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**Age Determination of the Northern Anchovy, Engraulis mordax**

1995

FIGURE 1. The northern anchovy, *Engraulis mordax*

FIGURE 1. *The northern anchovy, Engraulis mordax*

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FOREWORD

With the rapid decline of the sardine fishery beginning in 1946–47, California fishermen and processors turned to substitute species. One of these was the northern anchovy (Engraulis mordax). Until 1947, anchovies had been used for bait almost exclusively and the annual catch had seldom exceeded 5,000 tons. Between 1947 and 1951 these fish were canned in moderate amounts and the landings varied from 5,000 to 12,000 tons. In 1952 the tonnage increased to 34,000 and in 1953 to 49,000.

The major part of the anchovy canning has been done by the processors at Monterey. In this Central California area anchovies are also used in small quantities for dead bait. Along the Southern California coast for many years there has been a thriving live bait anchovy fishery. This bait is used chiefly by sport fishermen and in more limited amounts by the commercial men. The live bait anchovy catch of Southern California increased from about 2,000 tons in the early forties to more than 6,000 tons in 1953.

Because of the use of these fish for live bait and because anchovies are an important forage fish for the larger species fished extensively in California waters by both sport and commercial fishermen, much concern has been expressed over the rapid expansion of the anchovy canning industry. Several plans for control of this expanding fishery have been proposed and the California Fish and Game Commission has refused permits to use anchovies for reduction into meal and oil and has established case pack requirements. Continued public pressure for more stringent regulations made evident the need for basic biological information about this species. To supply this need the Department of Fish and Game increased its investigations on the anchovy and the Cooperative Oceanic Fisheries Investigation added this species to its program of studies. Only by such methods will a solution to the problems of population dynamics be reached and made applicable to management.

Clark and Phillips (1952) published results of the anchovy studies from 1946 through 1951. This introductory work indicated the need for intensive research on certain aspects of the anchovy life history. The most important and difficult was the development of a reliable method for age determination. The responsibility for this fell to the biologists conducting the routine sardine age analysis, two from the California Department of Fish and Game and two from the U. S. Fish and Wildlife Service.

The program of anchovy sampling was expanded to include all California ports of landing. Since northern anchovy and Pacific sardine scales are similar in type and structure, the anchovy commercial catch sampling and age analysis was conducted in a manner similar to that adopted for the Pacific sardine and the anchovy age determinations were made as soon as the collections were completed for the season.

The usual procedure in conducting a routine age analysis of a newly studied species is to first complete preliminary studies relative to the reliability of the method as applied to that species. For the anchovy these special studies were conducted simultaneously with the collection and analysis of the first two seasons' catch. If the results of these special studies indicated that anchovy scales could not be read with a sufficient degree of reliability then the routine age analysis would be discontinued. This bulletin presents the results of these special studies and the age and length composition of the 1952–53 and the 1953–54 catch.

Here are given the reasons for considering valid the method used to interpret the age from the scales of the anchovy. The errors inherent in the method are pointed out and the reliability that can be placed on the findings is indicated. Given also are the tonnages and numbers of anchovies taken in the canning catch in the 1952–53 and 1953–54 seasons. No fish older than six years was found. In 1952–53 more than half of the catch came from the 1950, 1951 and 1952 year classes, anchovies less than three years old. In 1953–54 fish under three years (the 1951, 1952 and 1953 year classes) comprised more than 80 percent of the catch. These data suggest that the anchovy is a relatively short lived fish and that the population is subject to comparatively rapid turnover.

DANIEL J. MILLER
May, 1955

1. STUDIES RELATING TO THE VALIDITY OF THE SCALE METHOD FOR AGE DETERMINATION OF
THE NORTHERN ANCHOVY
(Engraulis mordax)

By DANIEL J. MILLER, Marine Fisheries Branch

1.1. ACKNOWLEDGMENTS

1.2. THE PROBLEM

The importance of a reliable aging method has been fully acknowledged by all fisheries researchers and throughout the past century much work has been undertaken in development of methods for many species. Nearly all age determinations are made from interpretations of marks, bands or differentiated areas of scales, otoliths and other hard parts of the fish such as fin rays and spines and various skeletal structures. Where possible the age groups have been checked against the Petersen method of following the progression of modal peaks in length frequency distributions from year to year. With most culpeids the Petersen method is not accurate beyond the third of fourth year and it has been found unreliable after the first year for the northern anchovy. The latter is evident in the length-frequency polygons shown by Clark and Phillips (1952). Otoliths and skeletal structures proved of little value in anchovy age determinations thus limiting the study to the use of scales.

Most fisheries researchers recognize that both biased (reader faults) and unbiased (scale faults) errors can and do exist in all scale mark interpretations. Reader faults occur when a reader mistakenly omits a clear ring (annulus) or through carelessness or acquired bias tends to choose as valid rings certain marks that have been determined as false annuli by other scale readers. Through use of the method adopted by Walford and Mosher (1943b) these reader faults can be measured to a degree and can be limited in occurrence by having three or four readers, each undergoing the constructive criticism of the others.

Scale faults are due to inherent qualities of the scale such as failure to show an annulus due to abnormal conditions of food and temperature, and other factors as they effect growth, or production by these growth factors of a false mark on all scales of a fish which cannot be distinguished from a true annulus. It is not possible to accurately measure either the degree or direction of these scale faults and it is hoped for the sake of reliability that these over-all unmeasurable errors are compensatory thus rendering the trend of the results valid and useful in fisheries investigations.

Because such errors do exist there is a tendency by some workers to view with skepticism the use of age determinations in fisheries studies. Van Oosten (1929)[1] made a thorough review of the scale literature and gave a general summary of the validity of the scale method by presenting examples of works both proving and disproving the concept. To most researchers the evidence presented lends confidence in the scale method. The over-all hypothesis of the scale method was accepted as valid at the onset of this study.

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[1] There have been many summaries of scale method work. Among the most useful of these are Thompson, 1904; Taylor, 1916; Creaser, 1926; Graham, 1929; and Hile, 1941.

In this investigation the procedure for determining the reliability of the scale method for the northern anchovy was patterned after the procedures utilized by past workers to test three assumptions given by Van Oosten: (1) The scales remain constant in number and identity throughout the life of the fish; (2) The annual increment in the length of the scale maintains, throughout the life of the fish, a constant ratio with the annual increment in body length; and (3) The annuli are formed yearly and at the same time each year.

One of the most difficult aspects in the interpretation of scale marks is to determine the value of personal judgment in lieu of statistical proof of the accuracy of age readings. When two or more readers do not interpret a scale mark alike there is no immediate statistical test available to indicate which way the decision should be cast. Only constructive criticism and thorough understanding of each other's interpretation can lead to arrival at the "most correct age." Walford and Mosher (1943a and 1943b) presented statistical comparisons between readers by means of Chi square tests and were able to delimit the degree and direction of disagreement between readers. No statistical evaluation (other than to present the total disagreements of all readers combined) has been made of the error existing between different readers in this study and emphasis has been placed on improvement of techniques to reduce and better understand scale error.

1.3. METHODS

1.3.1. Sampling the Commercial Catch

This study does not involve detailed analysis of the adequacy of fish sampling techniques. A cursory examination of the data indicates that, if anything, there has been oversampling of the catch at times, especially at the ports of San Francisco and Monterey in the Central California region. There was need, however, to determine the adequacy of scale collections from the fish samples. A comparison of the total length frequency to that of the length frequency of fish from which scales were taken indicated that in the Central California area there was a tendency to take too few scale samples from the smaller fish. The mean standard length of 2,091 fish sampled at San Francisco in 1952 was 145.7 mm. as compared to a mean of 147.0 mm. for the 413 fish from which scales were taken. No scale samples were taken from fish in the range 80–110 mm. Anchovy scales are very deciduous, especially on small fish, and because of rough handling in the capture and transportation of fish to the cannery most anchovies of this size are devoid of scales. This lack of scales from small sizes proved to be of little consequence, however. A series of scales from fish 80–110 mm. was obtained by special samples in Central California and in routine samples in Southern California (Pt. Conception to San Diego) and nearly all fish in this range, at least in the summer and fall, were 0-ring fish, fish of the year.

Random sampling of anchovies in the commercial catch has been similar to the procedure used in sampling Pacific sardines. This consists of recording all pertinent data of the catch from which a sample was taken including the date, time of capture, name of boat, location of catch, size of catch in pounds, number of sets needed to make the catch, where landed, and to which processing plant the fish were taken.

A random sample of 50 fish is measured and recorded by standard length (from the tip of the snout to the posterior edge of the fleshy part of the caudal peduncle which coincides with the termination of the hypural) and notes are entered on stage of maturity and other special data desired. The weight of the 50 fish sample is recorded. Ten fish are picked at random from the 50 fish and from each of these about 10 to 20 scales are removed and placed in a vial containing a weak solution of carbolic acid. A numbered scale box contains 50 of these vials serially arranged. The scale box number is entered on the sample sheet and the vial number assigned to the fish from which scales were taken is listed after the length of that fish.

The number of samples taken per week was determined by the quantity of the catch being landed, or by the amount of time that could be spared by the samplers who had other duties to perform also. During periods of heavy fishing activity as many as five samples per week were taken at each port but during periods of limited catch sometimes only one sample per week was available.

1.3.2. Sampling on Board the M/V Yellowfin

A routine sampling procedure for anchovies was developed in conjunction with sampling techniques established on the department survey vessel *Yellowfin*. This consists of measuring a random portion of the catch taken either with the aid of a small explosive charge or (since 1954) with a blanket net (Radovich and Gibbs, 1954). When less than 50 fish are taken all are measured. If the catch is greater the measurements are limited to 50. In these collections, however, a stratified series of scales is taken. This consists of removing scales from a male and a female within each centimeter group. A centimeter group includes fish in the size range 1–10, as 121–130 mm. This stratified method of scale collecting is somewhat more time consuming and the results are not directly indicative of the actual percentage age composition as are the scale samples from the commercial catch but it gives scales from the entire size range in the sample.

1.3.3. Special Sampling

Collections of larval and juvenile fish are made weekly by Hopkins Marine Station personnel at Pacific Grove by dip netting under a light off a wharf. A series of early juvenile anchovies was collected in this manner. Other samples of a special nature included anchovies taken at the Moss Landing Pacific Gas and Electric steam plant during the summer of 1954 and anchovies caught incidently with other species. When scales were taken from fish in these special samples the stratified method was employed.

1.3.4. Mounting and Aging Procedure

Anchovy scales are mounted dry between two glass slides taped at the ends. This method, used in preference to a mounting medium or to making scale impressions, has proved the most satisfactory for sardines (Felin and Phillips, 1948) and is also best for anchovies. In order to "bring out" certain features of the surface and subsurface structures in the anchovy scale it is often necessary to reduce the intensity of light by placing a piece of paper partly across the beam between the source and the projecting microscope.

Scales were viewed in a phase microscope and some of the detailed structures of the circuli, radii and annuli were revealed but no hitherto undisclosed structures that would be an aid in age determination were evident. Unstained anchovy scales mounted dry were viewed in a polariscope with rotating Nicol prisms. Certain substructure elements were revealed, similar to those seen by Savage (1919), but for practical purposes in handling a large volume of scales no real advantage was apparent. With the polariscope the light source is greatly reduced and projection of an image to a diameter of 30 times (the routine magnification used in anchovy and sardine age readings) is not feasible.

When possible six scales from one fish are mounted on a numbered slide. All of the slides from a series or from several series are divided into four lots. The lots are then distributed to the four readers and each reader views each scale on a slide, determines the location of the annuli, selects one scale and traces the annuli and the edge of the scale on a card (Figure 2). The slides are then sent to an assigned "checker," another scale reader. The checker lists the slide numbers and enters after each number his own interpretation of the number of rings on the scales. After all the scales have been "read" and "checked," all four readers meet and review the scales on which the reader and checker do not agree (termed first disagrees). If the opinion of the group upholds the interpretation of the original reader then the card is filed with the scale cards for which there was agreement with no additional marks or notations. Should the opinion of the group uphold the reading of the checker or decide on a third interpretation then the card is changed and data relating to the discrepancy are entered on the scale card. These cards upon which the age readings have been changed are referred to as "second disagrees." Should all the scales on a slide be regenerated or too dirty to allow clear vision, the scale card for that fish is marked with a statement that the scales were not readable. After all the readings are checked by all the readers the scale cards are filled out with the data from the original sample sheets. This renders the data available for compiling into age and length groups, for calculated length studies, or any other analyses based on age determinations.
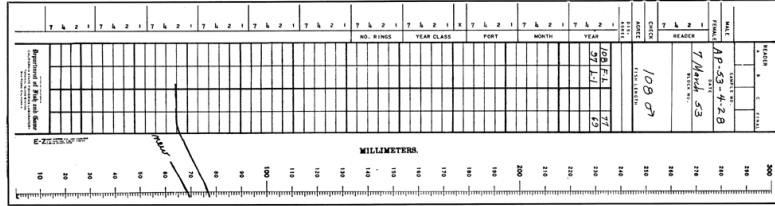
FIGURE 2. Scale card used in routine age readings and calculations of anchovy and sardine scales. The mark on the card at 77 mm. was drawn along the scale edge and the mark at 69 mm. was regarded as a "new" annulus.

1.4. DESCRIPTIONS OF SCALE STRUCTURES AND ANNULI

Scales of the northern anchovy are similar to those of other Engraulids, and have a characteristic structure and shape which may be classed as having both clupeoid and salmonoid features. This has been observed by Fage (1911) in *E. encrassicholus* and in this study on scales of *E. mordax* from the Central California area. The narrowing of the distance between circuli, during periods of reduced growth in length, forms dark bands in contrast to the lighter areas of wider space circuli characteristic of rapid growth. Blackburn (1950) pointed out that *E. australis* scales in general have "more widely spaced striae which are disposed semiconcentrically, in a manner more reminiscent of salmonoid scales." With E. mordax these salmonoid type bands are not present on all scales. Some fish fail to show any indication of a band at annulus formation but instead have only the typical clupeoid annual "check" or light colored line. More often than not there is a confused pattern of both checks (clupeoid type annuli) and bands (salmonoid type annuli) on the same scale (see Figure 17). Blackburn favored the recognition of the bands of *E. australis* as representing the true annuli. He writes, "the age-rings also have many characters of those of salmonoid scales, and are quite unlike those of clupeids." In Figure 2, Plate 4 of his publication, Blackburn illustrates his point by marking the outer edges (anteriormost from the focus) of the bands and omits the two clupeoid type annuli present on this particular scale.

For the sake of consistency between the four age readers on this program, it was decided that the clupeoid type of annual checks would be chosen when both bands and checks occurred together on the same scale. When there were several clupeoid type checks confused with a band pattern the check before the band (towards the focus) was regarded as a false check. This system worked well as most of the checks in this position proved to be incomplete rings, scar-like and variable in position relative to the true annuli on the several scales studied from the same fish.

In general the definition of an annulus as given for the Pacific sardine by Walford and Mosher (1943b) was used as a basis for annulus interpretation for the northern anchovy. This definition is as follows: "An annulus is concentric with the margin of the scale. It is not always a sharp or unbroken line; nor are the segments of an interrupted annulus always perfectly co-circular (if the shape of a scale may be called circular in this discussion). But the course of an annulus, continuous or broken as it may be, can usually be traced, by careful scrutiny if necessary, entirely around the sculptured part of the scale from left-hand to right-hand margins. Sometimes they can be followed even around the unsculptured part. Annuli are clearly separated from each other and do not ordinarily meet at any point. *If an annulus has formed, it is present in all the normal scales of an individual.*"

The confusing patterns caused by false checks and accessory bands of anchovy scales do not invalidate the above, rather the situation strengthens the need of such a definition and the careful study of each individual scale.

TABLE 1

Percentage of Second Disagreements of Anchovy Scales From August, 1952 to May, 1954

	Number of rings												
	0		1		2		3		4		5		Average	
	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
August, 1952 to March, 1953_____	28.8	157	23.3	56	32.8	55	26.1	23	20.0	10	0	1	26.8	302
April, 1953 to July, 1953_____			20.3	74	20.4	98	30.3	33	18.2	11	20.0	5	21.7	221
August, 1953 to April, 1954_____	16.9	177	13.7	139	18.9	132	17.6	51	0	9	0	2	16.3	510

TABLE 1
Percentage of Second Disagreements of Anchovy Scales From August, 1952 to May, 1954

The scale photomicrographs[2] (Figures 14-18) were chosen to represent scales from fish of different ages and to demonstrate many of the structures mentioned.

1.5. DISAGREEMENTS

At the onset of anchovy scale determinations each reader interpreted the marks present on a series of scales using as background the experience gained while working with sardine scales. At the first scale reading session major differences of interpretation were verbally analyzed and more definite criteria were established.

During the first eight months of anchovy scale reading 26.8 percent of all the readings were second disagrees. During the next four months there were 21.7 percent and during the next eight months 16.3 percent (Table 1). This decrease in disagreements is not expected to continue as the readers now feel that there is little that can be done further to improve the consistency of anchovy scale mark interpretation. For 257 Pacific sardine scales read by the same workers during August, 1953, through April, 1954, there were 22.2 percent second disagrees. For this same interval the average was 16.3 percent for anchovies.

This comparison of percentages of second disagrees is not as valid a criterion for estimating the difficulty involved in scale reading as is the percentage of first disagrees. Unfortunately a complete series of these first disagreements is not available for the northern anchovy but a small number of first and second disagrees was tallied during the fall of 1953 and these are compared with sardine readings for the same time interval (Table 2).

TABLE 2

Percentage of Disagreements on Anchovy and Sardine Scales Read During the Fall of 1953

	Number read	First disagrees	Second disagrees
Sardine	128	46%	26%
Anchovy	585	50%	16%

TABLE 2

Percentage of Disagreements on Anchovy and Sardine Scales Read During the Fall of 1953

To those familiar with the percentage disagreements of the Pacific sardine as computed by Walford and Mosher (1943b), this 46 percent first and 26 percent second disagrees in the sardine readings may be of some surprise. In the days of development of the scale method on the Pacific sardine rarely would the readers disagree on the first readings by more than 27 percent. Several reasons may be responsible for this increase over the years in percentage of disagreements. One, presumably the most important, is that about two-thirds of the sardine scales from the 1953–54 commercial catch came from fish caught in Mexican waters with only approximately a third caught off Southern California. It has been noted by Frances E. Felin and Julius B. Phillips (personal communication) that sardines from the southern portion of their range have always been more difficult to age than those from Central California and to the north. Two, during the period of sardine scale method development the workers were studying a population dominated by the

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[2] Taken by Harry Mekjian, Marine Fisheries Branch, California Department of Fish and Game with apparatus to be described by Jack Schott and Harry Mekjian.

