

# THE YAQUINA BAY CLAM FISHERY

## Preliminary Report

### Introduction

Starting the first part of July, 1947 the Fish Commission of Oregon set up a field station at Newport for the purpose of conducting research work on shellfish. Working conditions regulating the type and amount of work that could be efficiently conducted while the laboratory was being set up, and the fact that this immediate time was one of a series of very low tides during the tourist season prompted the decision to spend the first several weeks working principally on the clam fishery in Yaquina Bay.

A map of Yaquina Bay proper is included and referred to here. No work was done above the settlement of Yaquina for reasons of transportation. It will be seen that the channel is quite narrow with most of the area of the bay being tideland. This was arbitrarily divided into 10 sections lettered A through K (I excepted) for reference purposes, as follows:

A - The narrow strip of beach running from Newport to McLeans Point, varying considerably in composition but sloping off comparatively rapidly along most of its length.

B, C, & D - The large flat locally known as "Sally's Bend"; comprising some 600 acres lying mainly at a 0 to a  $\pm$  2 ft. tide level, of sand and mud composition.

E - The island in front of and down from the dock area, lying from a -2 to a plus 2 ft. tide level and of almost all hard white sand composition. This island has reportedly been rapidly increasing in area during the last 5 or so years.

F - This flat is reportedly similar in height and composition to section E, composed entirely of sand.

G & H - This flat is identical in physical characteristics to Sally's Bend (secs. B, C, & D).

J - The area locally known as Kings Slough, lying along the mouth of a small creek, reportedly of very soft mud with many small channels and potholes.

K - This flat is reportedly similar to secs. B, C, D, G, & H.

It was not possible to personally examine sections F, J, or K; the only information gathered here being reports from the local clam diggers.

It should be noted that all of the foregoing tidelands (both sides of the river from the mouth of the Bay to Yaquina) with very minor exceptions are owned by the Port Commission of Newport, having been deeded over to them from the original Railroad grant in Yaquina Bay.

It should also be noted that these tidelands make up the bulk (in area at least) of all the possible available clam beds in this bay since above Yaquina there is apparently little tideland, what there is being fairly steep with but a few small flats.

The following species of clams have been recorded to date in the Bay:

#### Local Names

Cardium corbis	-----	cockle, or cockrel
Schizothaerus nuttallii	-----	horse neck, horse clam, or mud clam
Mya arenaria	-----	Eastern clam, or mud clam
Paphia staminea	-----	little neck, or butter clam
Saxidomus giganteus	---	Coney Islands

(CONT.)

*Solen sicarius* ----- jackknife clam, or razor clam  
*Siliqua patula* ----- razor clam, or razorback  
*Macoma inflatula* ----- mud clam  
*Macoma inquinata* ----- mud clam

Cockles which are found throughout the entire bay and as far up river as Oysterville and horse clams which are found throughout the bay are by far the two most important and dominant species. The principal beds of *Mya* are up the river around Oysterville where they are supposedly fairly extensive. They are found in very few places in the Bay proper. A few *Paphia* are scattered throughout the entire bay but are not plentiful. There reportedly are a very few small beds of *Saxidomus* left, principally in Sally's Bend whose locations are kept as private secrets by those who know them. Occasional individuals are found over the entire bay. The jackknife clam is taken off and on, and the only razor clams found are a few small ones on sections E and F. *Macoma* are plentiful but are rarely if ever bothered with ~~XXXXXX~~ because of their small size.

### Present Condition of the Beds

Due to the transportation set-up, all the quantitative work was done in Sally's Bend (sections B, C, & D). The number of clams present per unit area was arrived at by four methods, each being used to supplement the others. Plots of 100 sq. ft. area were measured out by pacing and gone over carefully both by inspection and actually feeling by hand to spot all horse clam holes. The areas were then raked thoroughly to get the number of cockles and other surface clams present, this being considered the best manner of determination for these. It was felt the numbers of horse clams could be most efficiently determined by recording the holes but because of their low numbers it was desired to supplement the 100 sq. ft. plots. This was done first by pacing out a strip 10 ft. by 100 ft. and again looking and feeling for the siphons. Another method was to pick out extremely thorough ~~HI~~ diggers working in single small areas and to record the number of clams taken against the area worked in. The method used for determination of small clams and for large clams other than cockles or horse clams was to dig out known areas to a depth of about 1 1/2 ft., washing all mud through a screen so as to leave all clams, dead shells, etc. in the screen. A canning tray (basket) was obtained from Yaquina Bay Fish Co. for this use. It had elongated hexagonal holes, maximum width = 1/4 inch, maximum length = 7/8 inch. The basket itself measuring 15 X 32 inches was used to mark the plots.

