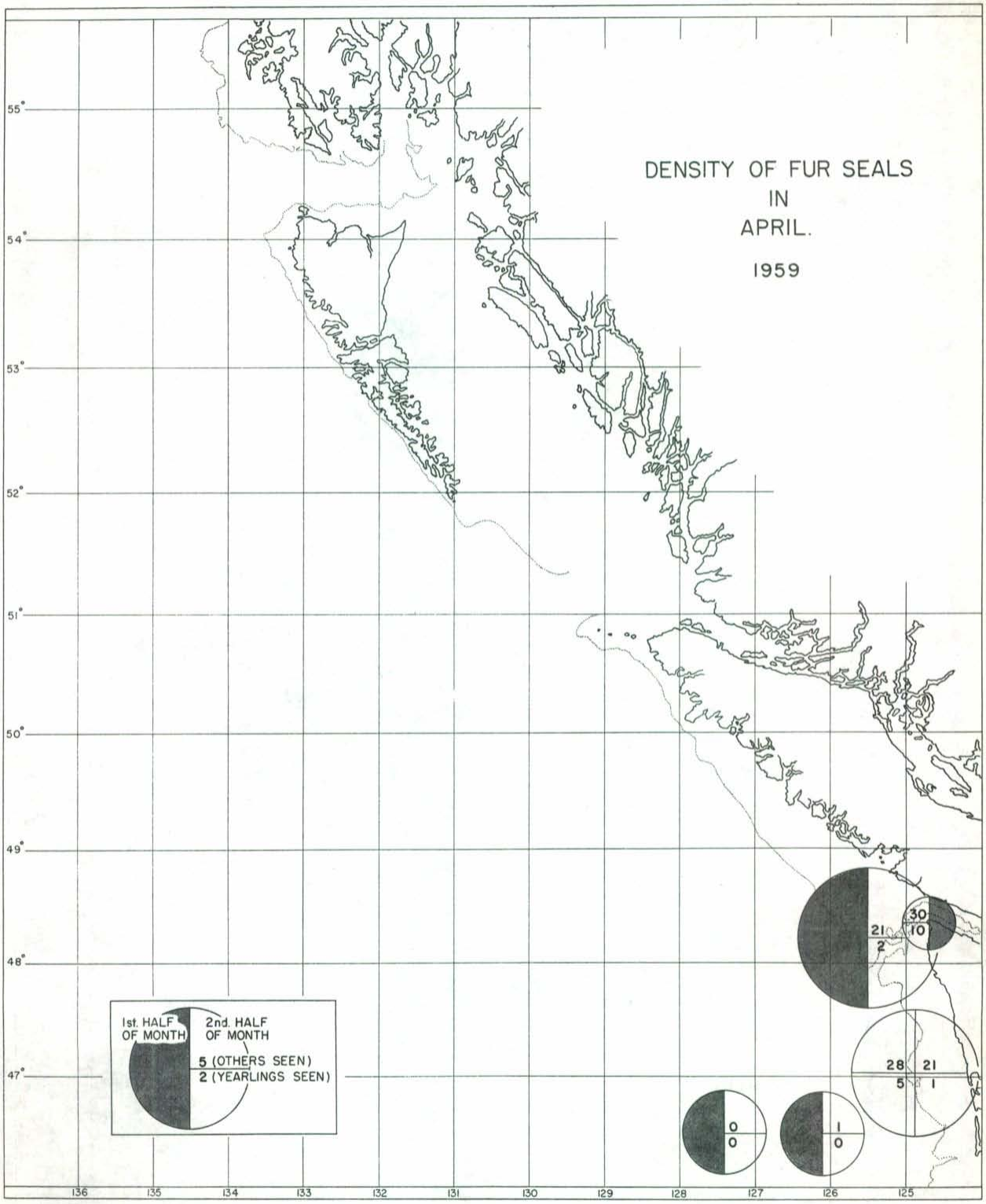

KENAI
PENINSULA
DISTRIBUTION OF FUR SEALS
IN
JUNE
TOTAL SEALS SEEN
YEARLINGS TAKEN
OTHERS TAKEN
3
2 : 1
59.00
58.00
57.00
56.00
55.00
151.00
150.00
149.00
148.00
147.00
146.00
145.00

