1954

56-5 #20

The following is a discussion by the biological staff of the proposed regulations for the July 13 Fish Commission hearing.

RAZOR CLAMS FOR CRAB BAIT

At present it is unlawful to use razor clams for crab bait except in Clatsop County. The advisability of permitting razor clams to be used as such the length of the coast is the issue. Any proposed change in this regulation must be viewed from two sides: (1) the effect of such a measure on the crabs, and (2) the effect of such a measure on razor clams.

In the following discussion only those razor clam stocks in Clatsop County are being considered, as it is from these beaches that 95% of Oregon's commercial production originates.

(1) Effect on crabs: It is the biologists' opinion that permitting the use of razor clams for crab bait in all coastal waters would not materially affect the landings of crab; although it might possibly tend to slightly increase the total state's landings. (Among fishermen razor clams are considered to be faster fishing than other baits.) Under the present 6-1/4" size limit on male crabs, and the prohibition of landing female crabs, it is felt that the stocks of crabs would not be adversely affected by a slight increase in fishing intensity (heavier fishing).

(2) Effect on razor clams: Under the present 3-1/2" commercial size limit and 36 personal possession limit the razor clam stocks are being very heavily dug. It is the biologists' belief that any increase in the amount of digging would not be advisable at this time. By opening the whole coast for the use of razor clams for crab bait an inadvisable increase in digging would result.

However, let us consider the use of razor clams for crab bait along the whole coast under a 4-1/4" size limit, and a 24 personal possession limit which is designed to harvest clams after they have had a chance to gain some weight. Protection of the smaller clams having been attained by this regulation, the only result of an increased amount of digging would be the rate of removal of the larger (greater than 4-1/2") clams.

PROPOSED REGULATION CHANGES OF OREGON RAZOR CLAM FISHERY.

1. Synopsis of Investigation

The purpose of this investigation, begun in 1949, was to learn whether razor clams are being harvested to produce the biggest catch, in pounds, which is compatible with the biological characteristics of this clam, such as growth rates, etc. Among the general findings presented to the Commission on April 14, 1950, were the following:

1. In 1949 the average weight of the amateur bag limit of 36 clams was only 2.5 pounds (clams in the shell); this corresponds to nearly 30 clams in dressed condition (shell and viscera removed) per pound.

2. It was the opinion of Mr. Roger Tollefson, formerly in charge of shellfish investigations, that commercial diggers are able to determine to a large extent the size of clams which they dig.

Other important information such as the growth of very young clams was also obtained in the first year of investigation. In 1950 a system of estimating the magnitude of commercial and amateur catches was developed. Most of the fiscal year of 1951 was utilized to consolidate the earlier growth data, validate the age criteria, which are

indispensable to examining the effect of fishing, and design a marking experiment which would measure the effect of fishing. This experiment lasted from April 1952 until September 1953. The findings made during this investigation are presently being made ready for publication. The following recommendations for changes in regulation and the essential data underlying these recommendations were presented to the public at Seaside on May 12, 1954:

a. A 24-clam bag limit for amateurs instead of the present 36-clam limit.

b. A minimum 4-1/4" size limit for commercial diggers instead of the present 3-1/2" size limit.

Digging restrictions are much more severe in Washington and Alaska, especially the former, where complete closures of some beaches, quotas (resulting in very short commercial seasons), and weekend closures to commercial digging are employed to reduce the amount of digging. Alaska employs a 4-1/2" minimum size limit.

A summary of objections aired at this meeting, together with rebuttal, is presented in Part II of this report.