### 100 Sq. Ft. Samples

Section	Date	horse clams	cockles	little-necks
B <i>Sally's Bend</i>	7/17	0	12	0
		0	34	0
		2	28	2
		1	24	0
		0	6	0
		<u>2/400 sq'</u>	<u>104/500 sq'</u>	<u>2/500 sq'</u>
Approx. no./acre		20	900	20
" lbs./acre		25	330	--
C	7/18	1	25	3
		3	37	0
		2	18	4
		<u>6/300 sq.'</u>	<u>80/300 sq.'</u>	<u>7/300 sq.'</u>
		90	1,200	100
		115	450	--
Approx. no./acre		90	1,200	100
Approx. lbs./acre		115	450	--

Horse Clam Surveys (larger area)

Sec. B, 7/17, own count = 9 clams per 1000 sq. Ft.  
 = 40 clams per acre  
 = 50 lbs. per acre

Sec. C, 7/18, commercial digger = 25 clams per 1000 sq. ft.  
 = 110 clams per acre  
 = 140 lbs. per acre

private digger = 100 clams per 3,750 sq. ft.  
 = 100 clams per acre  
 = 150 lbs. per acre

Screened Samples of 3.34 Sq. Ft., Sec. C

Date	no. of samples	this year set horse clam	small cockles	little-neck	Macoma inflatula	Macoma inquinata
7/19	1	1	0	0	52	2
	1	6	0	0	21	12
7/21	2	0	1	0	49	17
	2	1	2	2	32	16
Totals	6	8	3	2	154	47
Approx, no./acre		1,700	650	45	33,000	10,000

It should be recorded that in this general area, sections C and D are considered alike in populations, both representing comparatively untouched beds. Almost all of the digging on this flat to date has been on section B due to its being the first one reached by the clambers. Therefore as long as clams have been plentiful the diggers satisfied themselves with the closest tract and only during these July tides have any numbers started working section C. Section D is still untouched as of recent years and will probably be moved onto only after section C has been well worked over.

It will be seen that the above figures also bear out these general observations, there being only 30 horse clams per acre in # B as against approximately 100 in section C. Cockles are also less but here the difference is not as noticeable, probably representing a shifting about of the cockle population, both by normal self-movement and by tidal factors which tend to even the numbers out over the entire tract. The numbers of tiny immature clams of both species will be referred to later.

Little-neck clams also show the effect of the greater digging in the first section but nowhere is this species abundant enough to warrant digging for it specifically. Since it is taken only as incidentally found while taking cockles this effect is perhaps of little consequence, and certainly does not justify any extensive work on the species. Further since only the near surface clams are taken there seems little danger of their being completely wiped out.

Saxidomus is conspicuous by its absence. Any one digger will apparently average about one clam for every 3 or 4 tides of digging if doing so more or less indiscriminately. The old commercial diggers say there used to be quite a few of them but that they were rapidly dug out. It seems likely then that they may never have existed in large enough numbers to stand specific digging. Despite their recognized desirability they should under present conditions at least be looked on by the Commission as merely an incidental species.

As pointed out before no one is interested in Macoma because of the size. Therefore the numbers found, while of interest, are still of little consequence for any immediate use. A possible future

use might be for checking back against as a measure of abundance of an abundant clam not influenced by digging, should at any time the sought after clams decrease markedly and the question be raised as to whether the cause was over-digging or some other "universal" factor such as pollution, hydrographical conditions, etc.

With the exception of section E which reportedly has large numbers of clams and the foregoing sections in Sally's Bend, all other sections are at the present time comparatively dug out. It is still possible to dig a "mess" of clams in the course of a tide but the numbers of large, taking size clams present are definitely not outstanding.

#### Age Composition and Recruitment of the Stocks

Length and width (actually depth) measurements were made on a total of 252 horse clams on July 16, 17, & 18. These clams were dug on sections B and C by commercial and private diggers and represent the size groups actually taken only. It is admitted that this does not give a true sample of the clams present on the beds but it was felt that it was the only way in which to get a large number of individuals in the time available.

