

Heasterson

Oregon Crab Management

INTRODUCTION

The purpose of this report is to discuss the following topics: (1) a review of the Oregon crab fishery; (2) crab condition studies; (3) seasons, and problems involved in setting seasons; (4) "backing" crabs prior to landing; (5) closures off river mouths; (6) pot versus ring fisheries in bays; (7) minimum sizes of bay and ocean crabs; (8) possession limit for personal-use fishermen; and (9) Columbia River closure.

OREGON CRAB FISHERY

Oregon crab fishermen remove 90% or more of the legal-sized male crabs each season. When a fishery operates largely on a single year class of animals, as this one does, landings fluctuate widely. Oregon annual landings range from 5 to 12 million pounds. The success of each season appears dependent upon environmental conditions that affect juvenile crabs. When viewed over a long-term period, the production trend is relatively stable at an average of between 7 and 8 million pounds annually.

The fishing intensity has increased from 64 crabbers fishing 8,000 pots in 1947-48 to a high of 134 crabbers fishing 28,000 pots in 1961-62 (Table 1). The intensity dropped slightly in 1962-63 to 118 fishermen fishing 25,000 pots, probably because of the scarcity of crabs. The effect of increased intensity has been to move the period of peak production closer to the opening date (Figures 1 and 2). In 1947-48, peak production occurred in April and May. In the past four seasons peak production occurred in the first two months of the season (December-January). Although final figures are not available, the 1962-63 season will probably show a higher percentage of the catch being taken in the first two months than any previous season. This is undoubtedly a reflection of crab scarcity. Figure 1 depicts three seasons which may be classed as good, average, and poor, yet the production trend is virtually the same in each with

Table 1. Crab Season, Number of Boats, and Estimated Number of Crab Pots Fished.

Year	Numbers of Boats Fishing	Maximum No. of Pots Fished 1/
1947-48	67	8,015
1948-49	35	3,935
1949-50	29	3,795
1950-51	63	13,626
1951-52	83	15,709
1952-53	71	13,507
1953-54	83	16,177
1954-55	91	19,634
1955-56	92	18,923
1956-57	94	19,206
1957-58	73	21,307
1958-59	81	21,824
1959-60	97	20,623
1960-61	118	24,443
1961-62	134	28,399
1962-63	118	24,618

1/ All estimates are probably minimal and those for 1948-49 and 1949-50 are undoubtedly low.

the greatest catch rate made in the first 90 days of the season. If this trend continues, and if a high percentage of the crabs are soft when the season opens, then the peak production will be on soft-shell crabs. If their condition was such that large numbers had to be thrown back during the early season then the fishery could suffer heavy losses.

CONDITION STUDIES

Through the cooperation of the processing plants and fishermen, crabs were sampled at sea and at the dock for shell condition. Condition of the crabs was determined by pinching the shell at the base of the tenth antero-lateral spine. If the shell was immovable at this point, the crab was considered condition 1 or hard shelled. If it was flexible or compressed readily it was classified as soft shelled.

The crab condition data are primarily the result of sampling landings at the dock with only limited sampling at sea. The fishermen have, for most of the sampling, already sorted their catches at sea and retained only what they