1938 and 1939 year classes, considered to be of "northern" origin because of their small growth during the first year. Fish of these year classes had typically clear well formed annuli which tended to keep the disagreements fairly low. Three, there were two new scale readers on the program starting in 1952, thus increasing the disagreements because of lack of experience. The over-all validity of the age readings was not affected, however, for the corrections made by the two experienced scale readers brought about continuance of results comparable with former seasons.

For the anchovy, there is no indication in the data at hand that any age group caused more reading error than any other. The percentage of second disagrees of anchovy scales for the period August 1952 to April 1954 (Table 1) shows no obvious differences between the age groups.

1.6. INTERMEDIATE LENGTH CALCULATIONS

Intermediate lengths were calculated by direct proportion between scale size and fish length using the formula

$$L_1 = \frac{L \times l_1}{l}$$

FORMULA

where L = the length of the fish from which the scale was taken, L_1 = the length of the fish at the formation of annulus l_1, l = the length of the scale from the focus to the anterior apex of the scale, and l_1 = the distance between the focus and each annulus.
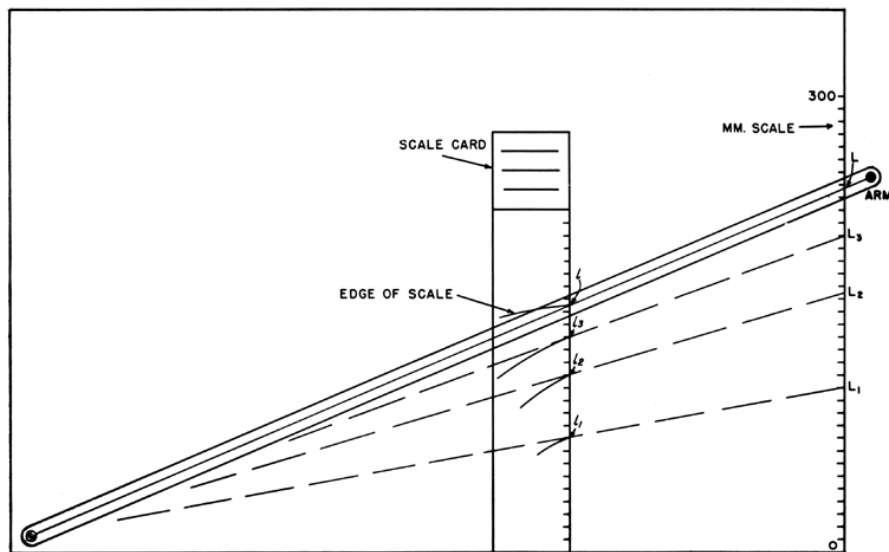
FIGURE 3. Diagram of the intermediate length calculating board used in sardine and anchovy length calculations. This board was described by Lindsay and Thompson (1932). It is based upon the simple, direct proportions as given in the Lee-Dahl formula.

FIGURE 3. Diagram of the intermediate length calculating board used in sardine and anchovy length calculations. This board was described by Lindsay and Thompson (1932). It is based upon the simple, direct proportions as given in the Lee-Dahl formula

The scale card (Figure 2) was placed on a nomograph involving the proportions described in the formula (Figure 3). The lengths were then entered on the scale card for further use.

A critical study of intermediate calculated lengths reveals some of the errors that may be present in these calculations and also gives evidence of the reliability of the scale method. Error inherent in scale formation and structure affecting the accuracy of calculated lengths may result

from several sources: (1) There may be a prolonged interval before scales are formed over the entire body; (2) there may be differential growth of scales on different areas of the fish after all scales are formed; (3) all of the scales may not grow at the same annual rate as does the fish; and (4) fish behavior, gear selection and Lee's phenomenon (Lee, 1920) may cause error in computing the earlier lengths of the fish.

1.6.1. Formation of Scales on Early Juveniles

Klaatch (1890) first considered this problem in his work on Salmo trutta. Huntsman's (1918) studies on scale formation of young herring, Clupea harengus, were later followed by work on different species of Salmo by Parrott (1934) and Neave (1936 and 1943) and on Salvelinus fontinalis by Elson (1939). Blackburn (1950) gave the problem consideration in the development of scale techniques for the Australian anchovy (Engraulis australis). In general the various authors have found in salmonids that scale formation starts when the juveniles are about 20–28 mm. standard length and all scales are formed by the time the young fish are near 60 mm. In S: fontinalis the scales first form when the young fish is about 4 months of age and are not formed over the entire fish until about 7–8 months of age.

In general E. mordax forms scales at a much more rapid rate than do salmonids. A series of 20 late larval and early juvenile northern anchovies ranging from 20–45 mm. standard length was selected for this study. The first indication of primary papillae formation along what would be the lateral line appeared on young juveniles at 28 mm. These papillae first appear as round thin platelets at the extreme caudal portion of the peduncle. There appeared to be a single primary papilla formed on each myomere, at least anteriorly as far as the area near the tip of the pectoral fin. Each scale papilla forms near the anterior edge of the myomere in close approximation to the myocoma between the myomeres (Figure 4). No bifurcation of the secondary papillae (as described by Elson, 1939) was observed. As the papillae progressed anteriorly in the form of a "V" shaped area (Figure 4), the larger papillae some 8–10 myomeres posterior to the point of the "V" assumed a more oval shape. Later, approximately 20–25 myomeres posterior to the most anterior papillae, these papillae which may now be termed scale platelets assumed the more or less rectangular shape of adult scales. All scales were fully formed and overlapping on some juveniles at 39 mm. and on all juveniles at 41 mm.
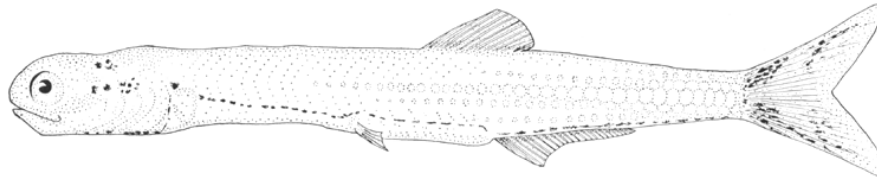
FIGURE 4. Development of scales of a 32 mm. juvenile northern anchovy (*Engraulis mordax*) taken in Monterey Bay, California, March, 1954

FIGURE 4. Development of scales of a 32 mm. juvenile northern anchovy (Engraulis mordax) taken in Monterey Bay, California, March, 1954

1.6.2. Comparison of Calculated Fish Lengths Based on Scales From Different Areas of the Fish

A study of this type not only reveals the presence of error in calculations but determines the area from which the calculations will be

least variable. Dannevig and Høst (1931) found considerable variation in calculated l_1, l_2, etc., lengths on species of *Salmo* and *Gadus*. Phillips (1948) found some variation on scales from 13 areas of the Pacific sardine but not great enough to affect intermediate length calculations. Most studies in the past indicated that the least variations in the calculations of the lengths resulted from scales taken from the area near the center of the body immediately posterior to the tip of the pectoral fin.

Scales from 10 fish ranging from 121 to 163 mm. were chosen for this study. An effort was made not to select scales for clearness or ease of age determination. This was done to calculate the approximate variation that could be expected in routine age analyses. There was little average difference in the calculated L_1 values between the 12 areas compared Table 3, Figure 5). Small discrepancies occurred in areas 3 and 6 where the mean difference in calculated length was greater than ± 1 mm. but less than ± 3 mm. The greatest variation occurred in areas 7, 11 and 12 where the mean difference from the 97.1 mm. average was slightly more than ± 3 mm. These variations are considerably less than those for the Pacific sardine, + 8.9 to - 5.7 mm. from the 105.3 mm. average.
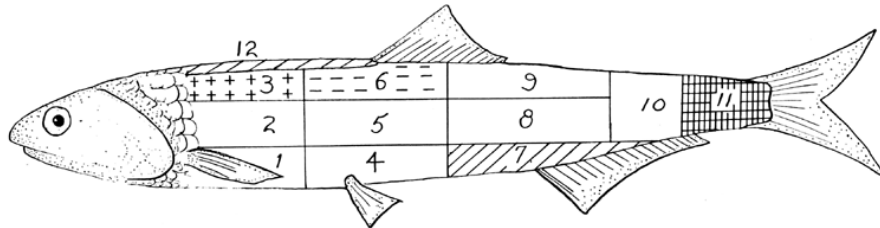
FIGURE 5. Variations of the means of calculated L_1 length from 12 areas on 10 anchovies. Data from Table 3. Blank areas equal less than ± 1 mm. deviation; dashed areas between —1 and —3 mm.; plus areas between +1 and +3 mm.; diagonal areas greater than —3 mm.; and crosshatched areas greater than +3 mm.

FIGURE 5. Variations of the means of calculated L$_1$ length from 12 areas on 10 anchovies. Data from Table 3. Blank areas equal less than ± 1 mm. deviation; dashed areas between -1 and -3 mm.; plus areas between +1 and +3 mm.; diagonal areas greater than -3 mm.; and crosshatched areas greater than +3 mm

The data in Table 3 indicate that there is a factor other than that of differential growth of the scales which causes these variations for the northern anchovy. For fish C, 125 mm., there is practically no variation in calculated lengths except for the scales taken from area 12. The ring on the scales of this fish is "new," that is the fish was approximately one year old and was forming a new ring when captured. This ring is exceptionally clear and the focus of the scale is small and easy to locate. The evidence of this one scale series (the scales of the other fish were not as clear) seems to indicate that there is very little variation in calculated lengths (except in area 12) from scales of this anchovy because of differential growth between areas. To further test this assumption a second series of scales was taken from fish B, Table 3. The calculated L_1 lengths are entered in column b. Duplicate scales could be found only in areas 1 through 8, due to regeneration and loss of scales on the other areas of this fish. This test, showing as much as 6 mm. difference in two readings from area 6, further indicates that most of the variations in Table 3 may be reader and not scale errors. Improper placement of the scale card at the focus, careless marking of the annuli and mistaking false annuli for true are probably the principal causes of discrepancy.

One half the sum of the greatest breadth plus the greatest length of the scale indicated that the largest scales were from area 5 and the

TABLE 3

Calculated Standard Length, by Scale Area, of Fish at Time of Formation of First Annulus
for the Ten Fish Used in the Study

Area	Fish											Average	Av. diff.
	A	B	b*	C	D	E	F	G	H	I	J		
	121	123		125	135	139	139	139	148	148	163		
1	107	100	99	121	78	106	85	104	112	68	94	97.5	0.4
2	105	103	102	122	86	106	88	98	109	62	101	98.0	0.9
3	106	101	102	121	87	104	86	102	114	69	97	98.7	1.6
4	106	99	103	121	86	103	82	106	114	64	94	97.5	0.4
5	102	102	103	121	77	108	85	109	113	59	100	97.6	0.5
6	106	102	96	122	79	105	80	108	108	55	92	95.7	—1.4
7	106	94	90	122	79	101	79	102	116	49	92	94.0	—3.1
8	106	99	99	123	84	102	84	104	116	61	97	97.9	0.8
9	105	99		122	83	109	83	109	110	60	96	97.6	0.5
10	102	96		123	84	108	84	109	114	62	96	97.4	0.3
11	103	99		123	85	108	85	111	120	66	98	100.3	3.2
12	102	91		118	84	98	84	99	106	58	94	93.0	—3.9
Average	104.6	98.8	99.3	121.6	82.7	104.8	83.7	104.9	112.6	61.0	95.9	97.1	

* b values were not included in the averages.

TABLE 3
Calculated Standard Length, by Scale Area, of Fish at Time of Fromation of first Annulus
for the Ten Fish Used in the Study

smallest from areas 7 and 11. Scales in the posterior region in areas 10 and 11 are not satisfactory for scale reading because the many radii on the scales and the crowded annuli make aging difficult.

1.6.3. Scale Length-Fish Length Relationship

Until the scale is fully formed when the anchovy is about 40 mm. in length, scale growth is at a considerably faster rate than the corresponding growth of the fish. To determine if the relationship between scale length and fish length was linear beyond this point (42 mm. standard length), regressions were calculated. The scales used were selected from fish ranging between 36 and 163 mm. and were taken from area 5.

The straight line formula $S = a + bL$ was used to calculate the regression equations from the resulting data (Figure 6). For area 5 the equation $S = -2.57 + .0786L$ defines the scale length-fish length relationship for fish from 36 to 42 mm. standard length and $S = -.38 + .0268L$ for fish above 42 mm. Since Figure 6 indicates that a straight line fits the data satisfactorily the increments of the scale and fish length may be considered proportional for fish lengths above 40 mm. From the equation for the data from fish less than 42 mm., at fish length 32.7 mm. scale length will be 0. This falls within the range of lengths at which scales first appear on the early juveniles.

For a general study of calculated lengths of fishes a correction factor (Hile, 1941 and Blackburn, 1950) may not be necessary but where more exact calculated lengths may be needed the formulas presented by Hile may be used. Should the calculated lengths of *E. mordax* fall below 45 mm. a correction is definitely needed. For the data so far at hand, no calculations of L_1 have given lengths below 49 mm. standard length.
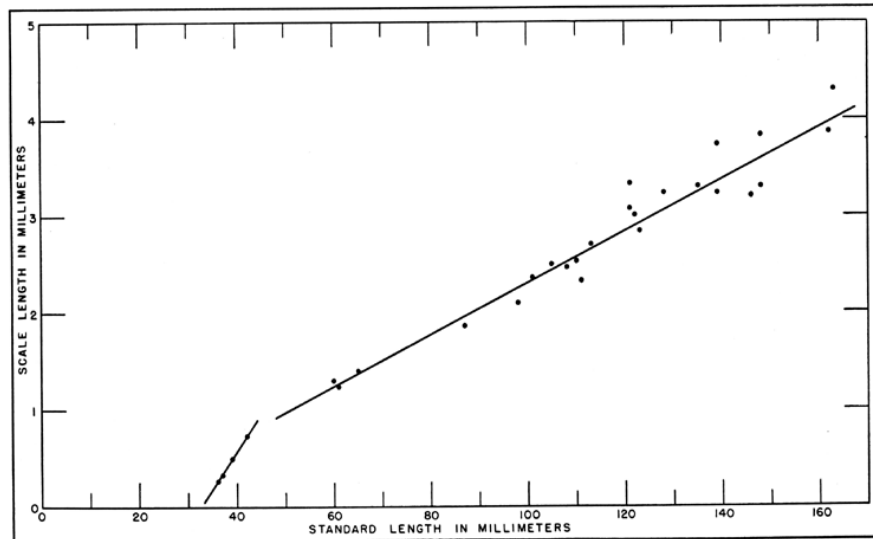
FIGURE 6. The scale length-fish length relationship for the northern anchovy based on Southern and Central California material. The regression was calculated from scale length-fish length measurements for scales from Area 5.

FIGURE 6. The scale length-fish length relationship for the northern anchovy based on Southern and Central California material. The regression was calculated from scale length-fish length measurements for scales from Area 5

1.6.4. Observed Versus Calculated Length

Clark and Phillips (1952) found considerable difference between observed and calculated lengths in the northern anchovy. The largest discrepancy occurred in the comparison of observed year-old fish with calculated L_1 lengths. The observed average was 115 mm. whereas the calculated length was 82 mm. This difference could result from errors
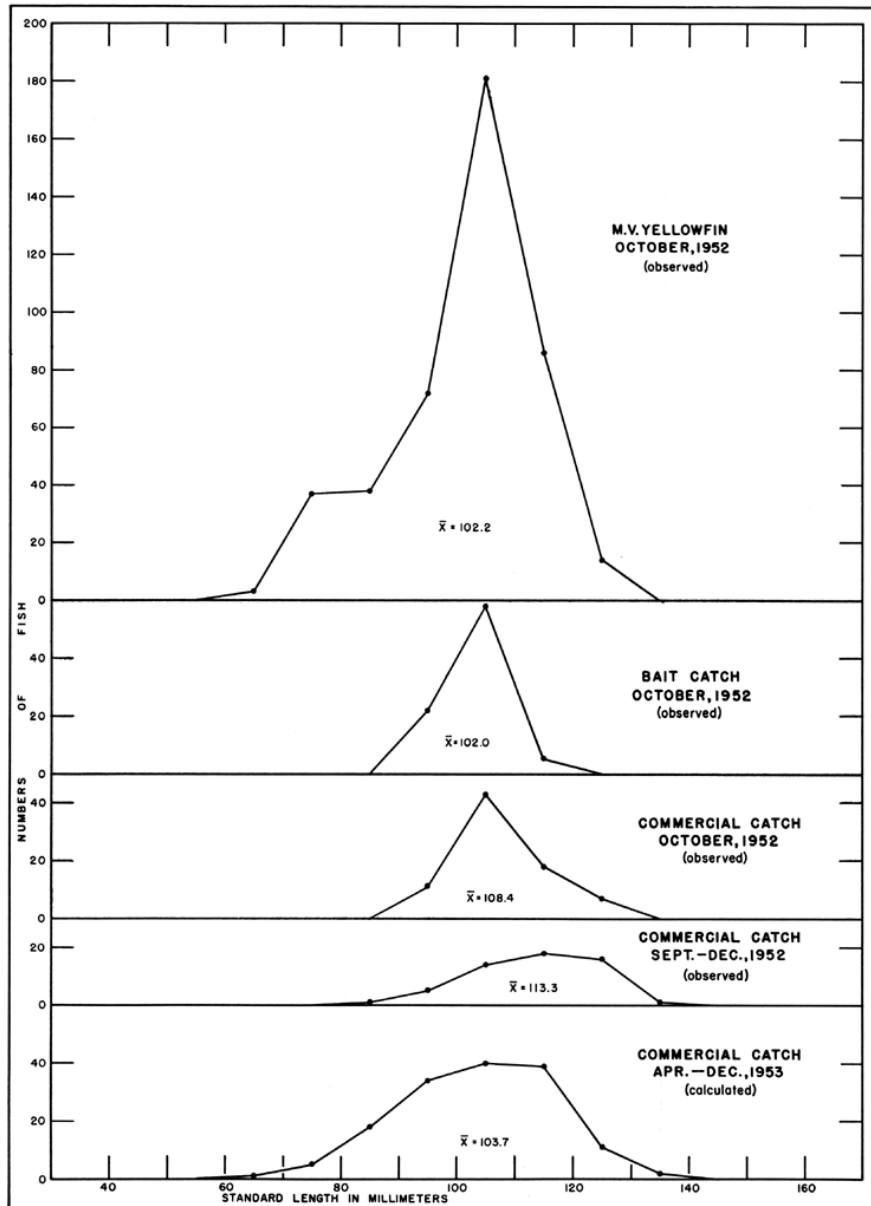
FIGURE 7. Length frequency polygons comparing the sizes of O-ring (1952 year class) anchovies caught by various methods in the fall of 1952 with the calculated lengths of fish of the same year class collected in 1953

FIGURE 7. Length frequency polygons comparing the sizes of O-ring (1952 year class) anchovies caught by various methods in the fall of 1952 with the calculated lengths of fish of the same year class collected in 1953

of annulus interpretation, gear selection, change in behavior or schooling pattern of the fish, or possibly from Lee's phenomenon in the case of the calculations derived from older fish. A similar discrepancy was found when observed and calculated lengths were compared for the 1952 year class anchovies taken in Southern California. The mean observed length of the 1952 year class taken September through December, 1952, was 113.3 mm., whereas the calculated length at L_1 of 1952 year class fish taken by commercial boats during April—December, 1953, in the same area averaged 103.7 mm. (Figure 7).