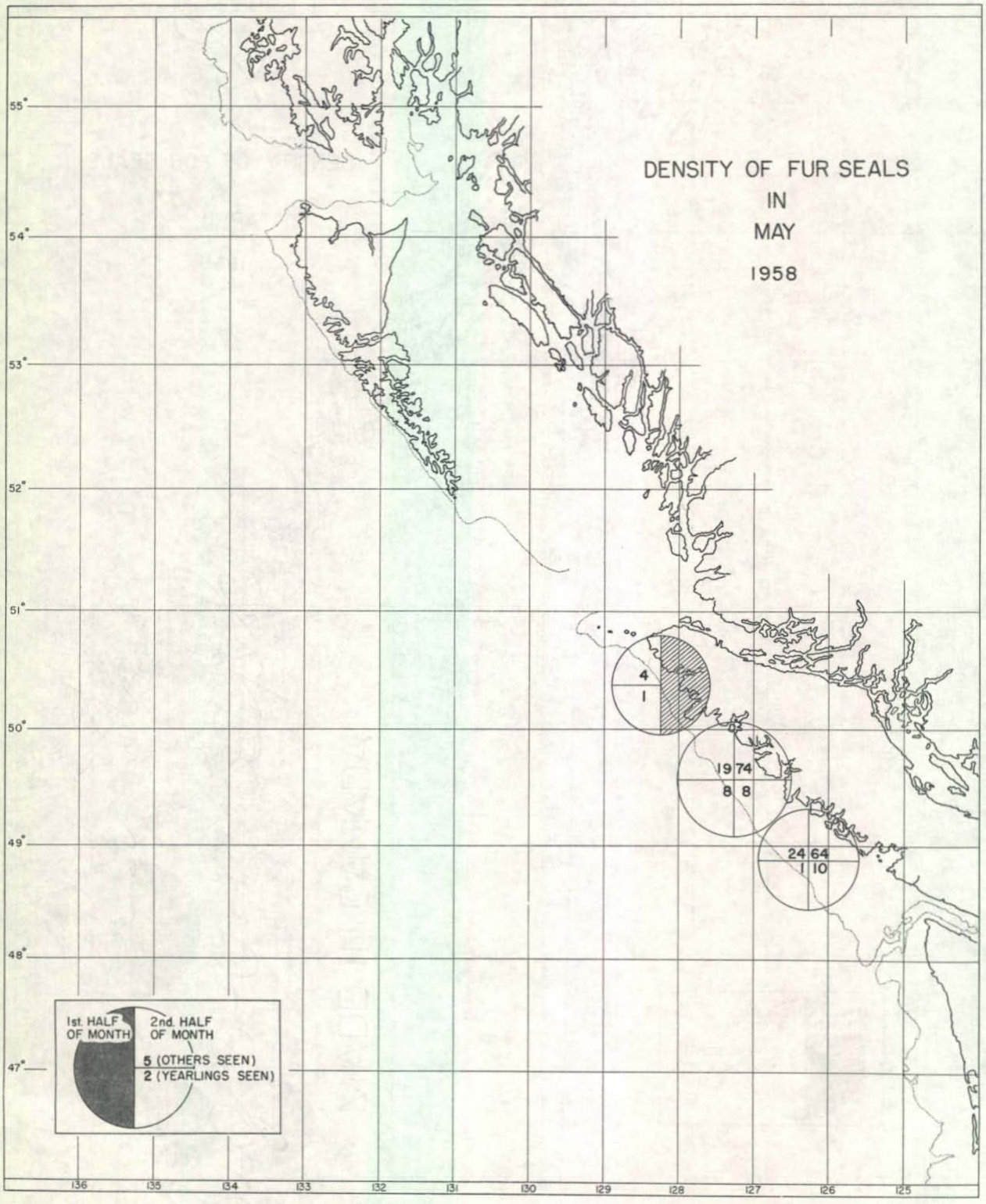

6 1 2 1 3
0·4 0·1 0·1 0·0 0·1
6
0·1
3
0·1
2
0·1
CAPE SPENCER
2 2
0·1 0·0
59.00
58.00
57.00
56.00
55.00
DISTRIBUTION OF FUR SEALS
IN
JUNE
143.00
142.00
141.00
140.00
139.00
138.00
137.00