2. Results of Investigation.

Under existing conditions of regulation and fishing intensity, a considerable proportion of clams is taken at too early an age to give the biggest poundage which could be obtained: more pounds of clams could be produced by leaving these clams in the sand longer, than by digging them at the size at which they are now being taken. The major purpose of the present recommendations is to reduce the number of small clams which are taken at uneconomical levels, and thereby to

increase the proportion of those taken when their weight is near the maximum attainable. The gain, in terms of the increased production of weight, which the proposed recommendations are expected to yield, is independent of the number of clams on the beach. The yield per clam will be higher than at present whether there are a thousand or hundred thousand clams in an area. The principal purpose of the change in the regulations is not to increase the numbers of clams on the beach, but rather to increase the weight of those clams that are present by taking them when they are a few months older and have a greater average weight. At the present time clams are first taken when they are much less than one year old. The young of the year which are only three-eights of an inch long when they are first found on the beaches in fall, grow to nearly three inches by the next spring. It is at this stage when they are first exploited by sport diggers; they weigh on the average about 0.03 pounds (or over 30 clams to the pound). The sport diggers are joined by the commercial diggers in late spring and summer when the fastest growers of the previous fall-set attain 3-1/2 inches. This situation exists everywhere on Clatsop beaches, but is most pronounced at Seaside where there is more digging than in the other areas. In 1952, nearly 45 percent of the clams taken from the 1951 set in the Seaside area were captured before they were one year old. (There was an unusually good fall fishery in that year at Seaside). The value of these 45 percent was about $6,450 (25,801 lbs. at $0.25 per lb.). See Table 1. If these clams had not been dug in their first year, but had been left to live--and grow--until the following summer, their poundage would have been better than doubled (52,634 lbs.) and the value would have

risen accordingly ($13,159). These weight increases have been adjusted for the fact that a part of these 45 percent would not live until the following summer because of death from natural causes. (Allowance was made for an 18 percent loss per annum from natural causes). Calculations of possible weight gain can be also made from data which were collected in 1950 and 1949: from our age composition data on the commercial catch in these years we can estimate the numbers and weight of clams in their first year which were taken by the commercial fishery at that time. This information, as well as the 1952 Seaside data, is presented in summary form in Table 1.

The poundage gains anticipated under the proposed recommendations are based on estimates of growth and death rates which were obtained in the course of this investigation. The recommended changes aim at lowering the death rate due to fishing to make exploitation much more profitable than at present: a 4-1/4-inch minimum size limit would protect most young clams until the second spring or summer. Such a size limit can be observed by commercial diggers because of their ability to distinguish between clams of different sizes. However, amateurs often lack this ability and therefore the imposition of a minimum size limit for the amateur is not practical because many clams would be wasted. The only feasible alternative--apart from complete beach closures--seems to be the reduction of the number of clams each amateur is permitted to take. As a measure for reducing fishing mortality, such reductions are by no means foolproof because an increased number of sport diggers would take the clams which it is

intended to save by means of a reduced bag limit. (This difficulty does not arise in the commercial fishery: an increased number of diggers will simply take clams faster after they are of legal--hence profitable--size.)

The protection of clams until their second year will not only result in the increased yields in weight, but will also enable more individuals to reach sexual maturity and spawn at least once before capture. This aspect, although secondary to the main purpose of these recommendations, is nevertheless of importance. Although we do not know in detail what factors influence the quantity of young clams which annually set on our beaches, we do know that, compared to the Washington beaches, our set of young clams in the fall of each year is small: any measure which could possibly cause a larger number of young clams to set on our beaches would be desirable from this point of view alone. The proposed recommendations would tend to accomplish this aim in addition to the primary aim, which is to increase the yield in pounds.

Two alternatives are presented for imposing minimum size limits for commercial diggers. One, a simple 4-1/4-inch minimum size limit, has already been mentioned. Its advantages are:

1. It raises the average age of the clams, and hence the average weight per clam.

2. It allows commercial exploitation relatively early in the second year of life.

3. There will be only a relatively short period of time during which second-year clams would be available to the sport fishery but not to the commercial diggers.

4. . It is simple.

The major disadvantage which this alternative presents is the possible inability of commercial diggers to select clams of legal size in the spring of the year when many clams are near the legal size. If diggers cannot learn to select clams larger than legal size there may be much wastage of clams.

To counteract the eventuality of wastage of second-year clams when most of them are near 4-1/4 inches in total length, the following alternative is presented: a 4-inch minimum size limit from May 1 to September 1 of each year and a 4-1/2-inch minimum size limit from September 1 of one year to May 1 of the following year. This alternative would tend to eliminate wastage of second-year clams because the majority of second-year clams are smaller than 4-1/2 inches before May 1 and larger than 4 inches after May 1.