A series of samples caught in 1952 by different types of gear gives a clue to the reasons for this difference. The data were obtained from samples taken with small explosive charges and by dip netting under a light on the *M/V Yellowfin*, by commercial lampara and purse seine nets, and by small bait nets used by bait haulers. All these samples were taken in the month of October, 1952, in the same general area along the coast between Santa Monica and Newport and within the bays. It is assumed the same group of fish was being sampled.

The comparison (Figure 7) of the calculated lengths at age one of the same year class taken in 1953 in the same area with the observed catches taken in October, 1952, shows that the observed catch taken on the *M/V Yellowfin* was nearly the same in mean size and range as that of the calculated lengths. The commercial catches comprised fish of somewhat larger average size and the smallest fish of the year class were not taken in these samples nor in the October, 1952, bait samples. This is a case of behavior of the fish and not necessarily a matter of gear selection. For the *M/V Yellowfin* samples the small fish from 55 to 85 mm. were taken either by a small dip net from the surface or were found in very small surface schools or "spots" and were usually not found mixed in any numbers with the larger fishes. This suggests that the differences in fish sizes in the samples and in calculated versus observed lengths result from differences in fish behavior. When O-ring anchovies become large and thus fast enough to school with schools of adult fish they are taken by the commercial gear and start entering the commercial catch.

This change in schooling behavior occurs at approximately 85–90 mm. In addition most fishermen tend to select schools containing larger
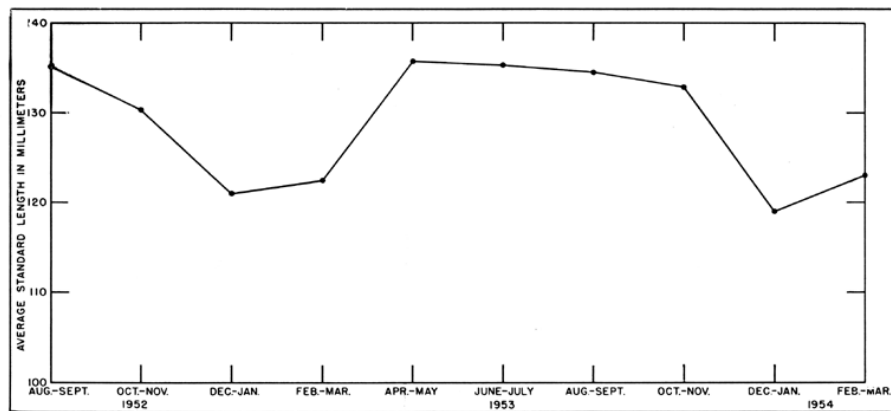
FIGURE 8. Mean body lengths of the Southern California anchovy catch from August, 1952, through March, 1954. The data are grouped by two-month intervals.

FIGURE 8. Mean body lengths of the Southern California anchovy catch from August, 1952, through March, 1954. The data are grouped by two-month intervals

fish as these are more desirable economically. Whenever schools of large adult fish (130 mm. and over) cannot be obtained, however, the fishermen often bring in catches of any sized anchovies present. Bimonthly average size of the Southern California catch from October, 1952, through March, 1954, (Figure 8) demonstrates this seasonal variation in sizes of fish in the catch due to the seasonal movements of the adult fish in and out of the fishing area. This augments the difficulties in obtaining true representative samples of the anchovy population, a problem now under study.

1.7. SEASONAL GROWTH PATTERNS

1.7.1. Time of Annulus Formation

The first annulus of some 0 age-group fish was detected as early as November and December and by April all had formed new rings. In one-year-old fish the second ring first appeared on the margin of the scale about February or March and by April–May all scales had new rings. Scales of all older fish also had new rings by mid-April.

For the sake of consistency all annuli very near the edge of the scale during the period January through March were termed "new." If these new rings had been regarded as old rings formed the winter before there would have been an error of year class assignment for that fish. Many first disagrees on anchovy scale readings were caused by uncertainty as to whether a ring was a "new" or an "old." Without doubt reader errors are present because of misassignment of fish to their proper year class due to confusing new rings with old. As a result of this source of error, a comparison of year class strength from season to season as used in mortality rate estimates should be based on scale data collected only from May through October.

Walford and Mosher (1943a) among others stated that annual winter marks of the scales of the Pacific sardine are truly summer checks as the cessation of growth of the fish occurs at this time. Both Pacific sardines and northern anchovies show very comparable growth in length with new rings appearing in the early winter and with the maximum of growth occurring in spring and early summer. This is surprising because this period of rapid growth in length of the northern anchovy and in its scales occurs during a period of spawning activity. Although some spawning takes place throughout the year most of the spawning is confined to winter, spring and early summer. That these rings are not spawning checks is shown by the presence of an annulus on young, immature fish and by the presence of new rings already forming on the scales of most fish collected just before and during the spring spawning. This indicates that rapid growth had been resumed prior to and was continuing through the spawning season.

To further clarify the time of annulus formation, the distance on the scale from the last annulus to the margin was measured. From this measurement the growth of the fish during the corresponding time interval was calculated. The resulting data for the 1952 year class were grouped and compared by two month intervals from December, 1952, through March, 1954 (Figure 9). During December, 1952, and January, 1953, 65 percent of the fish had no annulus yet formed on the scales. The fish whose scales showed a newly formed
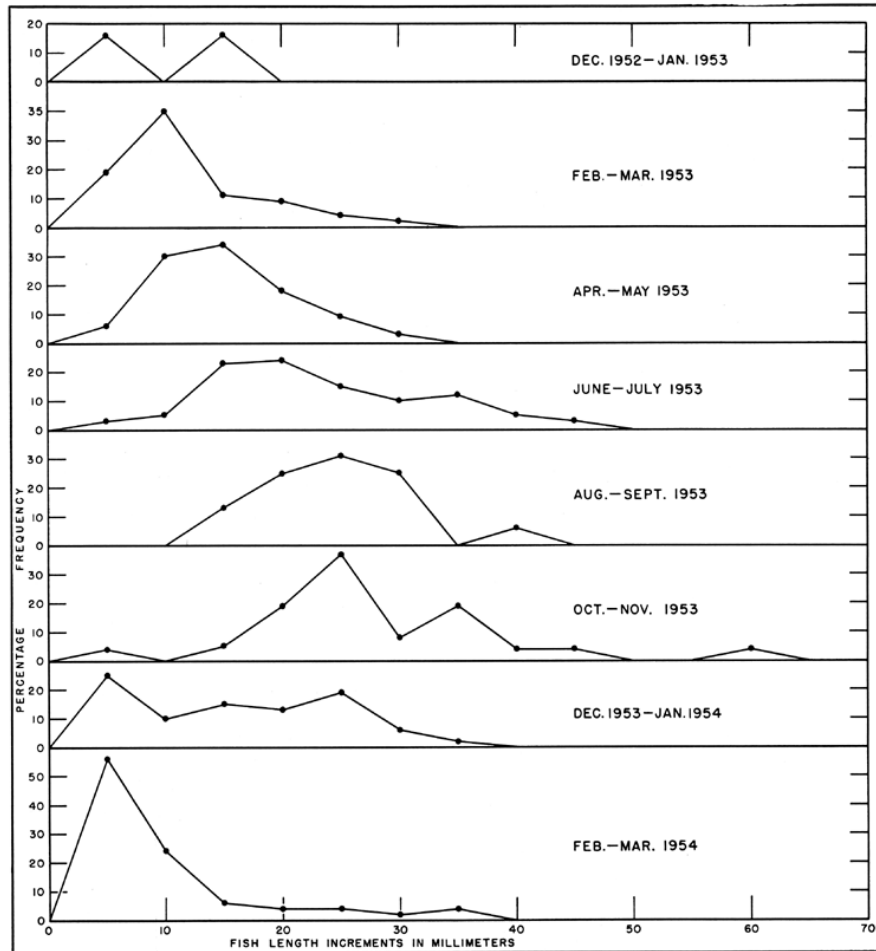
FIGURE 9. Frequency polygons of fish length increments after the first and second annuli are formed, computed from scales of the 1952 year class present in the Southern California catch from December, 1952, through March, 1954

FIGURE 9. Frequency polygons of fish length increments after the first and second annuli are formed, computed from scales of the 1952 year class present in the Southern California catch from December, 1952, through March, 1954

annulus had experienced 15 mm. or less of growth after the annulus was formed. In February and March 85 percent of the fish had a new annulus formed and by April and May all fish had formed new annuli. In the succeeding months growth beyond the annulus increased consistently until the next October–November when a few fish had formed a new annulus with a growth increment of less than 10 mm. By February–March, 1954, 80 percent of the anchovies in the 1952 year class had formed a second annulus and showed as much as 10 mm. of growth after annulus formation. A similar comparison made for the 1951 year class (Figure 10) shows a corresponding growth pattern during the formation of the second and third annuli. New annuli were forming in February and March and the greatest growth increment had occurred by October and November.

1.7.2. Modal Progression

For the 1952 year class (determined by scale readings) length frequency polygons were constructed from all data available from Southern California. These consisted of material from *M/V Yellowfin* cruises and commercial and bait fisheries. The data were plotted by two month intervals from August, 1952, through March, 1954 (Figure 11). These frequencies show only slight growth from September to November, 1952, and accelerated growth starting in December, 1952. The period of fastest growth occurred from February, 1953, through July, 1953, and a new cessation became apparent in October–November, 1953.
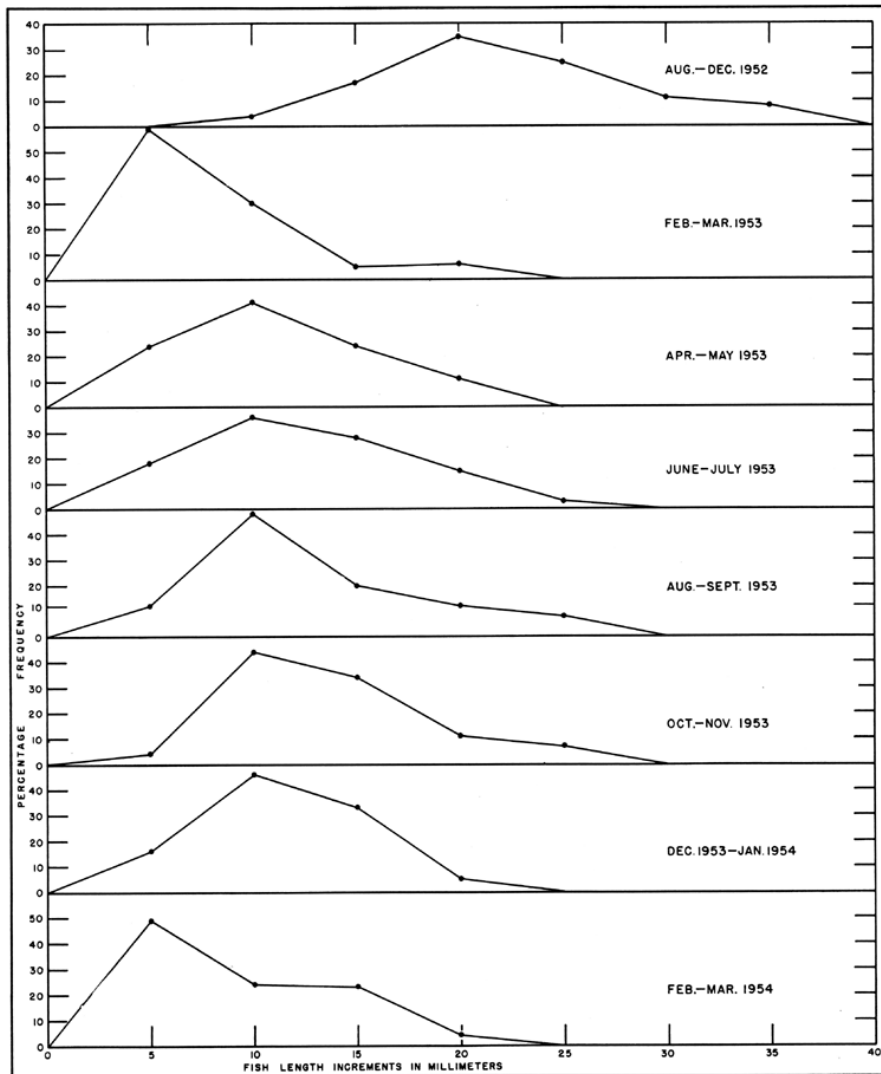
FIGURE 10. Frequency polygons of fish length increments after the second and third annuli are formed, computed from scales of the 1951 year class present in the Southern California catch from August, 1952, through March, 1954

FIGURE 10. Frequency polygons of fish length increments after the second and third annuli are formed, computed from scales of the 1951 year class present in the Southern California catch from August, 1952, through March, 1954

Growth then remained at a minimum until February and March, 1954. This growth pattern corresponds to that indicated by the length increments after the formation of an annulus (Figures 9 and 10).

A further test of the validity of the age determinations was made by an analysis of the growth rates of the 1953 and 1954 year classes. The growth rate during the first five months of life was measured for anchovies collected in Monterey Bay during the summer of 1954. A series of late larvae and early juveniles was collected from March to June, 1954, by dip netting at Monterey Wharf No. 2 by personnel of Hopkins Marine Station. Samples were also collected in the bay in June by the *M / V Yellowfin* and in August at the Pacific Gas and
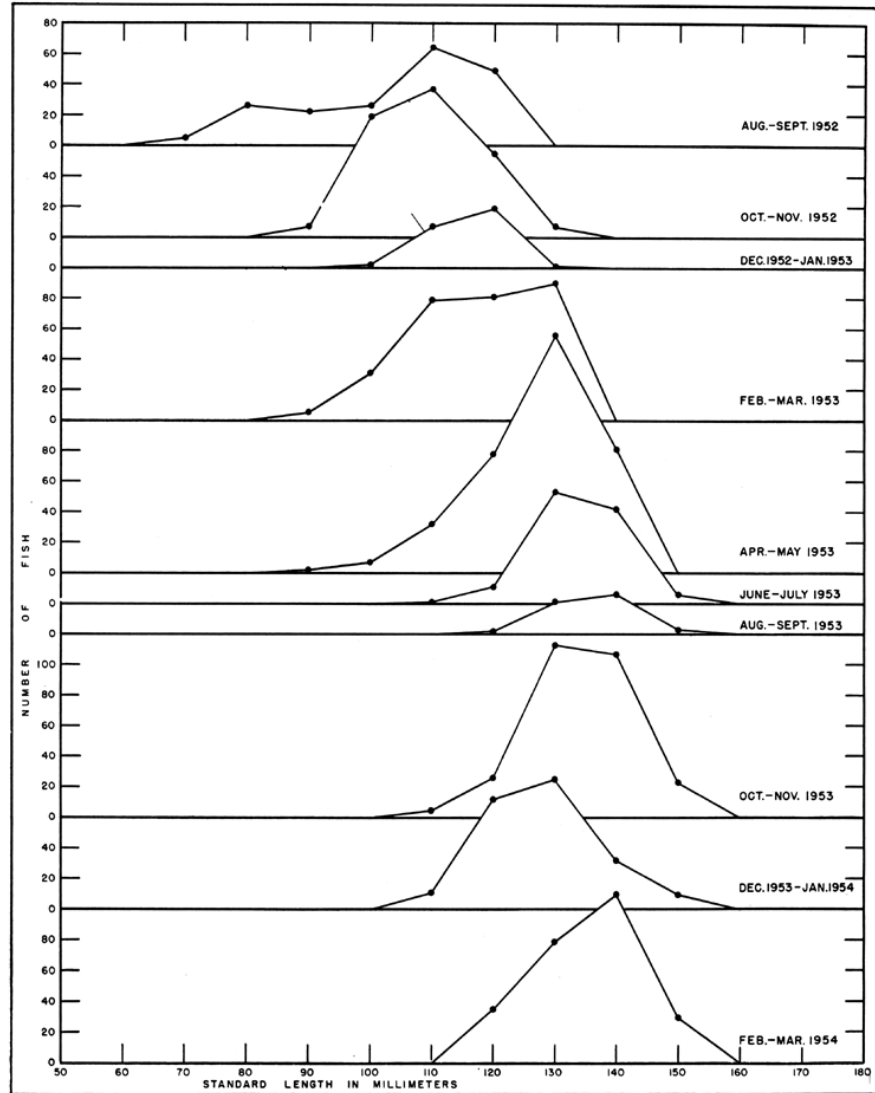
FIGURE 11. Length frequency polygons of the 1952 year class anchovies taken from Southern California waters

FIGURE 11. Length frequency polygons of the 1952 year class anchovies taken from Southern California waters

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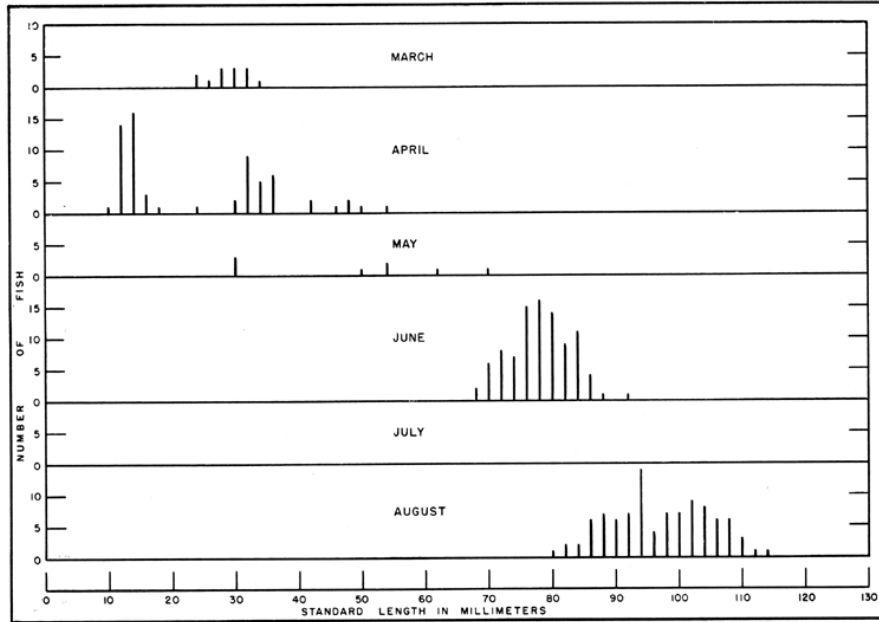
FIGURE 12. *Length frequency polygons of anchovies of the 1954 year class caught in Monterey Bay from March through August, 1954*

Electric Moss Landing steam plant where these fish accumulate on the screens in the intake pipes. The length frequency polygons of these anchovies (Figure 12) indicate a growth of about 100 mm. during their first six to eight months.