The results of these measurements (smoothed by 3's) are shown on the two graphs included. Age group peaks have been designated by inspection only. It will be seen that both measurements give the same picture, tending to substantiate the accuracy of each other. It must be remembered that these graphs do not by any means give the true relative abundance of the groups since the specimens were the result of selective digging. In the first place it is almost impossible in the type of tideland encountered to spot any of the smaller clams, and secondly there is a definite desire and ability on the part of all diggers to pick out and dig only the largest of the clams found. Therefore while the figure are probably statistically valid for the final end of the curve they are extremely low for the origin end. Nonetheless they should be valid for determining the location of modes even though not for determining heights of the modes.

The results of the screened mud samples showed a group of tiny, quite uniform in size specimens of an average length of 17.3 mm, width of 10.8 mm. These undoubtedly represent the first year group, i.e., the results of this springs spawning. On the face of the evidence available then one would designate the first group shown on the graphs as the second year class. This however seems ~~XXXXX~~ in error, it appearing highly unlikely that in one years time the clams could undergo the incredible growth required for this large jump in length, width, and volume. Further a rough analysis was made of the check marks on the shells despite the fact that past experience has shown this method to be rather vague and ambiguous for this species, as with some others. However if one could attribute two check marks per year to the clam it would agree roughly with the results of the length, width data if there were an intermediate year class between this years set and the first class shown on the graphs. Such a class could well exist and have been missed due to inadequate sampling or else, while theoretically existing actually be missing this year if there had been a failure of spawning or setting last year.

Untill further information is available one of the two foregoing conditions is assumed to be the case and the year groups are numbered as shown on the graphs.

It then appears that we have a fishery taking ~~XXX~~ for practical purposes the large adult stocks only, principally of a single year class, that would soon pass out of the picture and be wasted if not utilized. At first it might seem that the diggers could then take

all the clams they could find, which at the present would mean about 100 clams (125 lbs.) per acre per year. This reasoning however fails to take into account the matter of spawning population. It remains to be seen whether or not partial removal of the 4 year group and complete removal of the 5 year group and over would leave stocks capable of sustaining the population. If not, one approach would be to set seasons, prohibiting their taking from the time in late fall or winter when the 4 year group became large enough to begin to be taken in appreciable numbers, untill after the spawning in the spring. As far as reproduction is concerned this should then mean the loss of only the 6 year class which apparently is not too large in numbers. However too little is known on spawning times and potentials to trust this reasoning too far. Further, without question more work is needed on the relative abundance of the various year groups. Also as far as substantiation of the year class designations and growth goes it is felt that investigation into the length-width ratio might yield some interesting results since the work to date indicates a progressively changing ratio. Length (or width) frequencies should also be taken at various times of the year to get concrete data to work on, this being expected to yield the best results.

Sufficient data has not as yet been collected and worked up on age or recruitment of the cockles. It is proposed that this be done. However several interesting claims have been encountered regarding the species. One is the universal claim that the cockles have definitely not decreased in number despite the intensive taking but have held their own throughout the years, if anything now being more abundant than ever. The second is that the cockles have separate setting areas (namely the sections of pure clean sand, principally F and E) from which the young clams move onto the other sections to maintain the stocks. Although seeming a bit far-fetched this may well bear looking into.

At any rate it is proposed that the same type of program be carried out on this species as has been started on the horse clam.

It is also proposed that the reported large beds of *Nya* up the river be investigated to some extent. No work is contemplated on any of the other species.

### Intensity of the Fishery

Yaquina Bay reportedly is the main area for taking of clams (razor excluded) in Oregon as far as the tourist traffic goes. Without doubt it is a large drawing card for this area, and a resource that ~~XXX~~ should be maintained.

Clam diggers here may be divided into three groups: tourists, commercial, and a group here referred to as "home-canners". These last are primarily people from the "Valley" plus a few local residents who go out each year for one, two, or three tides, taking everything they can possibly dig and canning or freezing the clams for use during the next year. Reportedly they are most active during the winter when the clams are in the best condition. These take horse clams almost exclusively. Although the tourist season is naturally heaviest during the summer, the local residents all agree that the intensity of digging is roughly the same the year around. Apparently very little digging is done at any time except on the long runouts, principally on the zero and minus tides.

As complete data as possible was gathered on the low tide series of July 14 through 23'd as to the amount of clams taken in Yaquina Bay proper. The results are summarized in the following table. The data for Sally's Bend is felt to be quite accurate, although the data for the rest of the bay is approximate only, based almost entirely

on estimates. It is felt to be of correct magnitude however. It might be noted that virtually all the commercial digging is on Sally's Bend while it is obvious that the greatest number of tourists dig on the other sections due to these sections being more accessible to the average tourist without a boat.