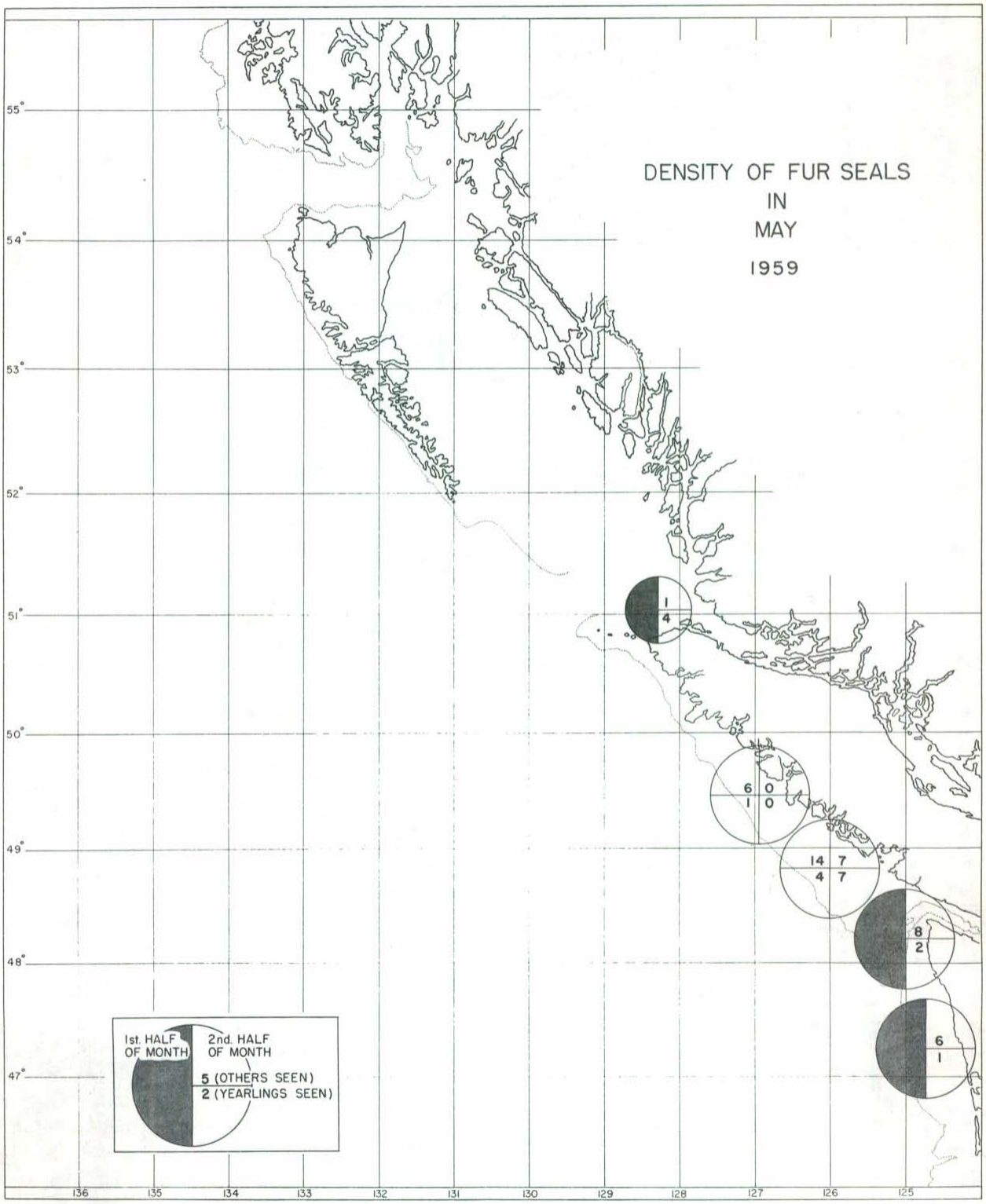

DENSITY OF FUR SEALS
IN
MARCH
1958
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
1st HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)
16
2
11
0
40 34
0 0