This growth compares favorably with that determined from length frequencies of 1953 year class anchovies taken by the *M / V Yellowfin* in Southern California in the spring and fall of 1953 (Figure 13). Scale readings were used to separate the 1953 class from older fish taken in the same collections. The Southern California April O-ring anchovies were larger than the April O-ring Monterey Bay fish in 1954, either due to differences in methods of collection or to time of spawning. The Monterey anchovies taken in a dip net from the pier may comprise fish spawned in the early spring whereas the Southern California fish were taken in the open sea and may include many fish spawned in the late winter. Collecting methods on the *M / V Yellowfin* are such that fish smaller than 50 mm. are seldom taken and consequently only the largest fish of the 1953 year class were caught. Size ranges for the Southern California September–October anchovies closely approximated those for Monterey in August. This comparison indicating parallel growth rate between anchovies whose age was determined by collecting over short time intervals and those whose age was determined by scale readings further demonstrates the validity of the age determination method.
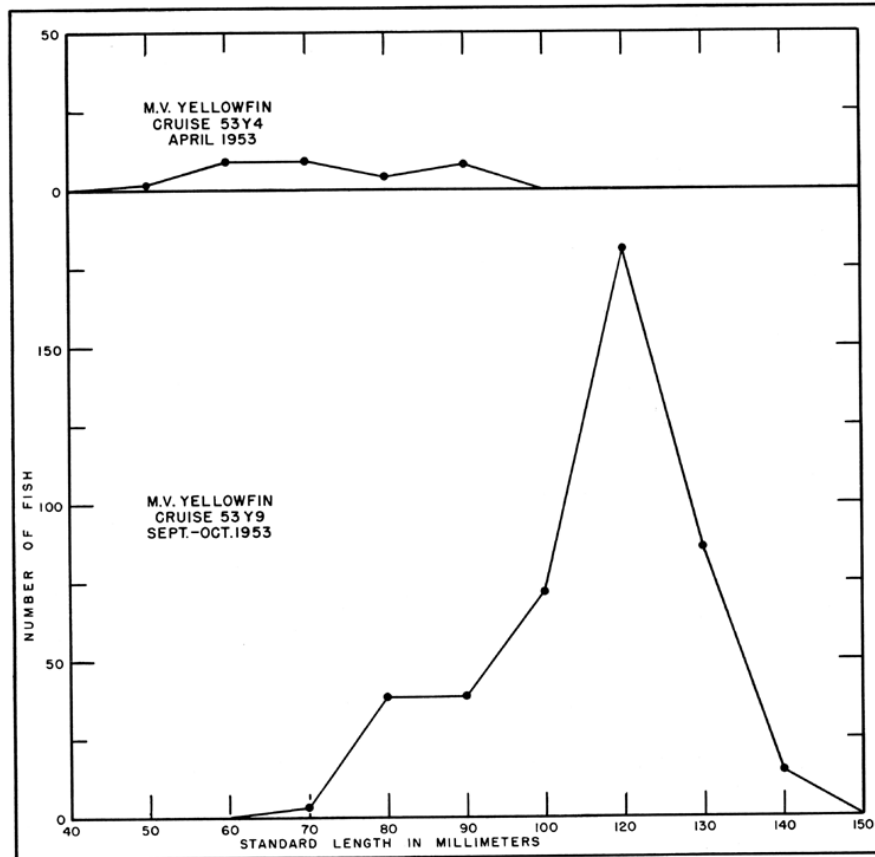
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FIGURE 13. Length frequency polygons of anchovies of the 1953 year class sampled in Southern California in April and September-October, 1953. The ages were determined by scale readings.

FIGURE 13. *Length frequency polygons of anchovies of the 1953 year class sampled in Southern California in April and September–October, 1953. The ages were determined by scale readings*

1.8. CONCLUSIONS

The analyses presented here demonstrate that three requirements for testing the validity of the scale method were fulfilled. (1) There was no indication that the scales did not remain constant in number and identity throughout the life of the fish. (2) Increment growth of the fish length calculated from scale length gave growth rates comparable with those demonstrated by modal progression in length frequencies. (3) The annular ring was formed during the same time interval each year.

The evidence gathered in this study shows, however, that anchovy age readings contain an unmeasurable degree of error. A statistical treatment of the data based on the degree of disagreement between readers would delimit the error of one reader in comparison with another but a study of this type would not measure the reliability of the age determinations. All the readers might be in almost perfect agreement but all might be making the same errors.

The accuracy of the age determinations has not been measured statistically and this should be kept in mind in using the results. If the

errors are consistent in degree from year to year or if they tend to be compensatory, the data may be used to measure variations in age composition and year class strength.

1.9. SUMMARY

1. Otoliths and skeletal structures were of little aid in age determinations of the northern anchovy. Scales mounted dry between two glass slides proved satisfactory and could be routinely handled and read in a manner similar to the method adopted for the Pacific sardine.

2. The percentage of first disagreements between readers was high. About one-half of the scales read were doubtful on the first reading but subsequent readings tended to limit the number of second disagreements. The percentage of disagreements on anchovy scales was comparable with that on the Pacific sardine scales read by the same scale readers during the same period.

3. Calculated lengths for the first year agreed with observed lengths for year-old fish. There·were no differential growth rates between scales from different parts of the body and the scale length-fish length increments were directly proportional for fish larger than 45 mm. standard length. Corrections of calculated L_1 lengths are needed if the L_1 readings are below 45 mm.

4. The annual rings were formed during the early winter and spring months and all fish showed new rings by the middle of April. Growth rates decreased during late summer and fall, August through November.

5. Schooling behavior and economic desirability of larger fishes was responsible for the differences between observed and calculated lengths of the 1952 year class in Southern California.

6. The growth trend of fish in their first year as determined by length frequencies substantiated the age readings.

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——— 1943b. Ibid. 3. Determination of age of adults by scales, and effect of environment in first year's growth as it bears on age determination. U. S. Fish and Wildl. Serv., Spec. Sci. Rept., no. 21, 29 pp.
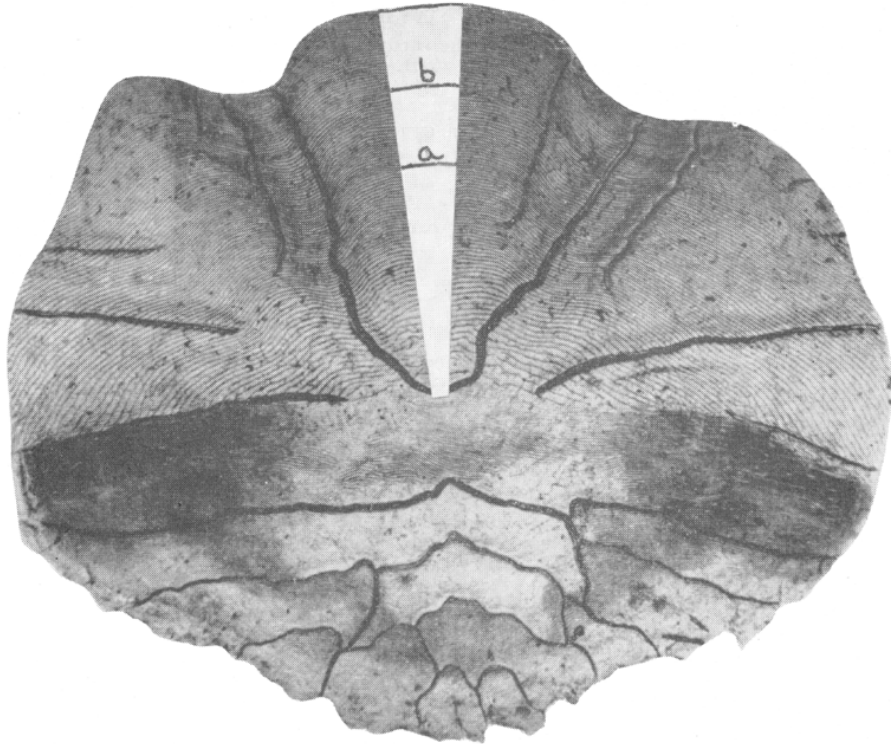
FIGURE 14. A O-ring fish from a 104 mm. female anchovy. The two darkened lines marked a and b do not go completely around the scale. A mark must be traced around the entire sculptured part of the scale to be a valid annulus.

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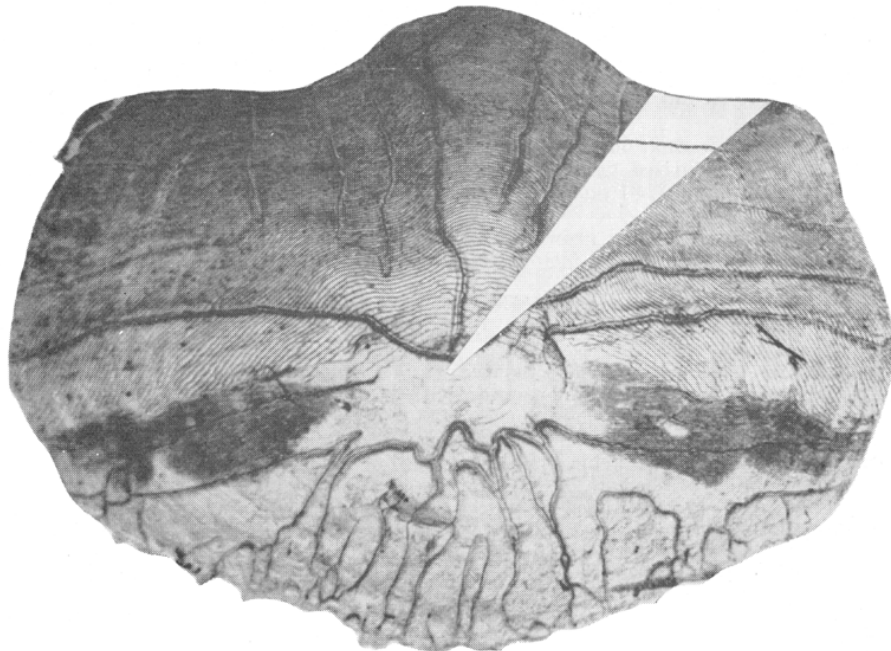
FIGURE 15. An anchovy scale showing one annulus from a 132 mm. female

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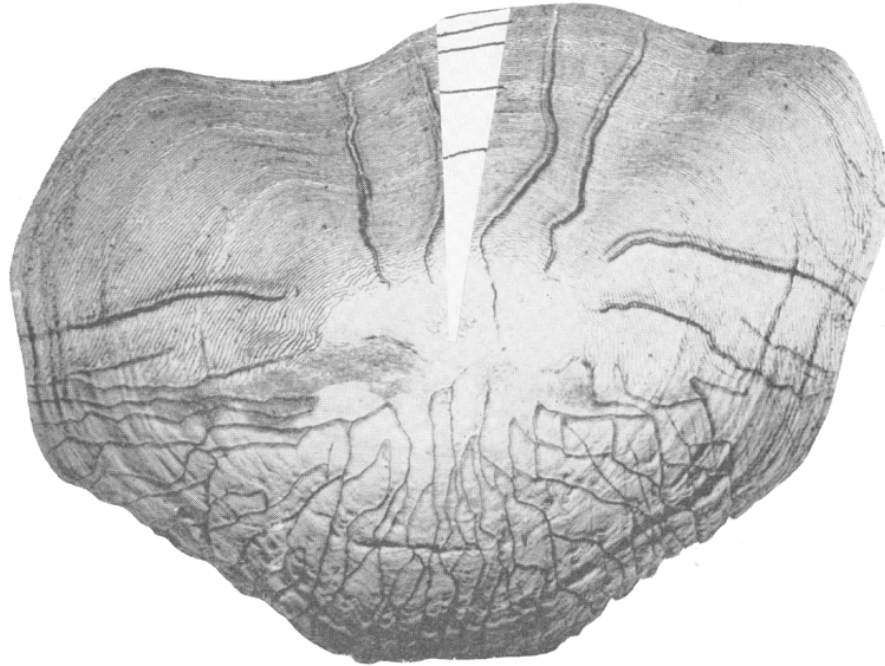
FIGURE 16. An anchovy scale showing four clear annuli from a 166 mm. female. This scale has a regenerated center. There is no evidence of salmonoid type bands. The clupeoid type annuli only are present
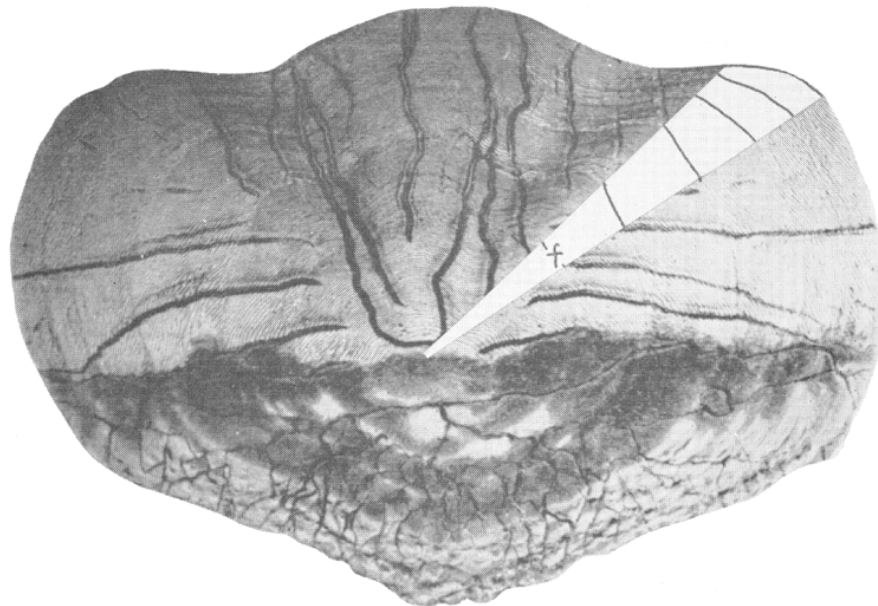
FIGURE 17. An anchovy scale with four annuli from a 150 mm. female. The ring marked f was considered false because it was not present on the other scales taken from this fish. This scale shows both salmonoid bands and clupeoid checks
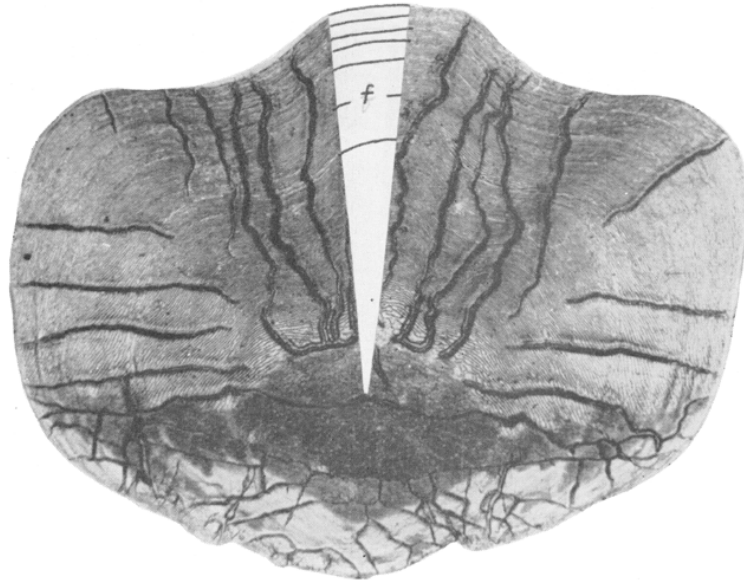
FIGURE 18. An anchovy scale with five annuli from a 160 mm. male. The false ring marked f was discounted because it could not be traced entirely around the scale.