The last point is illustrated in Figure 1 of the appendix. This figure shows the sizes and ages of 807 clams dug randomly by biologists in June 1950. The first year clams are well under 4 inches and the older clams well over 4 inches, so that selection of clams over 4 inches does not present much difficulty as long as they are present in fair numbers.

The advantages of this alternative are:

1. Reduced wastage of second-year clams in the commercial fishery.

2. Reduced wastage of small clams in the amateur fishery prior to May 1 because the competition for clams up to 4-1/2 inches from commercial fishery is removed. Thus the average size of clams available to the sport diggers prior to May 1 is higher than under the other alternative; and since the average size has much to do with wastage in the sport fishery, wastage will be reduced as a result.

3. Virtually complete harvesting of second-year clams by fall.

One disadvantage to commercial diggers of this alternative is the slightly longer delay it means before they can avail themselves of second-year clams since not many second-year clams reach 4.5 inches before May. However, growth during this period is rapid, resulting in an increase in weight. After May 1, this alternative will permit, simultaneously with the complete harvesting of second-year clams, the taking of some faster-growing first-year clams by exposing them to legal capture at a substantial loss in potential weight (those first-year clams which reach 4 inches between May 1 and September 1 of each year). As a result of almost complete harvesting of the second-year clams the average age of clam stocks at the end of a season may not be much greater than it is at present, so that the number of 2-year-old spawners may not be materially increased. Commercial diggers will need to distinguish between sizes of clams under two minimum sizes instead of one as under the first alternative. Finally, this alternative presents a more difficult enforcement problem than a simple 4-1/4" limit, because it makes it necessary for the enforcement officer to know not only the size of a clam in order to determine the legality of capture, but the date of capture and origin (Washington or Oregon) as well.

The reduction of the amateur bag limit by one-third does not mean a permanent reduction in the weight of the present bag limit. As a result of raising the average size of sport-caught clams the weight per clam will increase considerably. Mr. Roger Tollefson stated before the Commission in 1950 that the weight of 36 sport-dug clams

in 1949 amounted to only 2.5 pounds, or about 14.4 clams per pound. A bag limit of only 24 clams, a dozen of which were in their first, the other dozen in their second, year of life would weigh 2.9 pounds. This poundage seems not improbable when there is a sufficiency of clams in their second year of life on which the sport fishery can draw.

3. Review of some previous recommendations for regulation.

Recommendations similar to those proposed to the Commission have been formulated by Commission biologists in previous years. Mr. Charles Woelke proposed informally in 1951 that one of two sets of regulations be adopted:

1. Complete beach closure from August 1 to September 30, and the following:

   a. a 4.5-inch minimum size limit for commercial diggers.

   b. retaining the 36-clam bag limit from October 1 of one year to July 31 of the following.

or 2. a. 4.5-inch commercial minimum size limit.

   b. a 36-clam bag limit from October 1 to the following June 30.

   c. an 18-clam bag limit between July 1 and September 31.

The objectives of proposals in this brief are the same as those presented above: i.e., a reduction of fishing on clams before the most profitable time of capture. H.C. McMillin, one of the pioneer workers on the life history and fishery for the razor clam, proposed in 1924 a 4.5-inch minimum size limit for both commercial diggers and amateurs in the state of Washington. A quotation relevant to the present recommendation has been copied from a report on the 1926 razor clam season on Washington Ocean Beaches by H.C. McMillin, and is appended to this memorandum.

PART II.

REBUTTAL TO ARGUMENTS AGAINST PROPOSED CHANGES,

PRESENTED AT SEASIDE, MAY 12, 1954.

1. Premium price commanded by small clams (16-22 clams per pound, dressed).

The size range of the bulk of clams preferred by restaurants and fresh markets will not be affected by the 4-1/4-inch limit. They prefer clams which give nine to twelve clams per pound when dressed. Clams measuring 4-1/4 inches will give one dozen dressed clams per pound or more. (See Table 2)

At the present time, not all clams between 3-1/2 and 4-1/4 inches are dressed for the fresh market or used for human consumption because:

a. small clams are more economical crab bait than larger clams.

b. small clams are more expensive to dress than larger clams.