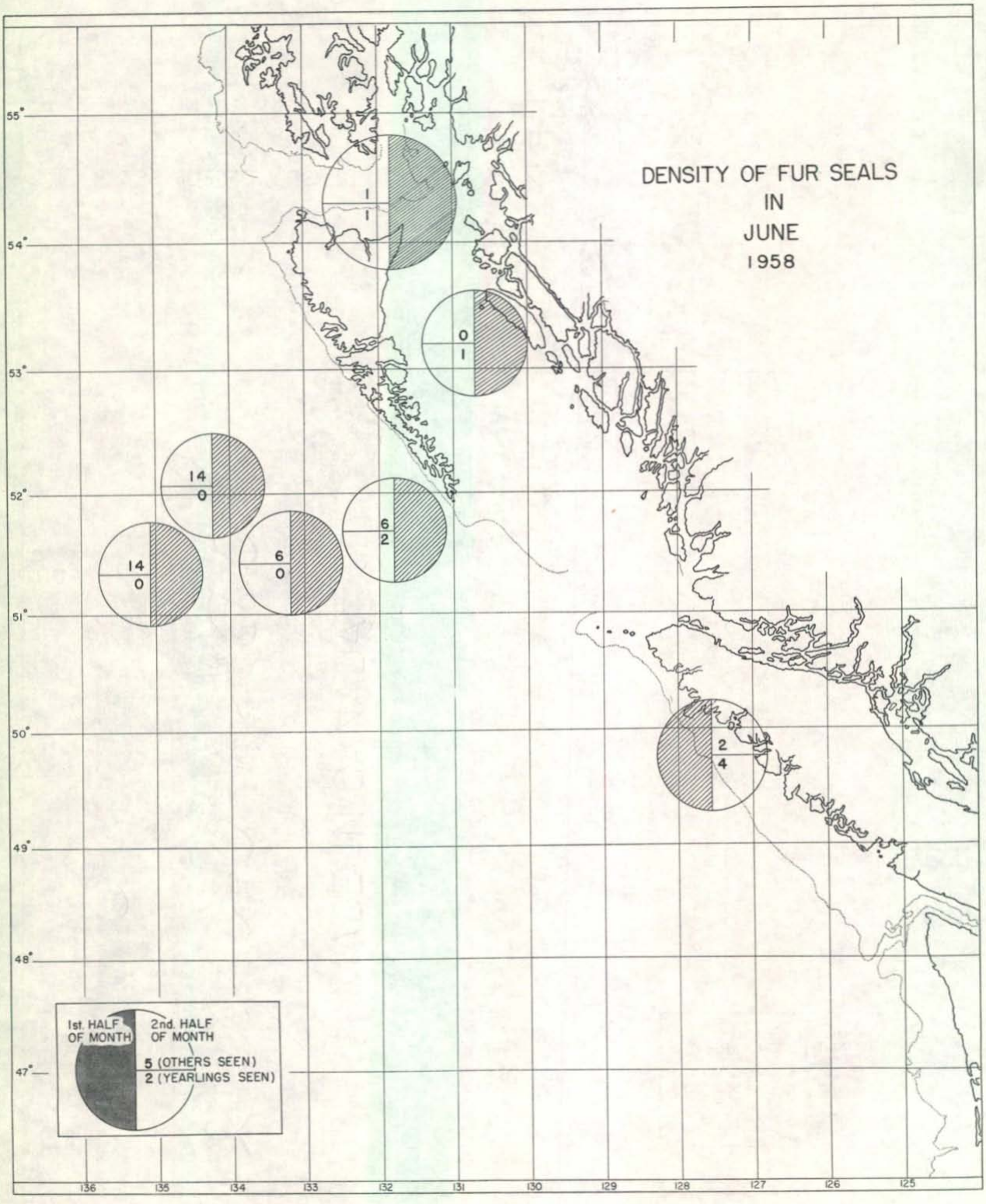

DENSITY OF FUR SEALS
IN
MARCH
1959
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
47
0
10
3
8
2
25
5
42
2
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)