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FIGURE 1. Map of statistical regions

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2. AGE AND LENGTH COMPOSITION OF THE NORTHERN ANCHOVY CATCH OFF THE COAST OF CALIFORNIA IN 1952–53 AND 1953–54

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This report on age and length composition of the catch of northern anchovy (Engraulis mordax) off the California coast covers two seasons' analyses. The techniques adopted for study of the anchovy are similar to those used in the routine Pacific sardine (Sardinops caerulea) age determinations and are described by Felin and Phillips (1948).

During the 1952–53 season 4,095 tons of anchovies were landed in the San Francisco region, including landings at Bodega Bay, Tomales, Berkeley, and San Francisco. In the Monterey region, including Santa Cruz, Moss Landing, and Monterey, 26,043 tons were delivered. The San Francisco and Monterey regions combined are here termed the Central California region. To the north practically no anchovies were taken and data for Northern California comprising the Del Norte and Eureka regions are not included. In the south, 5,202 tons were landed in the Santa Barbara region, including Santa Barbara, Ventura, and Port Hueneme. In the Los Angeles region, including Santa Monica, San Pedro, Wilmington, Long Beach, and Newport, 2,993 tons were caught. The Santa Barbara and Los Angeles regions combined are considered Southern California. The San Diego catch is not included as there was no sampling there; the poundage taken is too small to warrant detailed study.

During the 1953–54 season the tonnage by region varied considerably from the previous season, with the greater percentage of the catch being landed in the Southern California area. In San Francisco only 355 tons were landed and in Monterey only 671 tons, whereas 17,323 tons were delivered in Santa Barbara and 19,208 tons in Los Angeles.

Sampling was carried on at San Francisco, Moss Landing, Monterey, Santa Barbara, Port Hueneme, and in most ports of landing in the Los Angeles region.

Tables 1-17 give by sex and region of catch, for two–month intervals and for the total season, the length-frequency distributions of anchovies of each year class as taken in the 1952–53 random scale samples. Table 18 gives total tonnages and numbers of fish of each age caught in each region, by two-month intervals. Tables 19-36 give similar length-frequencies for 1953–54, and Table 37[*] the total tonnages and numbers of fish.

2.1. REFERENCE

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TABLE 1 Age and Length Composition in 1952-53 Season
SAN FRANCISCO

Year-class	1952			1951			1950			1949			1948			1947			1946			Total		
No. of rings	0			1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
104	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
106	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
108	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
110	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
112	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
114	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
116	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
118	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
120	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
122	..	..	..	..	2	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	3	4
124	..	..	..	1	2	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
126	..	..	..	..	2	2	1	1	2	..	..	..	1	..	1	..	..	..	..	..	..	2	3	5
128	..	..	..	..	2	2	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	1	3	4
130	..	..	..	..	..	..	1	4	5	..	..	..	..	1	1	..	..	..	..	..	..	1	5	6
132	..	..	..	..	..	..	5	3	8	..	..	..	..	1	1	..	..	..	..	..	..	5	4	9
134	..	..	..	..	1	1	..	3	3	1	1	2	..	..	..	..	..	..	..	..	..	1	5	6
136	..	..	..	..	..	..	6	4	10	4	3	7	..	..	..	..	..	..	..	..	..	10	7	17
138	..	..	..	..	..	..	6	5	11	6	..	6	..	..	..	..	..	..	..	..	..	12	5	17
140	..	..	..	..	..	..	7	3	10	3	4	7	2	2	4	1	..	1	..	..	..	13	9	22
142	..	..	..	..	..	..	7	10	17	6	4	10	..	1	1	..	..	..	..	..	..	13	15	28
144	..	..	..	..	..	..	10	7	17	9	6	15	1	3	4	1	..	1	..	..	..	21	16	37
146	..	..	..	..	..	..	8	10	18	8	6	14	1	1	2	1	..	1	..	..	..	18	17	35
148	..	..	..	..	..	..	14	6	20	11	10	21	1	2	3	..	2	2	..	..	..	26	20	46
150	..	..	..	..	..	..	2	6	8	11	10	21	1	4	5	..	1	1	1	..	1	15	21	36
152	..	..	..	..	..	..	3	7	10	6	16	22	3	2	5	1	..	1	..	..	..	13	25	38
154	..	..	..	..	..	..	3	4	7	4	12	16	3	..	3	..	1	1	..	..	..	10	17	27
156	..	..	..	..	..	..	..	4	4	3	12	15	1	4	5	1	..	1	..	..	..	5	20	25
158	..	..	..	..	..	..	..	..	..	5	10	15	3	1	4	1	..	1	..	..	..	9	11	20
160	..	..	..	..	..	..	..	1	1	..	..	..	..	5	5	1	5	6	..	1	1	1	12	13
162	..	..	..	..	..	..	..	..	..	..	4	4	..	3	3	..	..	..	..	..	..	..	7	7
164	..	..	..	..	..	..	..	..	..	..	1	1	1	3	4	..	1	1	..	..	..	1	5	6
166	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3	..	1	1	..	..	..	1	3	4
168	..	..	..	..	..	..	..	..	..	..	1	1	1	1	2	..	2	2	..	1	1	1	5	6
170	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	2	..	2
172	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..	1
174	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
176	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
178	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
180	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
182	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	1
184	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
186	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	1
Totals	2	..	2	3	11	14	74	80	154	78	100	178	22	36	58	8	14	22	2	3	5	189	244	433

TABLE 1 Age and Length Composition in 1952–53 Season
SAN FRANCISCO

TABLE 2
Age and Length Composition in August and September, 1952-53 Season
SAN FRANCISCO

Year-class	1951			1950			1949			1948			1947			1946			Total		
No. of rings	1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
112	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
116	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
122	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
124	--	2	2	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
126	--	1	1	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
128	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
130	--	--	--	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
132	--	--	--	2	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
134	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
136	--	--	--	3	1	4	3	2	5	--	--	--	--	--	--	--	--	--	6	3	9
138	--	--	--	3	3	6	2	--	2	--	--	--	--	--	--	--	--	--	5	3	8
140	--	--	--	3	1	4	1	2	3	1	1	2	--	--	--	--	--	--	5	4	9
142	--	--	--	3	8	11	2	--	2	--	1	1	--	--	--	--	--	--	5	9	14
144	--	--	--	4	5	9	5	5	10	--	3	3	--	--	--	--	--	--	9	13	22
146	--	--	--	5	9	14	2	4	6	1	--	1	--	--	--	--	--	--	8	13	21
148	--	--	--	7	2	9	6	4	10	--	1	1	--	--	--	--	--	--	13	7	20
150	--	--	--	--	3	3	4	7	11	1	3	4	--	--	--	1	--	1	6	13	19
152	--	--	--	1	4	5	4	8	12	1	--	1	--	--	--	--	--	--	6	12	18
154	--	--	--	3	3	6	3	7	10	2	--	2	--	1	1	--	--	--	8	11	19
156	--	--	--	--	2	2	--	6	6	1	2	3	1	--	1	--	--	--	2	10	12
158	--	--	--	--	--	--	3	5	8	2	--	2	1	--	1	--	--	--	6	5	11
160	--	--	--	--	1	1	--	--	--	--	2	2	1	3	4	--	--	--	1	6	7
162	--	--	--	--	--	--	--	2	2	--	2	2	--	--	--	--	--	--	--	4	4
164	--	--	--	--	--	--	--	1	1	--	3	3	--	--	--	--	--	--	--	4	4
166	--	--	--	--	--	--	--	1	1	--	1	1	--	--	--	--	--	--	--	2	2
168	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1	--	2	2
170	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
172	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
174	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
176	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
178	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
182	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
184	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
186	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
Totals	1	3	4	36	47	83	35	55	90	10	19	29	4	6	10	1	1	2	87	131	218

TABLE 2
Age and Length Composition in August and September, 1952–53 Season
SAN FRANCISCO

TABLE 3

Age and Length Composition in October and November, 1952-53 Season

SAN FRANCISCO

Standard length mm.	1951 (1 ring) M	F	T	1950 (2 rings) M	F	T	1949 (3 rings) M	F	T	1948 (4 rings) M	F	T	1947 (5 rings) M	F	T	1946 (6 rings) M	F	T	Total M	F	T
112	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
116	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
118	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
122	--	2	2	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	2	3
124	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
126	--	1	1	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	1	2
128	--	--	--	--	2	2	1	--	1	--	--	--	--	--	--	--	--	--	1	2	3
130	--	--	--	3	3	6	--	--	--	--	1	1	--	--	--	--	--	--	3	4	7
132	--	--	--	--	3	3	--	--	--	--	1	1	--	--	--	--	--	--	--	4	4
134	--	1	1	2	2	4	1	--	1	--	--	--	--	--	--	--	--	--	3	3	6
136	--	--	--	3	2	5	1	--	1	1	--	1	--	--	--	--	--	--	5	2	7
138	--	--	--	4	2	6	4	--	4	1	--	1	--	--	--	--	--	--	9	2	11
140	--	--	--	4	2	6	2	2	4	1	1	2	1	--	1	--	--	--	8	5	13
142	--	--	--	6	2	8	4	4	8	--	--	--	--	--	--	--	--	--	10	6	16
144	--	--	--	2	1	3	4	1	5	--	--	--	1	--	1	--	--	--	7	2	9
146	--	--	--	6	3	9	5	2	7	--	1	1	1	--	1	--	--	--	12	6	18
148	--	--	--	2	3	5	4	6	10	1	1	2	--	1	1	--	--	--	7	11	18
150	--	--	--	2	2	4	7	3	10	--	--	--	--	--	--	--	--	--	9	5	14
152	--	--	--	--	1	1	2	8	10	2	2	4	1	--	1	--	--	--	5	11	16
154	--	--	--	--	2	2	1	5	6	1	--	1	--	--	--	--	--	--	2	7	9
156	--	--	--	--	--	--	3	6	9	--	1	1	--	--	--	--	--	--	3	7	10
158	--	--	--	--	--	--	2	5	7	--	--	--	--	--	--	--	--	--	2	5	7
160	--	--	--	--	--	--	--	--	--	--	3	3	--	2	2	--	1	1	--	6	6
162	--	--	--	--	--	--	--	2	2	--	1	1	--	--	--	--	--	--	--	3	3
164	--	--	--	--	--	--	--	--	--	1	1	2	--	1	1	--	--	--	1	2	3
166	--	--	--	--	--	--	--	--	--	1	1	2	--	2	2	--	--	--	1	3	4
168	--	--	--	--	--	--	--	--	--	1	1	2	--	--	--	--	--	--	1	1	2
170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	1	--	1
172	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
174	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
176	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
178	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
182	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
184	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals	1	6	7	34	30	64	41	44	85	12	15	27	4	6	10	1	2	3	93	103	196

DEPARTMENT OF FISH AND GAME

TABLE 3
Age and Length Composition in October and November, 1952–53 Season
SAN FRANCISCO

TABLE 4

Age and Length Composition in February and March, 1952-53 Season

SAN FRANCISCO

Standard length mm.	1952			1951			1950			1949			1948			1947			Total		
No. of rings	0			1			2			3			4			5					
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
104	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
106	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
114	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
116	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
120	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
122	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
124	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
128	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
130	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
132	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
134	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
136	--	--	--	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
146	--	--	--	--	--	--	1	--	1	1	--	1	--	--	--	--	--	--	2	--	2
148	--	--	--	--	--	--	1	1	2	1	--	1	--	--	--	--	1	1	2	2	4
150	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1	--	--	--	--	2	2
152	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
158	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
Totals	2	--	2	1	2	3	4	3	7	2	1	3	--	2	2	--	2	2	9	10	19

TABLE 4
Age and Length Composition in February and March, 1952–53 Season
SAN FRANCISCO

TABLE 5
Age and Length Composition in 1952-53 Season
MONTEREY

Standard length mm.	1952 (0) M	F	T	1951 (1) M	F	T	1950 (2) M	F	T	1949 (3) M	F	T	1948 (4) M	F	T	1947 (5) M	F	T	1946 (6) M	F	T	Total M	F	T
108	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
110	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
112	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
114	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
116	--	--	--	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
118	--	--	--	4	2	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	2	6
120	1	1	2	--	1	1	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	2	3	5
122	--	--	--	2	3	5	1	--	1	1	1	2	--	--	--	--	--	--	--	--	--	4	4	8
124	--	--	--	--	1	1	1	--	1	1	1	2	--	--	--	--	--	--	--	--	--	2	2	4
126	--	2	2	5	3	8	1	1	2	1	1	2	--	--	--	--	--	--	--	--	--	7	7	14
128	--	1	1	2	2	4	1	1	2	1	--	1	--	--	--	--	--	--	--	--	--	4	4	8
130	--	--	--	--	1	1	1	1	2	1	1	2	1	--	1	--	--	--	--	--	--	3	3	6
132	--	--	--	2	--	2	3	2	5	1	2	3	2	--	2	--	--	--	--	--	--	8	4	12
134	--	--	--	2	2	4	4	4	8	2	--	2	--	--	--	--	--	--	--	--	--	8	6	14
136	--	--	--	1	1	2	11	2	13	2	1	3	1	--	1	--	--	--	--	--	--	15	4	19
138	--	--	--	--	1	1	12	7	19	5	5	10	3	1	4	--	--	--	--	--	--	20	14	34
140	--	--	--	--	--	--	8	7	15	9	4	13	--	--	--	--	--	--	--	--	--	17	11	28
142	--	--	--	--	1	1	19	13	32	7	4	11	2	3	5	--	--	--	--	--	--	28	21	49
144	--	--	--	--	--	--	19	8	27	10	9	19	3	5	8	--	--	--	--	--	--	32	22	54
146	--	--	--	--	--	--	9	11	20	14	10	24	4	5	9	1	--	1	--	--	--	28	26	54
148	--	--	--	--	--	--	11	18	29	17	17	34	6	7	13	1	--	1	--	--	--	35	42	77
150	--	--	--	--	--	--	7	9	16	10	12	22	7	8	15	--	--	--	--	--	--	24	29	53
152	--	--	--	--	--	--	5	7	12	16	23	39	6	11	17	3	--	3	--	--	--	30	41	71
154	--	--	--	--	--	--	1	1	2	8	18	26	6	7	13	4	1	5	--	--	--	19	27	46
156	--	--	--	--	--	--	1	4	5	7	20	27	6	14	20	2	3	5	--	--	--	16	41	57
158	--	--	--	--	--	--	--	3	3	2	9	11	5	8	13	4	4	8	--	--	--	11	24	35
160	--	--	--	--	--	--	--	--	--	--	3	3	6	14	20	1	4	5	--	--	--	7	21	28
162	--	--	--	--	--	--	--	--	--	--	4	4	6	9	15	5	6	11	--	--	--	11	19	30
164	--	--	--	--	--	--	--	--	--	--	3	3	2	6	8	4	5	9	--	1	1	6	15	21
166	--	--	--	--	--	--	--	--	--	--	--	--	--	10	10	1	4	5	--	--	--	1	14	15
168	--	--	--	--	--	--	--	--	--	--	--	--	--	5	5	--	2	2	--	1	1	--	8	8
170	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3	--	7	7	--	2	2	1	11	12
172	--	--	--	--	--	--	--	--	--	--	--	--	--	4	4	--	3	3	--	2	2	--	9	9
174	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1	--	1	1	--	3	3
176	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	--	1	1	--	--	--	--	3	3
Totals	2	4	6	20	20	40	118	101	219	114	146	260	67	123	190	26	41	67	--	7	7	347	442	789

TABLE 5
Age and Length Composition in 1952–53 Season
MONTEREY

TABLE 6

Age and Length Composition in August and September, 1952-53 Season

MONTEREY

Year-class	1950			1949			1948			1947			Total		
No. of rings	2			3			4			5					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
132	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
136	2	--	2	--	--	--	--	--	--	--	--	--	2	--	2
138	1	--	1	2	--	2	--	--	--	--	--	--	3	--	3
140	1	1	2	1	--	1	--	--	--	--	--	--	2	1	3
142	4	--	4	1	1	2	--	--	--	--	--	--	5	1	6
144	3	1	4	1	1	2	1	--	1	--	--	--	5	2	7
146	3	3	6	1	--	1	--	1	1	--	--	--	4	4	8
148	3	4	7	2	1	3	1	--	1	--	--	--	6	5	11
150	2	2	4	--	4	4	--	1	1	--	--	--	2	7	9
152	3	2	5	5	5	10	4	2	6	--	--	--	12	9	21
154	1	--	1	2	5	7	--	--	--	1	--	1	4	5	9
156	1	3	4	4	8	12	1	6	7	--	--	--	6	17	23
158	--	2	2	1	4	5	2	3	5	2	--	2	5	9	14
160	--	--	--	--	3	3	1	5	6	--	--	--	1	8	9
162	--	--	--	--	1	1	2	4	6	2	2	4	4	7	11
164	--	--	--	--	1	1	--	3	3	--	--	--	--	4	4
166	--	--	--	--	--	--	--	3	3	--	1	1	--	4	4
168	--	--	--	--	--	--	--	--	--	--	2	2	--	2	2
170	--	--	--	--	--	--	--	1	1	--	3	3	--	4	4
172	--	--	--	--	--	--	--	--	--	--	2	2	--	2	2
174	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
176	--	--	--	--	--	--	--	2	2	--	1	1	--	3	3
Totals	25	18	43	20	34	54	12	31	43	5	12	17	62	95	157

TABLE 6
Age and Length Composition in August and September, 1952–53 Season
MONTEREY