2. Large clams are mostly shell.

This argument is not substantiated by our data. Conversion varies between 45 and 50 percent practically over the entire size range from 3-1/2 to 5-1/4 inches. (See Table 3)

3. Increased wastage of clams.

Diggers can prevent the taking of undersized clams in three ways:

a. by judging the size of the clam from the size of the hole before digging for the clam,

b. by feeling the size of the neck and the uppermost part of the shell before removal from the sand, and

c. by replacing undersized clams after they have been dug erroneously.

The proportion of undersized clams which have to be replaced will be larger for the poorer diggers than for the better diggers. However, clams just a little under 4-1/4 inches will have a better chance to survive the ordeal than clams a little under 3-1/2 inches,

because the larger clams have thicker shells which are less easily broken in the process of digging. (Table 4)

Experienced diggers can recognize productive areas and must dig rapidly to make a profit. They will avoid the areas in which discrimination between clams of legal and sub-legal size presents a problem and slows digging. They will look for other areas which are more lucrative, at the same time keeping in mind the location of such beds which show many undersized clams, and will wait until the average size is such that selection no longer represents an economic loss to them.

4. Fishing has no effect on the yield.

One of the main objectives of the Seaside marking experiments was to learn whether this view was justified. Essentially the plan of attack was this:

1. Calculate by marking experiments the number of clams on Seaside Beach at the beginning and again at the end of a year.

2. Subtract the numbers present at the end of the year from those present at the beginning of the year.

3. Estimate the number of clams dug during the year.

4. If the number of clams dug during the year is about the same as the difference in numbers between the beginning and end of the year, it can be concluded that digging is indeed of primary importance in reducing the numbers of clams on the beach.

For 1952 the results were as follows:

Number of clams present 5-12-1952	607,000	
Number of clams present 5-1-1953	45,000	
Estimated difference		562,000
Natural mortality (18.63%)	110,000	
Approximate total catch	430,000	
Estimated reduction		540,000

These results indicate that digging is of major importance in the reduction of a given number of clams of similar age on a beach area. The figure of 430,000 clams for "Approximate total catch" does not include the sport-caught clams of this age which were caught between January and May 1953, nor does it include the number of clams destroyed by inexperienced diggers but not kept as part of their catch.

5. Fishing has no effect on the set of young clams.

The proposed changes are not primarily intended to provide additional spawn. However, on some beaches there are mature clams of only one age: the youngest age at which clams spawn. Only a few survive to spawn a second time. If the mature clams in such an area should be dug out and the next younger group of clams fail for some reason to set on the beach, the clams in the area could no longer perpetuate themselves unless larvae floated in from an outside area. Although we are ignorant of the processes which cause young clams to set on our beaches, it may be wise to forestall any shortage of spawn when this can be achieved, partially at least, by the same regulations of the fishery which tend to raise the production in pounds to a more favorable level than at present.

Table 5 shows that there has been a general downward trend of razor clam production since 1950.

6. The tourist bag limit should not be reduced.

Since the proposed changes aim at raising the average size of clams, the reduction of the bag limit in terms of numbers of clams does not imply a permanent reduction in weight.

7. Higher density of clams on the beach will reduce growth of clams.

The increase in the number of clams per unit area could hardly be large enough to affect the growth materially. The sets of young clams on the Washington beaches are consistently higher than ours, but no major growth differences are caused by this. The 1953 set of young clams at Seaside was many times as large as in previous years, but our sampling of the clams in this area has not shown any obvious growth differences to date.

8. The larger average size will cause a reduction in wholesale prices as in the case of Washington clams.

The lower price which the Washington clams command is at least partially due to the sudden glutting of the market during and immediately following the commercial season and also to the fact that many are frozen before being offered for sale, thereby reducing their quality. Under the proposed changes, the size range of the bulk of commercially dug clams will not be affected enough to increase the supply of very large clams which are undesirable to the fresh market buyers because of their size. (An oversupply of this nature occurs once in a while when a previously unexploited bar area becomes exposed and is dug by the majority of commercial diggers beaause of the high poundages it yields.)