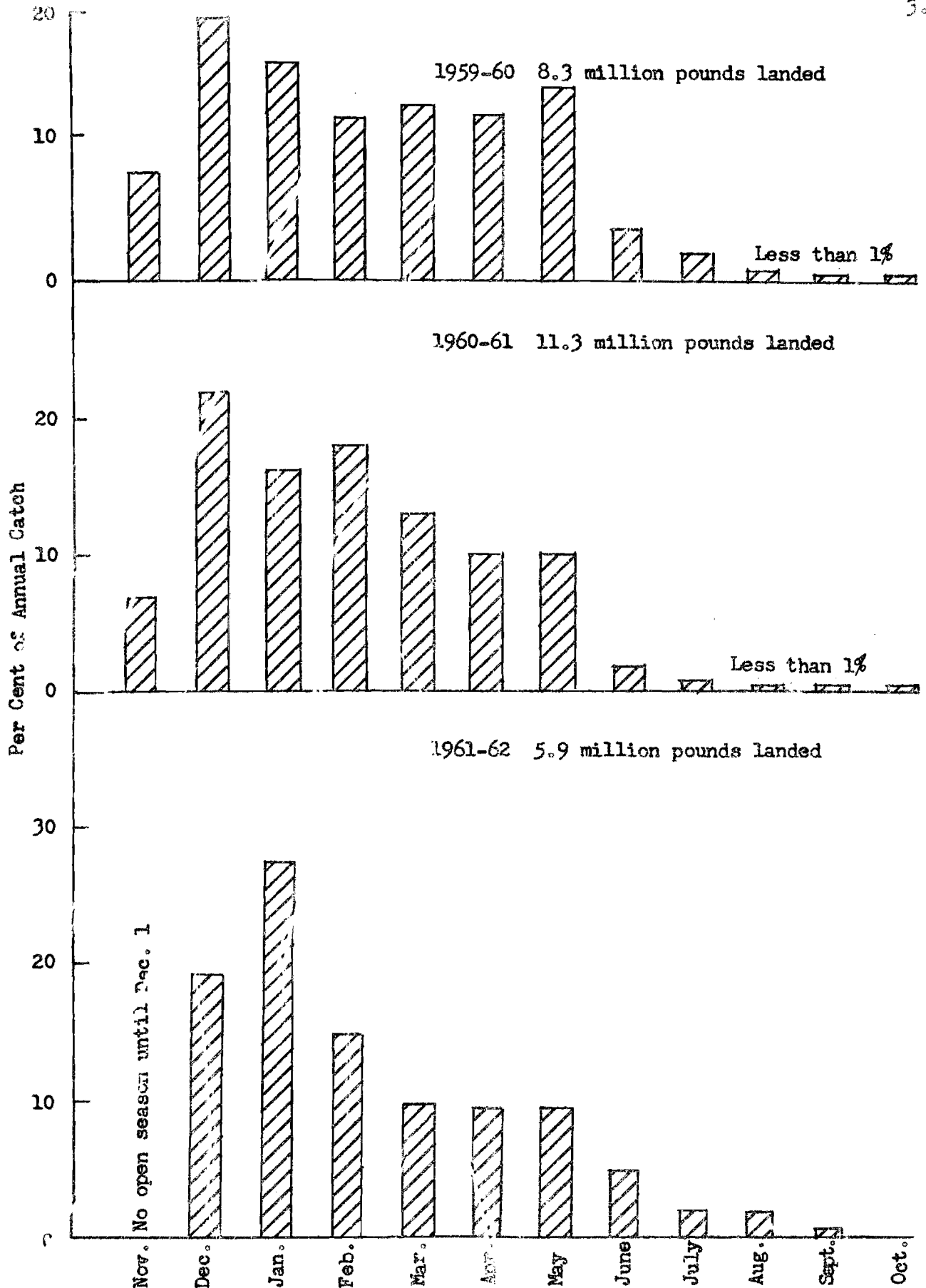


Figure 1. Per Cent of Annual Crab Catch by Month for the 1959-60, 1960-61, and 1961-62 Seasons.