Intensity of Digging and Take of Clams  
Yaquina Bay July 1947

Date	Sally's Bend						All Other Areas		
	no. of diggers	Commercial Take in lbs. horse clams	cockles	no. of diggers	Non-commercial Take in lbs. horse clams	cockles	no. of diggers	Non-commercial Take in lbs. horse clams	cockles
16	9	200	1,000	6	100	350	20	100	500
17	7	150	750	21	500	1,300	14	50	350
18	4	100	500	23	250	700	52	200	1,000
19	5	150	600	55	1,000	1,500	250	500	2,000
20	3	50	500	30	500	1,000	200	400	2,000
22	5	150	800	20	300	700	50	200	1,000
Totals:		800	4,150	157	2,650	5,550		1,450	6,850
Estimated total for entire tide:		1100	5,500		3,500	7,400		1,900	9,100

The estimated total for the entire tide series was obtained by considering the 21<sup>st</sup> as an average day, and the 14, 15, and 23<sup>d</sup> together (days of poorer tides) as another average day; therefore adding 1/3 of the total recorded on the other 6 days to that total.

The conversion factors between weight, numbers, and volume of clams as involved above were determined to be: horse clams- average weight = 1 lb. 4 oz. each; cockles = 90 clams per 5 gal. can = 33 lbs., or 6 1/2 lbs. per gal. volume. All figures are for clams in the shells as dug.

In order to obtain some idea as to the general trend or condition of the fishery some rough calculations might be made on the basis of the data presented so far. Assuming the take of clams on this tide to be average, and calculating on a basis of 10 tides per year, one gets the following:

		Annual Take in lbs.	Recruitment in lbs.
Sally's Bend	horse clam	46,000	50,000
	cockles	130,000	200,000
Remainder of Bay	horse clam	19,000	(?)
	cockles	90,000	(?)

The recruitment figure are of course subject to the questions brought up in the discussion of that point. It is seen then that if the foregoing figures are of the correct magnitude that in Sally's Bend the horse clam take is equal to the recruitment while the cockle take is considerably less than the recruitment-if it is also primarily a one year class stock. Such a condition could well explain the reported decline in abundance of horse clams with none yet noted for the cockles. A possible point of still more interest is the fact that although the two major area divisions have approximately the same area and might be expected to have the same recruitment potential, the take of clams on the longer, more heavily dug area is much less than in Sally's Bend despite the greater intensity of digging. It

1900  
9100  
10000  
3500  
14500  
7400  
21900

would then seem that this must represent a state of depletion; that the diggers cannot take all clams that can be located (the possibility brought up previously) without running the stocks down hill, perhaps due to the also previously mentioned factor of spawning populations.

At any rate it is believed that the data gathered to date indicates a condition at least approaching "over-fishing", if not already in such a process. In view of the still increasing magnitude and importance of the clam beds here and the apparently approaching ~~XXXX~~ condition of the fishery it is recommended that further work be done on this industry. It is felt that an expenditure during the coming year of this stations efforts to the extent of 15 % on this problem would not be out of line. This should then give data that would show better what regulations, if any, might be necessary before the fishery would have a chance to decline too far. It is also felt that other clam areas in the State should be at least briefly looked into to see if similar conditions might exist in those areas.

### Summary of Main Points

- 1 - Descriptions of the tidelands in Yaquina Bay are given as pertaining to clam beds.
- 2 - General notes are given on the clams found in this bay, their distribution, and respective importance.
- 3 - Horse clams (*Schizothaerus nuttali*) and cockles (*Cardium corbis*) are the only two clams found of consequence.
- 4 - Sally's Bend, the only large tract left with commercial numbers of clams remaining was found to contain a "take-able" population of 50,000 lbs. of horse clams and 200,000 lbs. of cockles.
- 5 - Preliminary work on the horse clam indicates it to be predominately a fishery of a single year class per year, the clams then being in their fifth year.
- 6 - The approximate take of clams in Yaquina Bay during the X low series of tides July 14 through 23 was found to total 1,100 lbs. of horse clams and 5,500 lbs. of cockles by commercial diggers. Non-commercial diggers took a calculated 5,400 lbs. of horse clams and 16,500 lbs of cockles.
- 7 - On the basis of data available so far <sup>5,400</sup> it is felt that the ratio between take of clams and recruitment is dangerously close to the side of depletion, if not already undergoing such a process.
- 8 - It is recommended that 15 % of the efforts of the coming year be spent in further investigation of this problem in Yaquina Bay, and elsewhere.