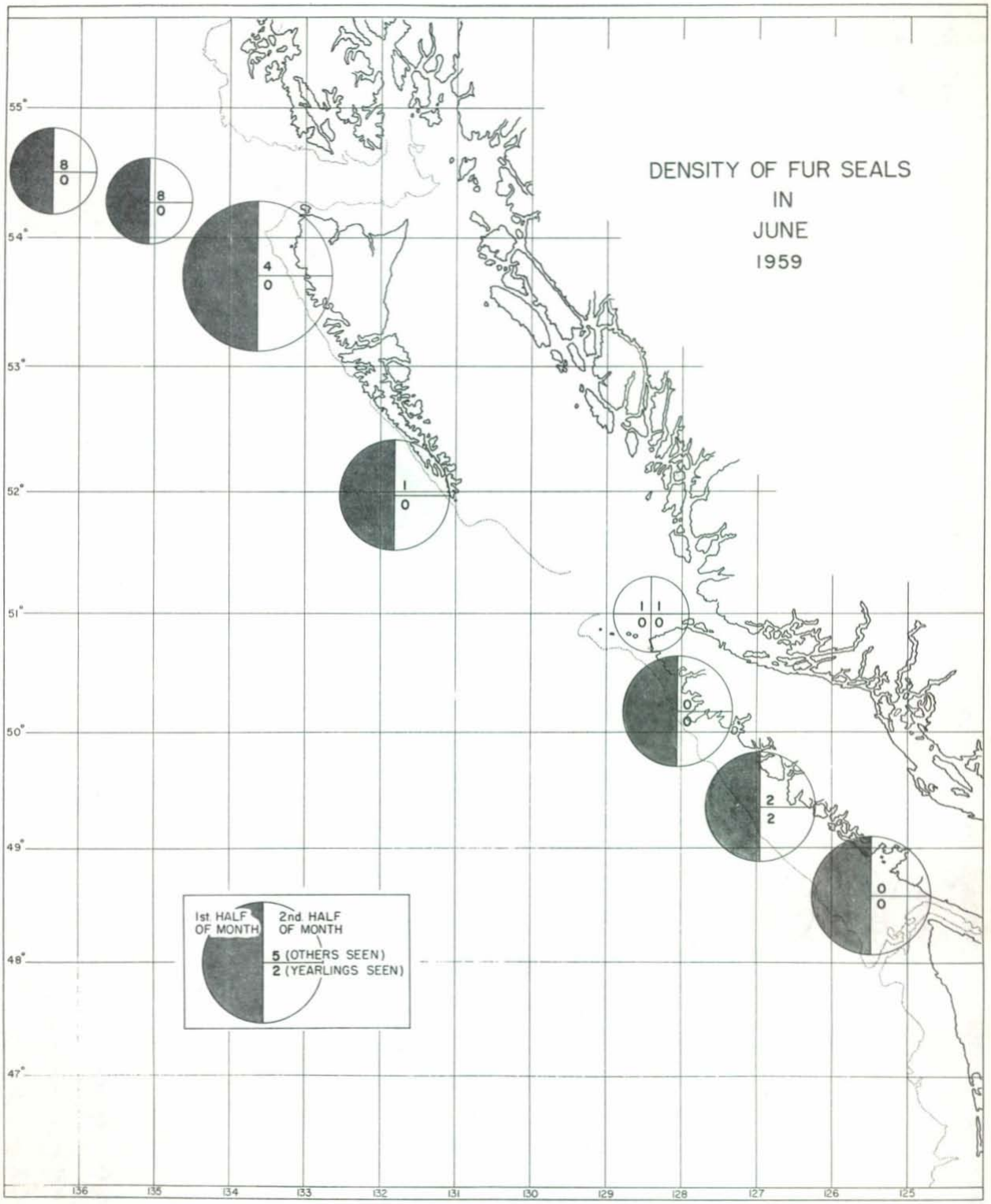

DENSITY OF FUR SEALS
IN
APRIL.
1958
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
0
24
0
10
46
11
10
5
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)


DENSITY OF FUR SEALS
IN
APRIL.
1959
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)
21
2
30
10
28
5
21
1
0
0
1
0


DENSITY OF FUR SEALS
IN
MAY
1958
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
4
1
19 74
8 8
24 64
1 10
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)


DENSITY OF FUR SEALS
IN
MAY
1959
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
1
4
6
1
0
0
14
4
7
7
8
2
6
1
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)


DENSITY OF FUR SEALS
IN
JUNE
1958
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
1
1
0
1
14
0
14
0
6
0
6
2
2
4
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)


DENSITY OF FUR SEALS
IN
JUNE
1959
55°
54°
53°
52°
51°
50°
49°
48°
47°
136
135
134
133
132
131
130
129
128
127
126
125
8
0
8
0
4
0
1
0
1
1
0
0
0
0
2
2
0
0
1st. HALF OF MONTH
2nd. HALF OF MONTH
5 (OTHERS SEEN)
2 (YEARLINGS SEEN)

## APPENDED REPORTS

1. Summary of results of Canadian pelagic fur seal research in 1959.

2. Plans for Canadian pelagic fur seal research in 1960.

3. Vessels to be used in Canadian pelagic fur seal research in 1960.

4. Tags recovered during the course of Canadian pelagic fur seal research in 1959.