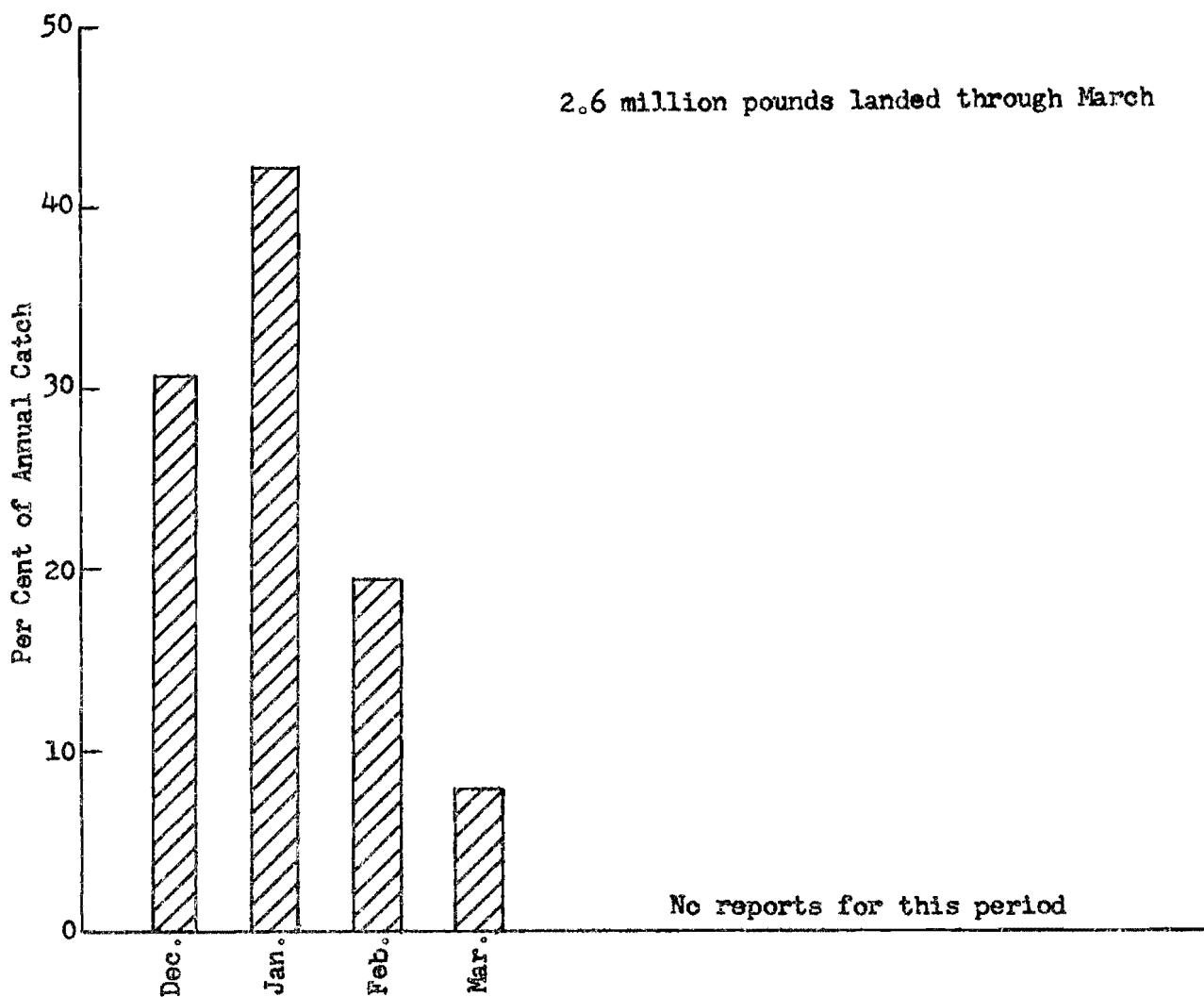


Figure 2. Per Cent of Annual Crab Catch by Month for the 1962-63 Season.

thought they could sell. Obviously the sampling results are altered one way or the other by deliberate action of the fishermen motivated by a combination of factors; it is unlikely that selectivity by the fishermen is uniform. Thus, the soft-shell percentages recorded by the biologists are minimal. Plant pick-out records are not precise measures of the percentage of soft-shell crabs in the catch. In absence of better information, dock sampling data provide the best relative measure of crab condition by time period.

Table 2 contains a preliminary summary of sampling results by two-week intervals and by area. Because of the method of computing entries, small atypical samples can have an unreasonable effect. It is clearly demonstrated that the crabs in Area II, particularly if the area from the Rogue River Reef to the California border is excluded, harden up sooner than those in Area I and at any given time the percentage of soft shells is greater in Area I than II. This tends to justify different opening dates for the two areas. Assuming the season should open when the soft-shelled percentage is about 10-15, it is obvious that Area II--and particularly so if Rogue River Reef to the California border area is eliminated--should open sooner than Area I, possibly on December 1 or 15. It is obvious that there are significant fluctuations within years and between years. With a limited amount of data, "unusual or irregular" years have a great influence.

The data in Table 2 indicate that the present opening dates are too early in most years to obtain optimum yield from the resource--assuming that approximately the same number of crabs will be harvested during the season even if the opening(s) were delayed somewhat. A delay in the season opening until January 15 would increase the meat yield, if there is an inverse relationship between percentage soft shelled and meat yield.

This method of sampling has been criticized by some segments of the industry. These people contended that Area I contained "rubber leg" crabs that

Table 2. Condition of Crabs by Percentage Soft Shelled in Landings
Sampled During the Period 1955-62.