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Submitted July 29, 1947

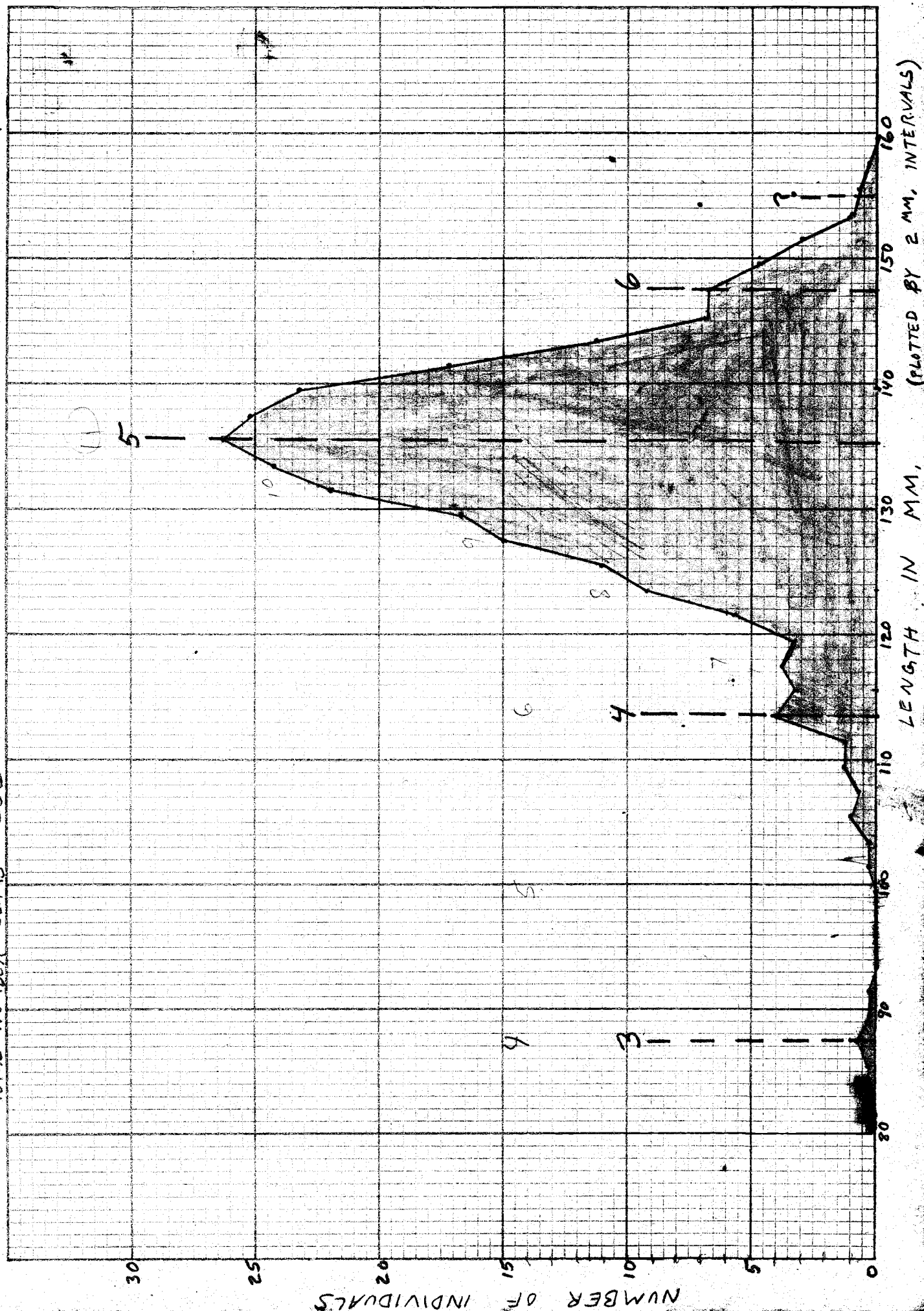
R. T.

Roger Tollefson

# LENGTH FREQUENCY - HORSE CLAMS SECS. B+C YAQUINA BAY (Sally: B+C) JULY 16, 17, 18, 1947

SMOOTHED BY 3 $\frac{1}{2}$

TOTAL NUMBER CLAMS = 252



WIDTH FREQUENCY - HORSE CLAMS  
SECS. B & C YAGUINA BAY  
16, 17, 18 JULY 1947

SMOOTHED BY 3

TOTAL NO. CLAMS = 252