# Summary of results of Canadian pelagic fur seal research in 1959

Pelagic fur seal research was continued in 1959 in accordance with the terms of the Interim Convention on Conservation of North Pacific Fur Seals. This is the second in a series of six years of co-operative research designed to obtain information on migration routes, wintering areas, the degree of mixing of American and Asian herds, and the extent to which food habits of fur seals affect commercial fish catches.

## Time and area of operation

A single vessel, the "Pacific Ocean", was chartered for the months of March to July, inclusive, to hunt seals. Areas hunted included waters from the mouth of the Columbia River to Kodiak, Alaska. Most hunting was done within 60 miles of shore. A second vessel, the "A. P. Knight", was used for a two-week period in January and February.

A total of 1374 seals were seen and 491 were collected up to the end of July. The total catch consisted of 83 per cent females. Sixty per cent were taken from British Columbia waters, 15 per cent from Oregon and Washington, and 25 per cent from the Gulf of Alaska.

## Distribution and density

Yearling seals of the 1958 year class were less abundant in British Columbia coastal waters in 1959 than in 1958 when storms concentrated yearlings in inside waters and resulted in many deaths during the winter months. More yearlings appeared to remain widely dispersed offshore during the winter of 1958-59 and in the summer of 1959.

The main herd, consisting mostly of northward-migrating pregnant females, passed by the coast of British Columbia earlier by 2-4 weeks in 1959

than in 1958. No large concentrations comparable to those encountered off the middle coast of Vancouver Island during the last two weeks in May, 1958, were seen in 1959.