Period	Year	Average Per Cent Soft Shell by Area		
		I	II	II w/o Rogue R. Reef to Calif.
Nov. 16-30	1955	--	18	
	1958	--	12	
	1959	--	18	
	1960	--	38	
	Average		22	
Dec. 1-15	1958	19		
	1959	48		
	1960	57	19	13
	1961	--	11	12
	1963	--	6	--
	Average	41	12	12
Dec. 16-31	1958	16		
	1959	35	14	
	1960	35	21	7
	1961	--	12	12
	1963	14	6	6
	Average	25	13	8
Jan. 1-15	1958	11		
	1961	25	10	7
	1962	36	22	19
	1963	16	7	6
	Average	22	13	11
Jan. 16-31	1961	10	9	8
	1962	12	14	14
	1963	10	7	8
	Average	11	10	10
Feb. 1-15	1962	8	6	7
	1963	9	12	9
	Average	9	9	8

were always soft, yet contained as much meat as the hard-shelled crabs. It is known that crabs will soften up prior to molting, but it has never been recorded that they never harden. However, in order to determine the validity of this criticism a pilot study was initiated during the 1962-63 season. This study involved selecting soft and hard crabs from the catch, weighing individuals, cooking them, picking out the meat, and removing water from the meat in a drying

oven to determine total solids. Data on hand from this method are limited at the moment. However, there is a suggestion that industry may be justified in their criticism for some of the crabs in Area I.

FACTORS OTHER THAN BIOLOGICAL

In considering seasons, many arguments other than biological are presented by industry and fishermen. For instance, people in southern Oregon maintain that any delay in the opening date in Area II would impose severe economic hardship on the small boat operators and on communities. They would lose their present one-month market advantage and fishermen would be inactive for an even longer continuous period than at present. Some believe many of the landings would then be made in California rather than Oregon. Still others advocate restoring the former Area II opening of November 15. Certain fishermen and processors feel the opening should be when the percentage soft shelled dictates, and their interpretation of the data is that the opening should be November 15 or December 1. Few if any southern Oregon interests make a specific point of relating their season opening to that of Area I except in an indirect way. On the other hand the Area I fishermen strongly advocate a uniform Oregon season presumably based on biological data. The economic disadvantages of opening the season a month later than in Area II undoubtedly influences their recommendations. Some say they have information to show a low percentage soft shell by December 1 in Area I, but it has not been presented to the Oregon Fish Commission. Few of the northern fishermen favor an opening on the Oregon coast earlier than December 1 and some would be satisfied with January 1.

In brief it may be stated that Area II fishermen will oppose any opening date later than December 1, many preferring November 15. It appears that many Area I fishermen will favor a December 1 opening and some will favor a January 1 opening. If the closing date is moved up there should be little or no opposition from Area II fishermen. The majority of fishermen in both Areas I and II

are through fishing by May or early June. However, two groups of fishermen located at Seaside-Warrenton and Tillamook will be most vociferous over the closing date if it is prior to September 15. These people are motivated primarily by economics. Their big business is tourist trade and they want to have crabs on hand through Labor Day. From the biological viewpoint, it is highly undesirable to have the fishery operating while molting is occurring during the summer and early fall.

Consideration must also be given to the attitudes of neighboring states. Seasons in one state can have pronounced effects on the fisheries of the adjoining state, particularly in the border areas. Washington biologists favor a January 1 opening, and certainly will oppose any opening earlier than January 1. California biologists prefer a January 1 opening in northern California, are relatively satisfied with the December 15 opening they now have, and would consider a December 1 opening. However, they still persist in opening their season from Point Arena south on the second Tuesday of November.

It would seem obvious from the foregoing that regardless of what action is taken, some segment of the Oregon industry or neighboring states will be displeased. Many localized situations and the vagaries of time of hardening and molting do not present a clear-cut pattern for basing regulations. Regulations must be broad enough to cover the irregular years and still not cause hardship during the "normal" years. The wisdom of Solomon is needed! At this time the staff recommends that the season open December 1 and close August 15. It is realized that this opening may be too early for optimum utilization, but further studies are needed to ascertain the best date.

BACKING PRIOR TO LANDING

During the present season a practice has developed that is deemed undesirable. Personal-use and commercial crabbers in some areas have been backing the crabs prior to landing. This has been noted before, but this year there are many sublegal crabs present in the estuaries and the practice has been more prevalent. Enforcement people cannot determine if the animals in possession

are legal or not, even though they may obviously appear to be small. The crabs that are barely sublegal this year make up the bulk of the next season catch and should be arduously protected. It is the staff recommendation that this practice be stopped.