TABLE 7

Age and Length Composition in October and November, 1952-53 Season

MONTEREY

Year-class	1951			1950			1949			1948			1947			1946			Total		
No. of rings	1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
118	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
120	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
122	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
124	--	1	1	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
126	1	2	3	1	2	3	--	--	--	--	--	--	--	--	--	--	--	--	2	4	6
128	1	--	1	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	2	--	2
130	--	--	--	--	--	--	--	1	1	1	--	1	--	--	--	--	--	--	1	1	2
132	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
134	1	1	2	2	2	4	2	--	2	--	--	--	--	--	--	--	--	--	5	3	8
136	--	--	--	5	2	7	2	--	2	--	1	1	--	--	--	--	--	--	7	3	10
138	--	--	--	6	3	9	3	2	5	1	1	2	--	--	--	--	--	--	10	6	16
140	--	--	--	3	5	8	3	2	5	1	--	1	--	--	--	--	--	--	7	7	14
142	--	1	1	9	6	15	2	4	6	1	1	2	1	--	1	--	--	--	13	12	25
144	--	--	--	9	4	13	3	5	8	2	1	3	1	--	1	--	--	--	15	10	25
146	--	--	--	5	5	10	3	6	9	2	2	4	1	--	1	--	--	--	11	13	24
148	--	--	--	4	9	13	6	5	11	3	9	12	--	--	--	--	--	--	13	23	36
150	--	--	--	3	4	7	6	8	14	4	--	4	2	--	2	--	--	--	15	12	27
152	--	--	--	--	--	--	3	9	12	1	5	6	--	--	--	--	--	--	4	14	18
154	--	--	--	--	1	1	5	5	10	4	3	7	--	--	--	--	--	--	9	9	18
156	--	--	--	--	1	1	2	5	7	4	3	7	1	2	3	--	--	--	7	11	18
158	--	--	--	--	--	--	--	5	5	2	3	5	1	2	3	--	--	--	3	10	13
160	--	--	--	--	--	--	--	2	2	--	1	1	1	1	2	--	--	--	1	4	5
162	--	--	--	--	--	--	2	1	3	2	4	6	2	4	6	--	--	--	6	9	15
164	--	--	--	--	--	--	--	--	--	1	2	3	3	4	7	--	--	--	4	6	10
166	--	--	--	--	--	--	--	--	--	--	4	4	1	3	4	--	1	1	1	8	9
168	--	--	--	--	--	--	--	--	--	--	4	4	--	--	--	--	--	--	--	4	4
170	--	--	--	--	--	--	1	--	1	--	1	1	--	3	3	--	1	1	1	5	6
172	--	--	--	--	--	--	--	--	--	--	4	4	--	--	--	--	1	1	--	4	4
174	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	5	5	10	51	44	95	44	60	104	29	49	78	14	19	33	--	3	3	143	180	323

TABLE 7
Age and Length Composition in October and November, 1952–53 Season
MONTEREY

TABLE 8

Age and Length Composition in December and January, 1952-53 Season

MONTEREY

Year-class	1952			1951			1950			1949			1948			1947			1946			Total		
No. of rings	0			1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
112	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
118	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
122	--	--	--	1	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
124	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
126	--	1	1	2	1	3	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	3	2	5
128	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	1
130	--	--	--	--	--	--	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	2	--	2
132	--	--	--	1	--	1	1	--	1	1	2	3	2	--	2	--	--	--	--	--	--	4	2	6
134	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
136	--	--	--	1	1	2	1	--	1	--	--	--	1	--	1	--	--	--	--	--	--	3	1	4
138	--	--	--	--	1	1	3	3	6	--	--	--	--	--	--	--	--	--	--	--	--	3	5	8
140	--	--	--	--	--	--	--	1	1	1	1	2	--	--	--	--	--	--	--	--	--	1	2	3
142	--	--	--	--	--	--	3	4	7	2	--	2	--	--	--	--	--	--	--	--	--	5	4	9
144	--	--	--	--	--	--	2	1	3	2	1	3	1	2	3	--	--	--	--	--	--	5	4	9
146	--	--	--	--	--	--	1	--	1	6	3	9	1	3	4	--	--	--	--	--	--	8	6	14
148	--	--	--	--	--	--	1	1	2	4	3	7	3	2	5	--	--	--	--	--	--	8	6	14
150	--	--	--	--	--	--	1	3	4	3	2	5	2	3	5	--	--	--	--	--	--	6	8	14
152	--	--	--	--	--	--	1	5	6	6	2	8	1	1	2	1	--	1	--	--	--	8	8	16
154	--	--	--	--	--	--	--	--	--	--	3	3	2	--	2	1	--	1	--	--	--	3	3	6
156	--	--	--	--	--	--	--	--	--	--	6	6	1	4	5	--	1	1	--	--	--	1	11	12
158	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	1	1	2	--	--	--	1	2	3
160	--	--	--	--	--	--	--	--	--	--	--	--	2	4	6	--	1	1	--	--	--	2	5	7
162	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	1	--	1	--	--	--	1	2	3
164	--	--	--	--	--	--	--	--	--	--	1	1	1	1	2	1	1	2	--	--	--	2	3	5
166	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
168	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1	--	2	2
172	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	--	2	2
Totals	1	1	2	6	7	13	16	18	34	27	25	52	17	25	42	4	5	9	--	3	3	71	84	155

TABLE 8
Age and Length Composition in December and January, 1952–53 Season
MONTEREY

TABLE 9

Age and Length Composition in February and March, 1952-53 Season
MONTEREY

Year-class	1952			1951			1950			1949			1948			1947			1946			Total		
No. of rings	0			1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
108	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
110	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
114	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
116	--	--	--	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
118	--	--	--	2	1	3	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	2	2	4
120	1	1	2	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
122	--	--	--	1	1	2	--	--	--	1	1	2	--	1	1	--	--	--	--	--	--	2	3	5
124	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
126	--	1	1	2	--	2	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	3	2	5
128	--	1	1	1	1	2	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	2	2	4
130	--	--	--	--	1	1	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
132	--	--	--	1	--	1	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
134	--	--	--	--	1	1	2	2	4	--	--	--	--	--	--	--	--	--	--	--	--	2	3	5
136	--	--	--	--	--	--	3	--	3	--	--	--	--	--	--	--	--	--	--	--	--	3	--	3
138	--	--	--	--	--	--	2	1	3	--	2	2	2	--	2	--	--	--	--	--	--	4	3	7
140	--	--	--	--	--	--	4	--	4	3	1	4	1	1	2	--	--	--	--	--	--	8	2	10
142	--	--	--	--	--	--	3	3	6	1	--	1	--	1	1	--	--	--	--	--	--	4	4	8
144	--	--	--	--	--	--	5	2	7	2	3	5	--	--	--	--	--	--	--	--	--	7	5	12
146	--	--	--	--	--	--	--	3	3	4	--	4	1	--	1	--	--	--	--	--	--	5	3	8
148	--	--	--	--	--	--	3	4	7	5	3	8	--	1	1	--	--	--	--	--	--	8	8	16
150	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1	--	--	--	--	--	--	--	2	2
152	--	--	--	--	--	--	1	--	1	4	8	12	1	2	3	1	1	2	--	--	--	7	11	18
154	--	--	--	--	--	--	--	1	1	1	6	7	--	1	1	1	--	1	--	--	--	2	8	10
156	--	--	--	--	--	--	--	--	--	1	1	2	--	1	1	--	--	--	--	--	--	1	2	3
158	--	--	--	--	--	--	--	--	--	1	--	1	1	2	3	--	1	1	--	--	--	2	3	5
160	--	--	--	--	--	--	--	--	--	--	--	--	3	2	5	--	2	2	--	--	--	3	4	7
162	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1	--	2	2
164	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
166	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1	--	--	--	--	2	2
168	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
170	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
172	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	1	--	1	--	--	--	1	1	2
174	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals	1	3	4	9	8	17	26	21	47	23	27	50	9	18	27	3	5	8	--	1	1	71	83	154

DEPARTMENT OF FISH AND GAME

TABLE 9
Age and Length Composition in February and March, 1952–53 Season
MONTEREY

TABLE 10
Age and Length Composition in 1952-53 Season
SANTA BARBARA

Standard length mm.	1952 (0 rings) M	F	T	1951 (1 ring) M	F	T	1950 (2 rings) M	F	T	1949 (3 rings) M	F	T	1948 (4 rings) M	F	T	1947 (5 rings) M	F	T	Total M	F	T
104	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
106	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
108	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
110	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
112	..	2	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	3	3
114	2	1	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
116	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
118	1	1	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
120	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
122	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
124	..	3	3	..	1	1	2	..	2	..	..	..	..	..	..	..	..	..	2	4	6
126	..	1	1	2	..	2	..	1	1	..	..	..	..	..	..	..	..	..	2	2	4
128	..	2	2	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	2	2	4
130	1	..	1	..	..	..	1	2	3	..	..	..	..	..	..	..	..	..	2	2	4
132	..	..	..	2	..	2	2	2	4	..	..	..	..	..	..	..	..	..	4	2	6
134	..	..	..	1	..	1	3	3	6	..	1	1	..	..	..	..	..	..	4	4	8
136	..	..	..	1	..	1	1	3	4	..	1	1	..	..	..	..	..	..	2	4	6
138	..	..	..	1	..	1	..	1	1	..	1	1	..	..	..	..	..	..	1	2	3
140	..	..	..	..	2	2	..	..	..	..	1	1	1	..	1	..	..	..	1	3	4
142	..	..	..	..	..	..	..	2	2	1	1	2	..	..	..	..	..	..	1	3	4
144	..	..	..	..	..	..	..	3	3	..	1	1	..	..	..	..	..	..	..	4	4
146	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	1	1	2
148	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..	1
150	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	1
152	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	1
154	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..	1
162	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	1	..	2	2
Totals	8	12	20	8	5	13	12	18	30	3	6	9	1	3	4	..	1	1	32	45	77

TABLE 10
Age and Length Composition in 1952–53 Season
SANTA BARBARA

TABLE 11

Age and Length Composition in September, 1952-53 Season

SANTA BARBARA

Year-class	1951			1950			1949			1948			Total		
No. of rings	1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
124	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
128	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
130	--	--	--	--	2	2	--	--	--	--	--	--	--	2	2
132	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
134	--	--	--	2	2	4	--	--	--	--	--	--	2	2	4
136	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
138	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
140	--	2	2	--	--	--	--	--	--	--	--	--	--	2	2
142	--	--	--	--	2	2	--	--	--	--	--	--	--	2	2
144	--	--	--	--	1	1	--	1	1	--	--	--	--	1	1
146	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
148	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
150	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	--	2	2	4	9	13	--	3	3	--	1	1	4	15	19

TABLE 11
Age and Length Composition in September, 1952–53 Season
SANTA BARBARA

TABLE 12

Age and Length Composition in October, 1952-53 Season

SANTA BARBARA

Year-class	1952			1951			1950			1949			Total		
No. of rings	0			1			2			3					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
104	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
106	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
108	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
112	--	1	1	--	1	1	--	--	--	--	--	--	--	2	2
114	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
116	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
118	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
122	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
124	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
128	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
130	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
132	--	--	--	1	--	1	1	1	2	--	--	--	2	1	3
134	--	--	--	--	--	--	--	1	1	--	1	1	--	2	2
136	--	--	--	--	--	--	--	2	2	1	--	1	1	2	3
138	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
140	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
142	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	1	2	3	2	2	4	4	6	10	1	2	3	8	12	20

TABLE 12
Age and Length Composition in October, 1952–53 Season
SANTA BARBARA

TABLE 13
Age and Length Composition in December, 1952-53 Season
SANTA BARBARA

Year-class	1952			1951			1950			1949			1948			Total		
No. of rings	0			1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
114	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
124	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
126	--	--	--	2	--	2	--	1	1	--	--	--	--	--	--	2	1	3
128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
130	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
132	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
134	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
136	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
138	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
140	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
142	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	1	--	1
144	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
146	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
162	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	1	--	1	2	1	3	1	2	3	--	1	1	1	1	2	5	5	10

TABLE 13
Age and Length Composition in December, 1952–53 Season
SANTA BARBARA

TABLE 14

Age and Length Composition in February-March, 1952-53 Season

SANTA BARBARA

Year-class	1952			1951			1950			1949			1948			1947			Total		
No. of rings	0			1			2			3			4			5					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
108	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
112	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
114	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
116	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
118	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
120	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
122	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
124	--	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3
126	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
128	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
130	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
132	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
134	--	--	--	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	2	--	2
136	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
138	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
140	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
142	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
144	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
146	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
148	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
152	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
154	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
160	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
162	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals	6	10	16	4	--	4	3	1	4	2	--	2	--	1	1	--	1	1	15	13	28

DEPARTMENT OF FISH AND GAME

TABLE 14
Age and Length Composition in February–March, 1952–53 Season
SANTA BARBARA

TABLE 15
Age and Length Composition in 1952-53 Season
LOS ANGELES

Year-class	1952				1951			1950			1949			1948			Total			
No. of rings	0				1			2			3			4						
Standard length mm.	U	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
90	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
94	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
96	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
98	1	--	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	2
100	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
102	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
104	--	1	3	4	--	--	--	--	--	--	--	--	--	--	--	--	--	1	3	4
106	--	2	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
108	--	4	--	4	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	4
110	--	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
112	--	2	1	3	--	--	--	--	--	--	--	--	--	--	--	--	--	2	1	3
114	--	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
116	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
118	--	1	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
120	--	--	1	1	1	--	1	--	--	--	--	--	--	--	--	--	--	1	1	2
122	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
124	--	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
126	--	--	1	1	1	--	1	--	--	--	--	--	--	--	--	--	--	1	1	2
128	--	2	--	2	--	1	1	--	--	--	--	--	--	--	--	--	--	2	1	3
130	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
132	--	--	--	--	2	1	3	--	--	--	--	--	--	--	--	--	--	2	1	3
134	--	--	--	--	--	1	1	--	1	1	--	--	--	--	--	--	--	--	2	2
136	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	1	--	1
138	--	--	--	--	--	2	2	--	--	--	1	--	1	--	--	--	--	1	2	3
140	--	--	--	--	--	1	1	1	--	1	--	--	--	--	--	--	--	1	1	2
142	--	--	--	--	--	--	--	1	1	2	--	--	--	--	--	--	--	1	1	2
144	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
146	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
148	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
150	--	--	--	--	--	--	--	--	1	1	--	--	--	1	--	1	--	1	1	2
152	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	1
156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	1
160	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
162	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
164	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
166	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	1
Totals	1	18	16	35	5	6	11	3	6	9	1	--	1	1	3	4	1	28	31	60

TABLE 15
Age and Length Composition in 1952–53 Season
LOS ANGELES

TABLE 16
Age and Length Composition in January, 1952-53 Season
LOS ANGELES

Year-class	1952			1951			Total		
No. of rings	0			1					
Standard length mm.	M	F	T	M	F	T	M	F	T
104	--	3	3	--	--	--	--	3	3
106	--	--	--	--	--	--	--	--	--
108	--	--	--	--	--	--	--	--	--
110	--	1	1	--	--	--	--	1	1
112	2	--	2	--	--	--	2	--	2
114	--	--	--	--	--	--	--	--	--
116	1	--	1	--	--	--	1	--	1
118	--	2	2	--	--	--	--	2	2
140	--	--	--	--	1	1	--	1	1
Totals	3	6	9	--	1	1	3	7	10

TABLE 16
Age and Length Composition in January, 1952–53 Season
LOS ANGELES

TABLE 17

Age and Length Composition in February-March, 1952-53 Season

LOS ANGELES

Year-class	1952				1951			1950			1949			1948			Total			
No. of rings	0				1			2			3			4						
Standard length mm.	U	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
90			1	1															1	1
92																				
94			1	1															1	1
96		1		1														1		1
98	1		1	2													1		1	2
100		1		1														1		1
102		1		1														1		1
104		1		1														1		1
106		2		2														2		2
108		4		4														4		4
110			1	1															1	1
112			1	1															1	1
114		1	1	2														1	1	2
116																				
118		1		1														1		1
120			1	1	1		1											1	1	2
122			1	1															1	1
124		1	1	2														1	1	2
126			1	1	1		1											1	1	2
128		2		2		1	1											2	1	3
130					1		1											1		1
132					2	1	3											2	1	3
134						1	1		1	1									2	2
136								1		1								1		1
138						2	2				1		1					1	2	3
140								1		1								1		1
142								1	1	2								1	1	2
144									1	1									1	1
146									1	1									1	1
148									1	1									1	1
150									1	1				1		1		1	1	2
152																				
154															1	1			1	1
156																				
158															1	1			1	1
160																				
166														1		1			1	1
Totals	1	15	10	26	5	5	10	3	6	9	1		1	1	3	4	1	25	24	50

TABLE 17
Age and Length Composition in February–March, 1952–53 Season
LOS ANGELES

TABLE 18

Age (Year Class) Composition of the Anchovy Catch in the 1952-53 Season (Numbers of fish are given in thousands, i.e., 000 omitted)

	Catch		Number of fish by age and year class						
	Tons	Nos.	0 1952	1 1951	2 1950	3 1949	4 1948	5 1947	6 1946
San Francisco									
April-May	80	2,042	26	40	786	820	275	76	19
June-July	44	1,123	14	22	433	451	151	41	11
August-September	835	21,318	273	409	8,214	8,566	2,874	780	202
October-November	1,955	50,673	709	2,432	16,064	21,637	6,486	2,686	659
December-January	207	5,365	75	258	1,700	2,291	687	284	70
February-March	974	32,688	9,152	4,250	10,133	4,577	2,288	2,288	--
Totals San Francisco	4,095	113,209	10,249	7,411	37,330	38,342	12,761	6,155	961
Monterey									
April-May	5	105	--	--	37	36	24	8	--
June-July	3,719	77,950	--	--	27,454	26,667	17,944	5,885	--
August-September	2,209	46,830	--	--	16,493	16,021	10,780	3,536	--
October-November	12,391	317,210	--	20,174	100,746	107,280	65,758	22,110	1,142
December-January	4,230	112,432	990	9,287	27,297	38,417	29,265	6,193	983
February-March	3,489	108,229	3,052	16,927	35,239	32,328	15,823	4,438	422
Totals Monterey	26,043	662,756	4,042	46,388	207,266	220,749	139,594	42,170	2,547
Totals Central California	30,138	775,965	14,291	53,799	244,596	259,091	152,355	48,325	3,508
Santa Barbara									
April-May	304	8,752	350	788	5,951	1,225	438	--	--
June-July	866	24,894	996	2,241	16,928	3,485	1,244	--	--
August-September	1,005	29,145	1,165	2,625	19,818	4,080	1,457	--	--
October-November	965	29,170	1,458	2,918	19,456	5,338	--	--	--
December-January	571	21,541	3,878	6,463	8,616	1,292	1,292	--	--
February-March	1,491	55,591	38,525	6,671	6,282	2,612	1,112	389	--
Totals Santa Barbara	5,202	169,093	46,372	21,706	77,051	18,032	5,543	389	--
Los Angeles									
April-May	586	29,593	--	21,307	8,286	--	--	--	--
June-July	314	10,242	83	3,759	3,943	1,895	409	153	--
August-September	220	17,600	16,544	264	616	176	--	--	--
October-November	318	17,604	10,023	3,511	2,359	1,344	367	--	--
December-January	116	10,783	9,489	1,294	--	--	--	--	--
February-March	1,439	68,742	41,521	12,580	6,668	4,331	3,642	--	--
Totals Los Angeles	2,993	154,564	77,660	42,715	21,872	7,746	4,418	153	--
Totals Southern California	8,195	323,657	124,032	64,421	98,923	25,778	9,961	542	--
Grand totals California	38,333	1,099,622	138,323	118,220	343,519	284,869	162,316	48,867	3,508