PERSONAL USE OF OYSTERS

Under the present regulation an individual is permitted to take 36 oysters as his personal possession limit. This is a total limit including both native oysters Ostrea lurida, and Pacific oysters Ostrea gigas. The native oyster is native to Oregon and present in very limited quantities in Yaquina and Netarts Bays. Their numbers are so small as to make their annual reproduction very small. Native oysters are present on both privately owned and state owned grounds.

The Pacific oyster is an introduced species, and does not successfully reproduce in quantities in Oregon's coastal bays and estuaries. Evidence of a very small natural set in Coos Bay has been seen. It has possibly occurred elsewhere. Pacific oysters are present on both privately and state owned ground.

It has been brought to the attention of the Commission that unlawful harvesting of oysters for personal use has been taking place in at least Tillamook Bay. The claim is that tourists are taking their 36 oysters from privately owned or state-leased beds using the possession limit as an excuse for taking the oysters. To stop this practice it has been proposed by Tillamook Bay oyster growers that the possession limit be withdrawn for Pacific oysters.

The problem is not a biological one, from the standpoint of Pacific oysters, as the state has no parent stock of these oysters. It maintains no reserves for public use. The Pacific oysters that are legal to harvest, under existing regulations, must originate from one of the following: (1) abandoned beds, (2) washing of oysters

from privately-owned ground onto public ground through wave action, etc., (3) natural set, and (4) unleased state-owned ground.

The native oyster populations are so marginal in reproductive capacity that they should be protected as far as possible to give them every chance to increase in numbers.

No stand is made regarding the elimination of a personal limit on Pacific oysters. If the question of the possession limit on native oysters is brought up, it is suggested that no harvesting be permitted on native oyster reserves in Yaquina or Netarts Bays.

PART IV

APPENDIX

Table 1. Actual and Potential Value of First-Year Clams Taken in 1949, 1950, and 1952.

Clams caught in:	The values of the first-year clams removed by the commercial fishery were:			The objective of the proposed regulation is to delay the take of these clams until the second spring, when these values would have been:			Percentage increase in value
	Pounds	Price per Pound	Total Value	Pounds	Price per Pound	Total Value	
Fiscal Year 1949	8,951	$ 0.25	$ 3,245.	17,497	$ 0.25	$ 6,874.	112 %
Fiscal Year 1950	55,063	0.25	13,766.	106,697	0.25	26,605.	93 %
Fiscal Year 1952	25,801	0.25	6,450.	52,634	0.25	13,159	104 %

Table 2. Relationship of Total Length to Number of Dressed Clams per Pound.

Total Length (Inches)		3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.8	5.0
Number / Pound	Spring	36.3	30.6	26.4	21.9	17.9	15.3	12.7	10.7	8.7	7.8	6.6
	Fall	40.5	25.9	22.8	17.8	16.1	14.0	12.0	10.9	9.1	7.8	6.3

Table 3. Relationship of Clam Length to the Percentage of Total Length Which is Meat.

Length of Clam (In.)	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.8	5.0	5.2
Meat Weight / Total Weight	54.6	47.7	46.2	46.5	44.1	47.0	47.4	49.9	50.3	50.3	54.1	46.3

Table 4. Wastage of Clams

Month	Holes examined	Number wasted	% of waste
May 1951	104	39	37.5
June 1951	341	80	23.4
July 1951	50	7	14.0
Totals	495	126* =	24.5%