The heaviest concentration of seals, comprising mostly pregnant females, was encountered near Middleton Island in the Gulf of Alaska on June 8th and 9th. Density was estimated at approximately 50 per square mile. Seventy-five seals were taken from this group in a period of 7 hours. Concentrations of seals were found just north of the Columbia River mouth in March and April and on La Pérouse Bank off Cape Flattery in April. A seaward dispersion of seals occurs off the west coast of the Queen Charlotte Islands in June. Only a few stragglers from the main herd were present in British Columbia waters in June. A small concentration of mature females was found in upper Hecate Straits in early March.

Yearling seals represented approximately 30 per cent of the catch in British Columbia waters but less than 4 per cent of the catch in other areas. The largest component of the catch in all areas was females 6-10 years of age and mostly pregnant. Males, other than yearlings, are scarce in British Columbia waters during the spring and summer months. The scarcity of 2-year-olds in the 1958 catch and 3-year-olds in the 1959 catch suggests a weakness in the 1956 year class.

Pregnancy rate

The pregnancy rate among females 4 years and older is 81 per cent for all areas combined. The rate among adult females is 89 per cent. In each age group the rate is higher in 1959 than in 1958.

Three causes of reproductive failure are apparent in the 1959 data. Failure of the ovum to implant (implying lack of mating or fertilization) is the most important cause in young animals. Loss of a fetus due to abortion or resorption of the fetus occurs at all ages. Failure to ovulate is of minor importance and occurs mostly in young, recently matured, animals.

Food habits

Food occurred in 45 per cent of all stomachs examined in 1959. Volumes of food and incidence of full stomachs were at a maximum during the morning hours.

Food of migrating seals in British Columbia waters in 1959 consisted mainly of the following species in order of decreasing volumes: herring and salmon, together constituting 45 per cent of the total volume; whiting and sablefish, together constituting 25 per cent of the total volume, and rockfish, constituting 10 per cent of the total volume. Yearling seals were feeding mostly on sablefish and herring. Smaller seals show a preference for small, schooling fish. Salmon was unimportant in the diet of yearlings but equalled herring in importance in the diet of seals older than yearlings. Apparent differences from 1958 may result from sampling different areas.

Rockfish predominated in volume of food found in seals from Washington and Oregon in March and April. Squid was second in importance. Saury and eulachon, which constituted 10 per cent of the total volume in this area in 1958, were unimportant in the 1959 diet.

Stomachs taken in the Gulf of Alaska in June, 1959 consisted of the following species in order of decreasing volumes: sandlance, capelin, herring, squid and salmon. Sandlance did not occur in stomachs samples in this area in July, 1958

Age composition of Canadian pelagic fur seal catch, March-June, 1959

| Age | British Columbia (March, April, May) | | | Oregon-Washington (March, April) | | | Gulf of Alaska (June) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Males | Females non-pregnant | Females pregnant | Males | Females non-pregnant | Females pregnant | Males | Females non-pregnant | Females pregnant |
| 1 | 31 | 41 | | 1 | 9 | | 1 | | |
| 2 | 11 | 16 | | 2 | 3 | | 3 | | |
| 3 | 2 | 4 | | 1 | | | | | |
| 4 | | 10 | 1 | 1 | 3 | 3 | 2 | 2 | |
| 5 | | 8 | 14 | | 3 | 1 | 1 | 1 | |
| 6 | | 3 | 23 | | | 2 | 1 | 3 | 11 |
| 7 | | 3 | 20 | 1 | 1 | 4 | 1 | 3 | 18 |
| 8 | | 3 | 15 | | | 7 | | 2 | 16 |
| 9 | | 1 | 17 | | | 5 | | | 12 |
| 10 | | | 4 | | | 6 | 1 | 1 | 12 |
| 10+ | | 2 | 25 | | 1 | 12 | 1 | 3 | 22 |
| | 44 | 91 | 119 | 6 | 20 | 40 | 11 | 15 | 91 |

Additions:

(1) 29 from British Columbia in January-February (28 of these were yearlings)
(2) 8 from British Columbia in June and July
(3) 17 not aged