TABLE 18
Age (Year Class) Composition of the Anchovy Catch in the 1952–53 Season (*Numbers of fish are given in thousands, i.e., 000 omitted*)

TABLE 19

Age and Length Composition in 1953-54 Season

MONTEREY

Year-class	1953			1952			1951			1950			1949			1948			1947			Total		
No. of rings	0			1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
102	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
104	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
106	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
108	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
110	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
112	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
114	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
116	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
118	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
120	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
122	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
124	--	--	--	--	--	--	2	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
126	--	--	--	--	--	--	1	2	3	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
128	--	--	--	--	1	1	3	--	3	1	1	2	1	--	1	--	--	--	--	--	--	5	2	7
130	--	--	--	--	2	2	2	1	3	1	2	3	1	--	1	--	--	--	--	--	--	4	5	9
132	--	--	--	--	--	--	1	4	5	1	--	1	--	--	--	--	--	--	--	--	--	2	4	6
134	--	--	--	--	1	1	1	5	6	2	--	2	--	--	--	--	--	--	--	--	--	3	6	9
136	--	--	--	--	--	--	2	3	5	--	--	--	1	--	1	--	--	--	--	--	--	3	3	6
138	--	--	--	1	--	1	3	1	4	1	1	2	1	--	1	--	--	--	--	--	--	6	2	8
140	--	--	--	--	--	--	--	4	4	--	1	1	2	2	4	--	--	--	--	--	--	2	7	9
142	--	--	--	--	--	--	1	--	1	--	3	3	--	--	--	--	--	--	--	--	--	1	3	4
144	--	--	--	--	--	--	1	1	2	1	1	1	1	--	1	--	--	--	--	--	--	2	2	4
146	--	--	--	--	--	--	1	1	2	5	--	5	1	--	1	--	1	1	--	--	--	7	2	9
148	--	--	--	--	--	--	--	--	--	2	1	3	--	--	--	--	--	--	--	--	--	2	1	3
150	--	--	--	--	--	--	--	--	--	2	1	3	1	--	1	--	--	--	--	--	--	3	1	4
152	--	--	--	--	--	--	--	--	--	3	1	4	1	1	2	--	--	--	--	--	--	4	2	6
154	--	--	--	--	--	--	--	--	--	1	1	2	2	1	3	--	1	1	--	--	--	3	2	5
156	--	--	--	--	--	--	--	--	--	--	2	2	3	--	3	--	1	1	--	--	--	3	3	6
158	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2	--	--	--	--	--	--	1	2	3
160	--	--	--	--	--	--	--	--	--	--	2	2	1	3	4	--	--	--	--	--	--	1	5	6
162	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3	--	--	--	--	--	--	--	3	3
164	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
168	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
172	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
Totals	2	5	7	4	6	10	18	22	40	20	17	37	17	12	29	1	4	5	--	1	1	62	67	129

DEPARTMENT OF FISH AND GAME

TABLE 19
Age and Length Composition in 1953–54 Season
MONTEREY

TABLE 20

Age and Length Composition in September, 1953-54 Season

MONTEREY

Year-class	1953			1952			1951			1950			1949			1948			1947			Total		
No. of rings	0			1			2			3			4			5			6					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
102	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
108	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
110	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
112	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
114	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
118	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
120	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
122	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
124	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
126	--	--	--	--	1	1	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	2	3
128	--	--	--	--	1	1	2	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2	1	3
130	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
132	--	--	--	--	1	1	--	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	4	4
134	--	--	--	--	--	--	1	3	4	--	--	--	--	--	--	--	--	--	--	--	--	1	3	4
136	--	--	--	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
138	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
140	--	--	--	--	--	--	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
142	--	--	--	--	--	--	1	--	1	--	2	2	--	--	--	--	--	--	--	--	--	1	2	3
146	--	--	--	--	--	--	--	1	1	2	--	2	1	--	1	--	--	--	--	--	--	3	1	4
148	--	--	--	--	--	--	--	--	--	2	--	2	--	--	--	--	--	--	--	--	--	2	--	2
150	--	--	--	--	--	--	--	--	--	2	--	2	--	--	--	--	--	--	--	--	--	2	--	2
152	--	--	--	--	--	--	--	--	--	2	--	2	1	--	1	--	--	--	--	--	--	3	--	3
154	--	--	--	--	--	--	--	--	--	--	2	2	2	--	2	--	--	--	--	--	--	2	2	4
156	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
158	--	--	--	--	--	--	--	--	--	--	2	2	1	1	2	--	--	--	--	--	--	1	3	4
160	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	--	--	--	--	--	--	--	2	2
162	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
164	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
168	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	2	5	7	3	4	7	7	13	20	8	6	14	5	5	10	1	--	1	--	1	1	26	34	60

TABLE 21

Age and Length Composition October and November, 1953-54 Season
MONTEREY

Year-class	1952			1951			1950			1949			1948			Total		
No. of rings	1			2			3			4			5					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
116	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
124	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
126	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
128	--	--	--	--	--	--	1	1	2	1	--	1	--	--	--	2	1	3
130	--	1	1	1	--	1	1	2	3	1	--	1	--	--	--	3	3	6
132	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
134	--	--	--	--	--	--	2	--	2	--	--	--	--	--	--	2	--	2
136	--	--	--	1	2	3	--	--	--	1	--	1	--	--	--	2	2	4
138	1	--	1	2	--	2	1	1	2	1	--	1	--	--	--	5	1	6
140	--	--	--	--	2	2	--	1	1	2	2	4	--	--	--	2	5	7
142	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
144	--	--	--	1	1	2	--	1	1	1	--	1	--	--	--	2	2	4
146	--	--	--	1	--	1	1	--	1	--	--	--	--	1	1	2	1	3
148	--	--	--	--	--	--	1	1	2	--	--	--	--	--	--	1	1	2
150	--	--	--	--	--	--	--	1	1	1	--	1	--	--	--	1	1	2
152	--	--	--	--	--	--	1	1	2	--	1	1	--	--	--	1	2	3
154	--	--	--	--	--	--	--	1	1	2	1	3	--	--	--	2	2	4
156	--	--	--	--	--	--	--	--	--	1	--	1	--	1	1	1	1	2
158	--	--	--	--	--	--	--	--	--	1	--	1	--	1	1	1	1	2
160	--	--	--	--	--	--	--	--	--	--	2	2	--	--	--	--	2	2
162	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
172	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	1	1	2	8	7	15	9	11	20	12	7	19	--	4	4	30	30	60

TABLE 21
Age and Length Composition October and November, 1953–54 Season
MONTEREY

TABLE 22

Age and Length Composition in May, 1953-54 Season
MONTEREY

Year-class	1952			1951			1950			Total		
No. of rings	1			2			3					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T
106	--	1	1	--	--	--	--	--	--	--	1	1
128	--	--	--	1	--	1	--	--	--	1	--	1
130	--	--	--	1	--	1	--	--	--	1	--	1
132	--	--	--	--	--	--	1	--	1	1	--	1
134	--	--	--	--	2	2	--	--	--	--	2	2
138	--	--	--	1	--	1	--	--	--	1	--	1
146	--	--	--	--	--	--	2	--	2	2	--	2
Totals	--	1	1	3	2	5	3	--	3	6	3	9

TABLE 22
Age and Length Composition in May, 1953–54 Season
MONTEREY

TABLE 23

Age and Length Composition in 1953-54 Season

SANTA BARBARA

Year-class	1953			1952				1951			1950			1949			Total			
No. of rings	0			1				2			3			4						
Standard length mm.	M	F	T	U	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
100	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	2	2
102	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	---	---
104	2	2	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	4
106	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	1	1
108	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
110	1	1	2	--	1	..	1	--	--	--	--	--	--	--	--	--	--	2	1	3
112	4	1	5	--	1	..	1	--	--	--	--	--	--	--	--	--	--	5	1	6
114	3	2	5	--	2	1	3	--	--	--	--	--	--	--	--	--	--	5	3	8
116	1	5	6	1	..	1	2	--	--	--	--	--	--	--	--	--	1	1	6	8
118	4	3	7	--	1	3	4	--	--	--	--	--	--	--	--	--	1	5	6	11
120	1	..	1	--	1	1	2	--	--	--	--	--	--	--	--	--	--	2	1	3
122	1	3	4	--	4	1	5	--	--	--	--	--	--	--	--	--	--	5	4	9
124	--	2	2	--	4	2	6	--	--	--	--	--	--	--	--	--	--	4	4	8
126	1	..	1	--	7	2	9	1	-	1	--	--	--	--	--	--	--	9	2	11
128	--	--	--	--	6	4	10	5	1	6	--	--	--	--	--	--	--	11	5	16
130	--	--	--	1	3	2	6	6	4	10	--	2	2	--	--	--	1	9	8	18
132	--	--	--	--	4	3	7	3	4	7	--	--	--	--	--	--	--	7	7	14
134	--	--	--	--	5	3	8	6	6	12	--	--	--	--	--	--	--	11	9	20
136	--	--	--	--	5	1	6	9	7	16	1	1	2	--	--	--	--	15	9	24
138	--	--	--	--	3	2	5	4	7	11	1	3	4	--	--	--	--	8	12	20
140	--	--	--	--	3	2	5	3	10	13	1	5	6	--	--	--	--	7	17	24
142	--	--	--	--	1	1	2	5	2	7	2	4	6	--	--	--	--	8	7	15
144	--	--	--	--	1	6	7	2	7	9	2	1	3	--	--	--	--	5	14	19
146	--	--	--	--	2	..	2	2	3	5	2	2	4	1	1	2	--	7	6	13
148	--	--	--	--	--	--	--	2	1	3	2	3	5	1	..	1	--	5	4	9
150	--	--	--	--	--	--	--	--	2	2	1	1	2	--	--	--	--	1	3	4
152	--	--	--	--	--	--	--	1	1	2	--	2	2	--	--	--	--	1	3	4
154	--	--	--	--	--	--	--	--	-	---	--	2	2	1	..	1	--	1	2	3
156	--	--	--	--	--	--	--	--	--	---	--	1	1	--	--	--	--	---	1	1
158	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	---	---	---
160	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	---	---	---
162	--	--	--	--	--	--	--	--	--	---	1	..	1	--	--	--	--	1	---	1
164	--	--	--	--	--	--	--	--	--	---	1	..	1	1	..	1	--	1	1	2
Totals	19	23	42	2	54	35	91	49	55	104	12	28	40	5	1	6	2	139	142	283

TABLE 23
Age and Length Composition in 1953–54 Season
SANTA BARBARA

TABLE 24

Age and Length Composition in April-May, 1953-54 Season
SANTA BARBARA

Year-class	1952				1951			1950			1949			Total			
No. of rings	1				2			3			4						
Standard length mm.	U	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
112	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
116	1	--	1	2	--	--	--	--	--	--	--	--	--	1	--	1	2
118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
122	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
124	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
128	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
130	--	--	1	1	--	1	1	--	1	1	--	--	--	--	--	3	3
132	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
134	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
136	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
138	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
140	--	--	--	--	--	3	3	--	1	1	--	--	--	--	--	4	4
142	--	--	--	--	--	--	--	1	1	2	--	--	--	--	1	1	2
144	--	--	--	--	--	1	1	--	1	1	--	--	--	--	--	2	2
146	--	--	--	--	--	--	--	1	--	1	--	--	--	--	1	--	1
148	--	--	--	--	--	--	--	--	--	--	1	--	1	--	1	--	1
Totals	1	3	2	6	--	7	7	2	4	6	1	--	1	1	6	13	20

TABLE 24
Age and Length Composition in April–May, 1953–54 Season
SANTA BARBARA

TABLE 25

Age and Length Composition in June-July, 1953-54 Season
SANTA BARBARA

Year-class	1952				1951			1950			1949			Total			
No. of rings	1				2			3			4						
Standard length mm	U	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
118	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
122	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
124	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
126	--	2	--	2	--	--	--	--	--	--	--	--	--	--	2	--	2
128	--	--	--	--	2	--	2	--	--	--	--	--	--	--	2	--	2
130	1	1	--	2	2	2	4	--	--	--	--	--	--	1	3	2	6
132	--	2	1	3	2	1	3	--	--	--	--	--	--	--	4	2	6
134	--	1	1	2	2	--	2	--	--	--	--	--	--	--	3	1	4
136	--	1	1	2	2	2	4	1	--	1	--	--	--	--	4	3	7
138	--	--	--	--	1	4	5	--	1	1	--	--	--	--	1	5	6
140	--	1	1	2	--	2	2	--	--	--	--	--	--	--	1	3	4
142	--	--	--	--	--	--	--	--	2	2	--	--	--	--	--	2	2
144	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	1	1
146	--	--	--	--	--	2	2	--	--	--	1	--	1	--	1	2	3
148	--	--	--	--	1	--	1	1	1	2	--	--	--	--	2	1	3
150	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
152	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	1	1
154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
156	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	1	1
158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
160	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
162	--	--	--	--	--	--	--	--	--	--	1	--	1	--	1	--	1
164	--	--	--	--	--	--	--	--	--	--	1	--	1	--	1	--	1
Totals	1	11	5	17	12	14	26	2	6	8	3	--	3	1	28	25	54

TABLE 25
Age and Length Composition in June–July, 1953–54 Season
SANTA BARBARA

Year-class	1952			1951			1950			Total		
No. of rings	1			2			3					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T
120	--	1	1	--	--	--	--	--	--	--	1	1
122	--	--	--	--	--	--	--	--	--	--	--	--
124	--	--	--	--	--	--	--	--	--	--	--	--
126	--	--	--	1	--	1	--	--	--	1	--	1
128	3	--	3	2	1	3	--	--	--	5	1	6
130	2	1	3	3	1	4	--	1	1	5	3	8
132	--	--	--	1	3	4	--	--	--	1	3	4
134	--	1	1	1	1	2	--	--	--	1	2	3
136	1	--	1	1	1	2	--	1	1	2	2	4
138	--	1	1	2	1	3	--	1	1	2	3	5
140	--	1	1	--	--	--	1	2	3	1	3	4
142	--	--	--	--	1	1	--	--	--	--	1	1
144	--	1	1	--	1	1	--	--	--	--	2	2
146	--	--	--	--	--	--	--	1	1	--	1	1
Totals	6	6	12	11	10	21	1	6	7	18	22	40

TABLE 26
Age and Length Composition in August–September, 1953–54 Season
SANTA BARBARA

Year-class	1953			1952			1951			1950			1949			Total		
No. of rings	0			1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
112	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
114	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
116	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
122	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
124	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
126	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
128	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
130	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
132	--	--	--	2	1	3	--	--	--	--	--	--	--	--	--	2	1	3
134	--	--	--	1	--	1	2	4	6	--	--	--	--	--	--	3	4	7
136	--	--	--	--	--	--	4	2	6	--	--	--	--	--	--	4	2	6
138	--	--	--	1	--	1	--	1	1	1	--	1	--	--	--	2	1	3
140	--	--	--	1	--	1	2	4	6	--	2	2	--	--	--	3	6	9
142	--	--	--	--	--	--	--	1	1	1	1	2	--	--	--	1	2	3
144	--	--	--	--	--	--	2	4	6	2	--	2	--	--	--	4	4	8
146	--	--	--	--	--	--	1	1	2	1	1	2	--	1	1	2	3	5
148	--	--	--	--	--	--	--	1	1	--	2	2	--	--	--	--	3	3
150	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
152	--	--	--	--	--	--	1	--	1	--	1	1	--	--	--	1	1	2
Totals	1	1	2	8	5	13	13	18	31	5	8	13	--	1	1	27	33	60

TABLE 27
Age and Length Composition in October–November, 1953–54 Season
SANTA BARBARA

TABLE 28
Age and Length Composition in December-January, 1953-54 Season
SANTA BARBARA

Year-class	1953			1952			1951			1950			Total		
No. of rings	0			1			2			3					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
110	--	1	1	1	--	1	--	--	--	--	--	--	1	1	2
112	3	--	3	--	--	--	--	--	--	--	--	--	3	--	3
114	1	1	2	1	--	1	--	--	--	--	--	--	2	1	3
116	1	2	3	--	--	--	--	--	--	--	--	--	1	2	3
118	2	1	3	--	1	1	--	--	--	--	--	--	2	2	4
120	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
122	--	1	1	1	--	1	--	--	--	--	--	--	1	1	2
124	--	1	1	1	--	1	--	--	--	--	--	--	1	1	2
126	--	--	--	3	1	4	--	--	--	--	--	--	3	1	4
128	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
130	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
132	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
134	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
136	--	--	--	1	--	1	1	2	3	--	--	--	2	2	4
138	--	--	--	--	--	--	1	--	1	--	1	1	1	1	2
140	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
142	--	--	--	--	1	1	1	--	1	--	--	--	1	1	2
144	--	--	--	--	2	2	--	1	1	--	--	--	--	3	3
154	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	8	7	15	8	7	15	4	3	7	--	2	2	20	19	39

TABLE 28
Age and Length Composition in December–January, 1953–54 Season
SANTA BARBARA