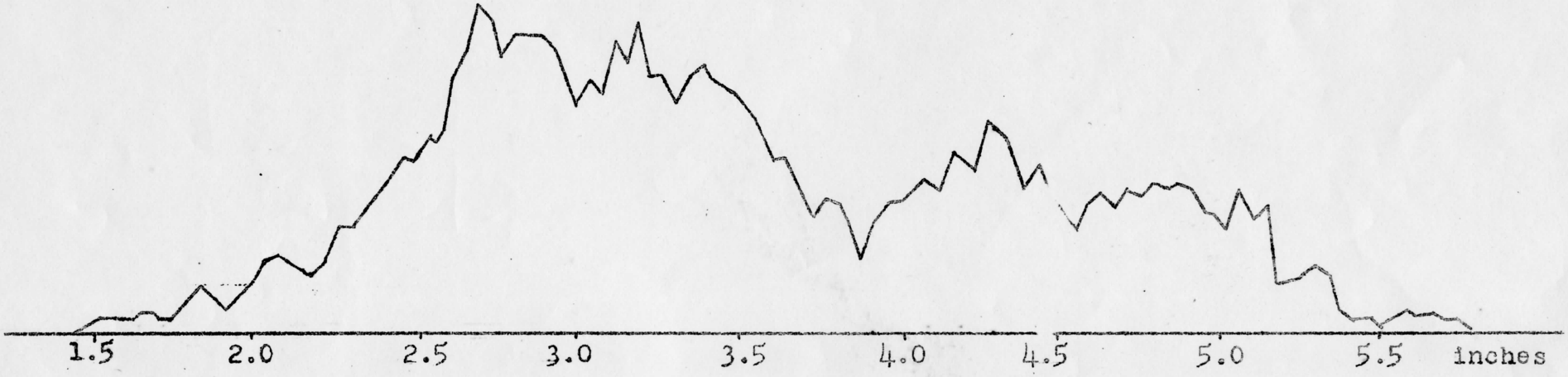
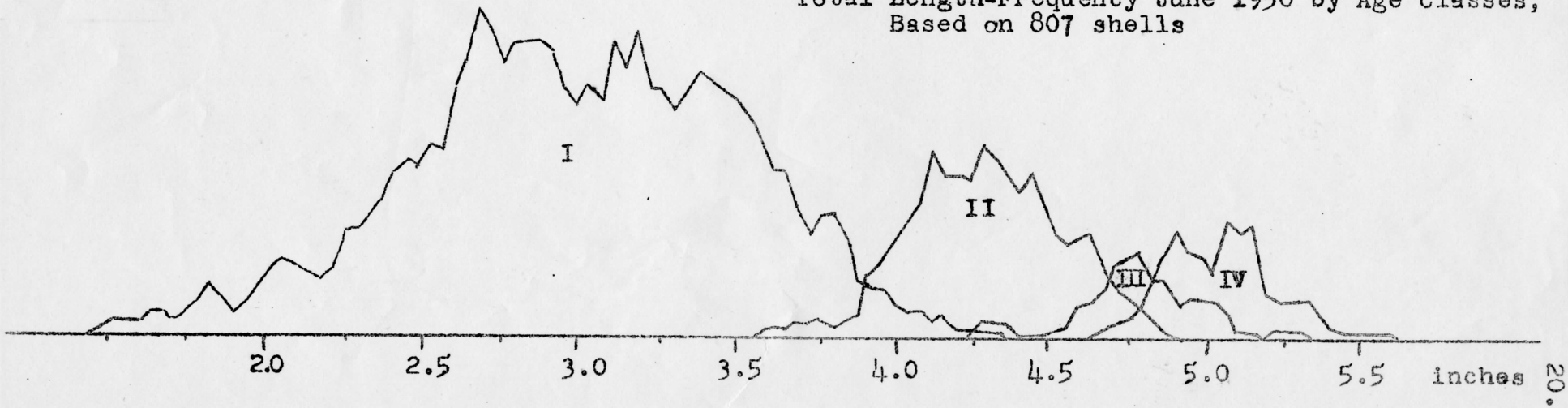
* 124 clams were in their first year; 2 clams in their second year.

Table 5. Razor Clam Landings of Clatsop Beaches For Fiscal Years 1941 through 1953.

Fiscal Year	Pounds
1941	124,286
1942	13,894
1943	18,748
1944	64,448
1945	77,988
1946	151,477
1947	166,355
1948	206,835
1949	200,486
1950	335,091
1951	282,289 *
1952	226,938 *
1953	254,964 *

* The figures for these years are provisional.

Figure 1. Total Length-Frequency June 1950
Based on 807 Shells



Total Length-Frequency June 1950 by Age Classes,
Based on 807 shells