Summary analysis of 1959 catch, by area
(figures in %)

| Area | Males | | Females | | | | Totals |
|---|---|---|---|---|---|---|---|
| | Yearlings | Others | Yearlings | Juveniles (2-3 years) | Pregnant | Non-pregnant (4-10+ years) | |
| British Columbia | 12 | 5 | 16 | 8 | 47 | 12 | (100) |
| Oregon-Washington | 2 | 8 | 14 | 5 | 61 | 9 | (99) |
| Gulf of Alaska | 1 | 9 | 0 | 0 | 78 | 13 | (101) |

# Plans for Canadian pelagic fur seal research in 1960

Pelagic fur seal research in 1960 will again be based primarily upon the collection of 500-750 specimens.

If possible, the same vessel used in 1958 and 1959, the M.V. "Pacific Ocean", will be chartered to hunt seals during the months of March to June, inclusive. Hunting activities will be concentrated off the Washington coast in March, off the lower Vancouver Island coast in April, off the middle Vancouver Island coast in May, and off the Queen Charlotte Islands in June. Attempts will be made to obtain the quota as early in the season as possible so that more time can be devoted to observations providing knowledge of density and distribution. A small aircraft will be chartered for occasional surveys offshore in order to use the vessel more efficiently in hunting.

All teeth, stomachs and reproductive organs will be returned to the laboratory for study. Detailed study of reproductive organs will be continued in 1960.

Vessels to be used in Canadian pelagic fur seal research in 1960

| Name | Type of vessel | Length | Horsepower | Port of Registry |
|---|---|---|---|---|
| "Pacific Ocean"(1) | seiner | 72 foot | 290 | Vancouver, B. C. |
| "A. P. Knight"(2) | seiner | 76 foot | 300 | Vancouver, B. C. |

(1) The "Pacific Ocean" will be chartered during the months of March-June, inclusive.

(2) The "A. P. Knight", a research vessel belonging to the Fisheries Research Board of Canada, will be used occasionally to supplement hunting activity of the chartered vessel.

Tags recovered during the course of Canadian pelagic fur seal research in 1959

| Tag Number | Marked Date | Recovered Date | Recovered Location | Specimen Number | Sex | Length (cm) | Weight (kg) | Condition |
|---|---|---|---|---|---|---|---|---|
| K 32035 | Aug 28/58 | Jan 28/59 | Queen Charlotte Sd. | Can 551 | ♀ | 84 | 8.4 | Nullipara |
| K 14206 | Aug 23/58 | Feb 2/59 | Knight Inlet, B.C. | Can 572 | ♀ | 77 | 8.3 | Nullipara |
| K 4245 | Aug 23/58 | Feb 1/59 | Johnstone Strait,B.C. | Can 575A | ♀ | 75 | 5.9 | Nullipara |
| K 6381 | Aug 24/58 | Apr 2/59 | Off Cape Flattery | Can 700 | ♂ | 77 | 10.0 | Nullipara |
| J 19397 | Aug 24/57 | Apr 12/59 | 18 mi off Barkley Sd. | Can 764 | ♂ | 92 | 15.9 | Immature |
| K 36086 | Aug 25/58 | Apr 19/59 | 48°20'N, 124°52'W | Can 781 | ♀ | 78 | 10.0 | Nullipara |
| J 40616 | Aug 26/57 | Apr 22/59 | 46°56'N, 124°19'W | Can 788 | ♂ | 98 | 15.5 | Immature |
| F 5560 | Sept 2/53 | May 2/59 | 48°42'N, 125°29'W | Can 812 | ♀ | 116 | 31.7 | Pregnant, Multipara |
| J 896 | Aug 22/57 | May 22/59 | 48°45'N, 125°42'W | Can 902 | ♀ | 85 | 13.6 | Nullipara |
| J 49320 | Aug 27/57 | Jun 17/59 | Off Cape St. James | Can 1030 | ♂ | 96 | 15.5 | Immature |