TABLE 29
Age and Length Composition in March, 1953-54 Season
SANTA BARBARA

Year-class	1953			1952			1951			1950			1949			Total		
No. of rings	0			1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
100	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
102	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
104	2	2	4	--	--	--	--	--	--	--	--	--	--	--	--	2	2	4
106	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
108	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2
110	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
112	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
114	2	1	3	1	--	1	--	--	--	--	--	--	--	--	--	3	1	4
116	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
118	2	2	4	--	2	2	--	--	--	--	--	--	--	--	--	2	4	6
120	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
122	1	2	3	1	--	1	--	--	--	--	--	--	--	--	--	2	2	4
124	--	1	1	1	2	3	--	--	--	--	--	--	--	--	--	1	3	4
126	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	2	--	2
128	--	--	--	1	2	3	1	--	1	--	--	--	--	--	--	2	2	4
130	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
132	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
134	--	--	--	3	1	4	1	--	1	--	--	--	--	--	--	4	1	5
136	--	--	--	2	--	2	1	--	1	--	--	--	--	--	--	3	--	3
138	--	--	--	2	1	3	--	--	--	--	--	--	--	--	--	2	1	3
140	--	--	--	1	--	1	--	1	1	--	--	--	--	--	--	1	1	2
142	--	--	--	1	--	1	4	--	4	--	--	--	--	--	--	5	--	5
144	--	--	--	1	2	3	--	--	--	--	--	--	--	--	--	1	2	3
146	--	--	--	2	--	2	1	--	1	--	--	--	--	--	--	3	--	3
148	--	--	--	--	--	--	1	--	1	1	--	1	--	--	--	2	--	2
150	--	--	--	--	--	--	--	1	1	1	--	1	--	--	--	1	1	2
152	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
154	--	--	--	--	--	--	--	--	--	--	1	1	1	--	1	1	1	2
164	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
Totals	10	15	25	18	10	28	9	3	12	2	2	4	1	--	1	40	30	70

TABLE 29
Age and Length Composition in March, 1953–54 Season
SANTA BARBARA

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TABLE 30

Age and Length Composition in 1953-54 Season

LOS ANGELES

Year-class	1953				1952			1951			1950			1949			1948			Total			
No. of rings	0				1			2			3			4			5						
Standard length mm	U	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
100	---	2	1	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2	1	3
102	---	3	4	7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3	4	7
104	---	7	7	14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7	7	14
106	---	3	9	12	---	3	3	---	---	---	---	---	---	---	---	---	---	---	---	---	3	12	15
108	1	3	9	13	---	1	1	---	---	---	---	---	---	---	---	---	---	---	---	1	3	10	14
110	---	7	14	21	2	---	2	---	---	---	---	---	---	---	---	---	---	---	---	---	9	14	23
112	---	2	8	10	2	1	3	---	---	---	---	---	---	---	---	---	---	---	---	---	4	9	13
114	---	1	9	10	2	---	2	---	---	---	---	---	---	---	---	---	---	---	---	---	3	9	12
116	---	3	5	8	3	5	8	---	---	---	---	---	---	---	---	---	---	---	---	---	6	10	16
118	---	1	2	3	---	5	5	---	---	---	---	---	---	---	---	---	---	---	---	---	1	7	8
120	---	---	2	2	1	5	6	3	---	3	---	---	---	---	---	---	---	---	---	---	4	7	11
122	---	---	2	2	5	3	8	1	---	1	---	---	---	---	---	---	---	---	---	---	6	5	11
124	---	2	3	5	8	4	12	2	---	2	---	---	---	---	---	---	---	---	---	---	12	7	19
126	---	2	---	2	4	3	7	1	---	1	---	---	---	---	---	---	---	---	---	---	7	3	10
128	---	---	---	---	5	8	13	7	4	11	---	---	---	---	---	---	---	---	---	---	12	12	24
130	---	---	---	---	3	4	7	7	5	12	1	---	1	---	---	---	---	---	---	---	11	9	20
132	---	---	---	---	3	4	7	5	10	15	3	1	4	---	---	---	---	---	---	---	11	15	26
134	---	---	---	---	3	2	5	3	2	5	---	2	2	---	---	---	---	---	---	---	6	6	12
136	---	---	---	---	2	---	2	7	3	10	2	2	4	---	---	---	---	---	---	---	11	5	16
138	---	---	---	---	1	5	6	3	8	11	3	---	3	---	---	---	---	---	---	---	7	13	20
140	---	---	---	---	1	---	1	5	5	10	2	3	5	---	---	---	---	---	---	---	8	8	16
142	---	---	---	---	1	---	1	6	9	15	1	1	2	1	---	1	---	---	---	---	9	10	19
144	---	---	---	---	---	2	2	2	3	5	1	4	5	---	---	---	---	---	---	---	3	9	12
146	---	---	---	---	---	---	---	2	5	7	---	2	2	---	1	1	---	---	---	---	2	8	10
148	---	---	---	---	---	---	---	1	2	3	---	1	1	1	---	1	---	---	---	---	2	3	5
150	---	---	---	---	---	---	---	---	1	1	---	1	1	---	1	1	---	---	---	---	---	3	3
152	---	---	---	---	---	---	---	---	1	1	---	1	1	---	1	1	---	---	---	---	---	3	3
154	---	---	---	---	---	---	---	---	2	2	---	5	5	---	1	1	---	---	---	---	---	8	8
156	---	---	---	---	---	---	---	---	---	---	---	1	1	---	1	1	---	1	1	---	---	3	3
158	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
160	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
162	---	---	---	---	---	---	---	---	---	---	---	1	1	---	---	---	---	---	---	---	---	1	1
164	---	---	---	---	---	---	---	---	---	---	---	1	1	---	---	---	---	---	---	---	---	1	1
Totals	1	36	75	112	46	55	101	55	60	115	13	26	39	2	5	7	---	1	1	1	152	222	375

TABLE 30
Age and Length Composition in 1953–54 Season
LOS ANGELES

TABLE 31

Age and Length Composition in April-May, 1953-54 Season
LOS ANGELES

Year-class	1952			1951			1950			1949			1948			Total		
No. of rings	1			2			3			4			5					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
106	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
108	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
110	2	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2	--	2
112	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
116	3	3	6	--	--	--	--	--	--	--	--	--	--	--	--	3	3	6
118	--	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2
120	--	--	--	2	--	2	--	--	--	--	--	--	--	--	--	2	--	2
122	2	2	4	--	--	--	--	--	--	--	--	--	--	--	--	2	2	4
124	2	2	4	2	--	2	--	--	--	--	--	--	--	--	--	4	2	6
126	1	2	3	1	--	1	--	--	--	--	--	--	--	--	--	2	2	4
128	--	4	4	4	3	7	--	--	--	--	--	--	--	--	--	4	7	11
130	2	--	2	1	4	5	--	--	--	--	--	--	--	--	--	3	4	7
132	--	1	1	--	5	5	2	1	3	--	--	--	--	--	--	2	7	9
134	--	--	--	1	--	1	--	1	1	--	--	--	--	--	--	1	1	2
136	--	--	--	--	--	--	--	2	2	--	--	--	--	--	--	--	2	2
138	--	--	--	--	3	3	1	--	1	--	--	--	--	--	--	1	3	4
140	--	--	--	--	2	2	--	1	1	--	--	--	--	--	--	--	3	3
142	--	--	--	1	2	3	--	--	--	1	--	1	--	--	--	2	2	4
144	--	--	--	--	--	--	--	2	2	--	1	1	--	--	--	--	3	3
146	--	--	--	--	--	--	--	2	2	--	--	--	--	--	--	--	2	2
148	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
152	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
154	--	--	--	--	--	--	--	1	1	--	1	1	--	--	--	--	2	2
156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
158	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
160	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
162	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
Totals	12	19	31	12	19	31	3	10	13	1	3	4	--	1	1	28	52	80

TABLE 31
Age and Length Composition in April–May, 1953–54 Season
LOS ANGELES

TABLE 32

Age and Length Composition in June-July, 1953-54 Season
LOS ANGELES

Year-class	1952			1951			1950			1949			Total		
No. of rings	1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
124	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
126	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
128	4	1	5	2	1	3	--	--	--	--	--	--	6	2	8
130	--	1	1	5	1	6	--	--	--	--	--	--	5	2	7
132	1	--	1	5	4	9	--	--	--	--	--	--	6	4	10
134	1	--	1	--	2	2	--	1	1	--	--	--	1	3	4
136	--	--	--	1	--	1	1	--	1	--	--	--	2	--	2
138	--	1	1	--	2	2	--	--	--	--	--	--	--	3	3
140	--	--	--	1	2	3	1	1	2	--	--	--	2	3	5
142	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
144	--	--	--	1	1	2	--	1	1	--	--	--	1	2	3
146	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
148	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
150	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
152	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
154	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
158	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	8	4	12	15	15	30	2	6	8	--	1	1	25	26	51

TABLE 32
Age and Length Composition in June–July, 1953–54 Season
LOS ANGELES

Year-class	1952			1951			1950			1949			Total		
No. of rings	1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
132	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
134	1	--	1	--	--	--	--	--	--	--	--	--	1	--	1
136	--	--	--	1	--	1	--	--	--	--	--	--	1	--	1
138	1	1	2	1	--	1	--	--	--	--	--	--	2	1	3
140	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
142	--	--	--	1	--	1	--	1	1	--	--	--	1	1	2
144	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
146	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
148	--	--	--	--	--	--	--	--	--	1	--	1	1	--	1
Totals	2	1	3	3	1	4	1	1	2	1	--	1	7	3	10

TABLE 33
Age and Length Composition in August–September, 1953–54 Season
LOS ANGELES

Year-class	1953				1952			1951			1950			Total			
No. of rings	0				1			2			3						
Standard length mm.	U	M	F	T	M	F	T	M	F	T	M	F	T	U	M	F	T
100	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
102	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
104	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
106	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	1	1
108	1	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	1
110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
112	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	1	1
114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
116	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
120	--	--	--	--	--	2	2	--	--	--	--	--	--	--	--	2	2
122	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
124	--	--	--	--	3	--	3	--	--	--	--	--	--	--	3	--	3
126	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	1
128	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	1	1
130	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
132	--	--	--	--	--	1	1	--	1	1	--	--	--	--	--	2	2
134	--	--	--	--	--	--	--	1	--	1	--	--	--	--	1	--	1
136	--	--	--	--	--	--	--	2	1	3	1	--	1	--	3	1	4
138	--	--	--	--	--	--	--	1	1	2	1	--	1	--	2	1	3
140	--	--	--	--	--	--	--	1	--	1	--	1	1	--	1	1	2
142	--	--	--	--	--	--	--	2	2	4	--	--	--	--	2	2	4
144	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	1
146	--	--	--	--	--	--	--	1	3	4	--	--	--	--	1	3	4
148	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	1	1
150	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	1	1
152	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	1
154	--	--	--	--	--	--	--	--	2	2	--	1	1	--	--	3	3
156	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	1
Totals	1	2	2	5	3	5	8	8	12	20	2	5	7	1	15	24	40

TABLE 34
Age and Length Composition in October–November, 1953–54 Season
LOS ANGELES

DEPARTMENT OF FISH AND GAME

TABLE 35
Age and Length Composition in December-January, 1953-54 Season
LOS ANGELES

Year-class	1953			1952			1951			1950			Total		
No. of rings	0			1			2			3					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
100	--	1	1	--	--	--	--	--	--	--	--	--	--	1	1
102	3	4	7	--	--	--	--	--	--	--	--	--	3	4	7
104	4	3	7	--	--	--	--	--	--	--	--	--	4	3	7
106	1	7	8	--	1	1	--	--	--	--	--	--	1	8	9
108	2	6	8	--	--	--	--	--	--	--	--	--	2	6	8
110	4	7	11	--	--	--	--	--	--	--	--	--	4	7	11
112	2	3	5	1	1	2	--	--	--	--	--	--	3	4	7
114	1	6	7	2	--	2	--	--	--	--	--	--	3	6	9
116	1	3	4	--	1	1	--	--	--	--	--	--	1	4	5
118	1	1	2	--	3	3	--	--	--	--	--	--	1	4	5
120	--	--	--	--	3	3	1	--	1	--	--	--	1	3	4
122	--	1	1	2	--	2	1	--	1	--	--	--	3	1	4
124	--	1	1	--	1	1	--	--	--	--	--	--	--	2	2
126	--	--	--	1	1	2	--	--	--	--	--	--	1	1	2
128	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
130	--	--	--	--	2	2	1	--	1	1	--	1	2	2	4
132	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
134	--	--	--	--	1	1	1	--	1	--	--	--	1	1	2
136	--	--	--	1	--	1	3	1	4	--	--	--	4	1	5
138	--	--	--	--	2	2	1	--	1	1	--	1	2	2	4
140	--	--	--	--	--	--	2	--	2	1	--	1	3	--	3
142	--	--	--	--	--	--	1	4	5	1	--	1	2	4	6
144	--	--	--	--	1	1	--	1	1	1	--	1	1	2	3
146	--	--	--	--	--	--	1	1	2	--	--	--	1	1	2
148	--	--	--	--	--	--	1	--	1	--	--	--	1	--	1
154	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
164	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
Totals	19	43	62	7	18	25	14	7	21	5	2	7	45	70	115

TABLE 35
Age and Length Composition in December–January, 1953–54 Season
LOS ANGELES

TABLE 36
Age and Length Composition in February-March, 1953-54 Season
LOS ANGELES

Year-class	1953			1952			1951			1950			1949			Total		
No. of rings	0			1			2			3			4					
Standard length mm.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
100	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
102	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
104	3	4	7	--	--	--	--	--	--	--	--	--	--	--	--	3	4	7
106	2	1	3	--	--	--	--	--	--	--	--	--	--	--	--	2	1	3
108	1	3	4	--	--	--	--	--	--	--	--	--	--	--	--	1	3	4
110	3	7	10	--	--	--	--	--	--	--	--	--	--	--	--	3	7	10
112	--	4	4	1	--	1	--	--	--	--	--	--	--	--	--	1	4	5
114	--	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3
116	2	2	4	--	1	1	--	--	--	--	--	--	--	--	--	2	3	5
118	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
120	--	2	2	1	--	1	--	--	--	--	--	--	--	--	--	1	2	3
122	--	1	1	1	--	1	--	--	--	--	--	--	--	--	--	1	1	2
124	2	2	4	2	--	2	--	--	--	--	--	--	--	--	--	4	2	6
126	1	--	1	1	--	1	--	--	--	--	--	--	--	--	--	2	--	2
128	--	--	--	1	2	3	--	--	--	--	--	--	--	--	--	1	2	3
130	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
132	--	--	--	2	1	3	--	--	--	--	--	--	--	--	--	2	1	3
134	--	--	--	1	1	2	--	--	--	--	--	--	--	--	--	1	1	2
136	--	--	--	1	--	1	--	1	1	--	--	--	--	--	--	1	1	2
138	--	--	--	--	1	1	--	2	2	--	--	--	--	--	--	--	3	3
140	--	--	--	1	--	1	1	--	1	--	--	--	--	--	--	2	--	2
142	--	--	--	1	--	1	1	--	1	--	--	--	--	--	--	2	--	2
144	--	--	--	--	1	1	1	1	2	--	--	--	--	--	--	1	2	3
146	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
148	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	1
150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
152	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	1	1
154	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
156	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	1	1
Totals	15	30	45	14	8	22	3	6	9	--	2	2	--	1	1	32	47	79

TABLE 36
Age and Length Composition in February–March, 1953–54 Season
LOS ANGELES

TABLE 37
Age (Year Class) Composition of the Anchovy Catch in the 1953-54 Season (Numbers of fish are given in thousands, i.e., 000 omitted)

	Catch		Number of fish by age and year class						
	Tons	Nos.	0 / 1953	1 / 1952	2 / 1951	3 / 1950	4 / 1949	5 / 1948	6 / 1947
San Francisco									
April-May	40	1,500	--	150	900	450	--	--	--
June-July	132	4,981	--	498	2,989	1,494	--	--	--
August-September	131	3,716	640	538	1,164	840	449	48	37
October-November	51	1,553	--	53	402	547	431	105	15
December-January	1	37	--	1	10	12	10	3	1
February-March	--	--	--	--	--	--	--	--	--
Totals San Francisco	355	11,787	640	1,240	5,465	3,343	890	156	53
Monterey									
April-May	9	350	--	35	210	105	--	--	--
June-July	1	39		4	23	12			
August-September	363	10,302	1,772	1,494	3,224	2,328	1,247	134	103
October-November	294	8,878	--	302	2,291	3,125	2,468	604	88
December-January	4	125	--	4	32	44	35	9	1
February-March	--	--	--	--	--	--	--	--	--
Totals Monterey	671	19,694	1,772	1,839	5,780	5,614	3,750	747	192
Totals Central California	1,026	31,481	2,412	3,079	11,245	8,957	4,640	903	245
Santa Barbara									
April-May	4,287	149,899		43,471	59,959	40,473	5,996	--	--
June-July	4,251	126,023	1,765	38,688	57,970	23,440	4,160	--	--
August-September	3,458	116,249	30,224	62,194	23,831			--	--
October-November	2,903	102,590	7,182	25,647	47,910	19,184	2,667	--	--
December-January	1,637	86,105	40,470	33,581	9,471	2,583		--	--
February-March	787	34,284	14,399	13,028	4,800	1,371	686	--	--
Totals Santa Barbara	17,323	615,150	94,040	216,609	203,941	87,051	13,509	--	--
Los Angeles									
April-May	7,131	272,956	2,184	100,175	105,089	50,496	10,918	4,094	
June-July	5,495	179,340		43,760	103,300	29,411	2,869	--	
August-September	1,071	36,436		10,931	13,846	7,287	4,372	--	
October-November	1,163	46,305	10,558	8,520	21,114	6,113	--	--	
December-January	1,794	104,018	60,018	22,676	16,851	4,473		--	
February-March	2,554	125,138	70,703	37,541	15,016	1,252	626	--	
Totals Los Angeles	19,208	764,193	143,463	223,603	275,216	99,032	18,785	4,094	--
Totals Southern California	36,531	1,379,343	237,503	440,212	479,157	186,083	32,294	4,094	--
Grand totals California	37,557	1,410,824	239,915	443,291	490,402	195,040	36,934	4,997	245

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TABLE 37
Age (Year Class) Composition of the Anchovy Catch in the 1953–54 Season *(Numbers of fish are given in thousands, i.e., 000 omitted)*