CLOSURES OFF RIVER MOUTHS

For the past several years triangular areas off the mouths of Alsea and Nehalem bays have been maintained. Within these areas the taking of crabs for commercial purposes is prohibited. These regulations were adopted in order to allow free entry of crabs into the estuary from the ocean. It seems highly questionable to the staff that these regulations are accomplishing their purpose. The case against the closures may be summed up as follows: (1) crabbing in estuaries where we do not have closures is as good or better than in the estuaries where we have closures; (2) these closures are only enforceable when the Oregon State Police patrol boat is in the area and in many instances fishing takes place in these areas; (3) when crabs are moving, it is doubted that the presence of gear stops them; (4) crabs tagged and released in Yaquina Bay have been recovered in Alsea Bay during a period of time when pots were fishing within the triangular closure; (5) the ability of an estuary to support a crab fishery is dependent upon the salinity pattern of each individual bay; and (6) offshore commercial fishermen are limited to crabs of 6-1/4 inches shoulder width while the bay crabbers, both personal-use and commercial, are allowed to take 5-3/4-inch crabs--allowing inside fishermen to harvest a 1/2-inch size range unaffected by the outside fishery. The case for the closures may be simply stated that the closure may allow more crabs to enter the estuary. The staff recommends that the closed areas be abolished.

CRAB POTS VERSUS RING-NET FISHERIES

Within Alsea, Coos, Nehalem, Siletz, and Yaquina bays commercial fishing is limited to ring-nets only. From a biological point of view there is little

or no justification for this regulation. In fact, biologically speaking, crab pots employing escape ports are undoubtedly less detrimental to the crab population than ring-nets. Ring-nets must constantly be tended and many sublegal crabs are handled and injured. A pot with escape ports will retain legal-sized crabs and allow the sublegals to escape without handling. A fisherman who properly fishes rings will catch more crabs in a shorter period of time than a pot fisherman. The reason personal-use fishermen object to pots in bays stems from the fact that commercial fishermen can put several hundred pots in an estuary and let them fish 24 hours a day over extended periods of time. This, some people believe, reduces the number of crabs available to other fishermen. In certain instances estuaries have been limited to ring-net fishing only to alleviate enforcement problems. In some areas a few individuals have found it convenient to fish a few pots inside and a few hundred in the ocean. In some instances these people land a very high percentage of 5-3/4-inch "bay crabs". Unfortunately, the gear restriction has not always alleviated this problem. The staff recommends no change in existing gear regulations.

MINIMUM SIZE OF BAY AND OCEAN CRABS

Present regulations allow the harvest of 5-3/4-inch crabs within the estuary and 6-1/4-inch crabs in the ocean. Originally it was believed that the bay and ocean crabs comprised separate populations. Also, the bay crabs tend to average smaller in size than the ocean crabs. Consequently, different minimum sizes for harvest were established for the estuary and the ocean. Since establishment of these minimum sizes, much new information has been obtained. Tagging programs have shown a free interchange of animals between bay and ocean and seldom, if ever, is an egg-bearing female crab found within an estuary. Observations also show that crab abundance and seasonal patterns of occurrence and size are related to the salinity pattern of the estuaries. Small estuaries with a salt content low in winter and high in summer tend to have smaller crabs

and they are present in numbers only during the period of low river flow.

Larger estuaries with moderate or light freshwater influence tend to have larger crabs and more stable populations. Bay populations fluctuate in direct proportion to the ocean population.

It is obvious that an increase in the minimum size of bay crabs would virtually eliminate the fishery in some of the smaller estuaries. An increase in minimum size for the estuaries during the period 1957-63 would have reduced the bay catch by 48 to 61% with a mean reduction of 51% for this period. ^{1/} The same minimum size in the estuary and ocean on commercially caught crabs would alleviate the enforcement problem. Some fishermen feel that the reduction in catch would last for only one year. In view of the intense removal rate of legal-sized crabs from the ocean, this is doubtful. The staff recommends no change in size regulations.

POSSESSION LIMITS

Present sport regulations allow 12 crabs per day per person fishing with no limit on the number that can be in possession. In some areas personal-use crabbers live adjacent to the estuaries and maintain live boxes for holding clams and crabs. Some of these individuals will hold several dozen crabs in these boxes that were reportedly captured over a long period of time. In some cases there has been strong suspicion that the ultimate destination of these animals was a commercial outlet. In such cases enforcement officers cannot act unless they can actually observe excessive bag limits being taken or the actual sale of the crabs. It is the staff recommendation that this practice be discouraged by adopting a possession limit of 12 crabs.

COLUMBIA RIVER SEASON

There has been some interest expressed in opening the Columbia River

^{1/} Based on 10,157 width frequencies of legal-sized bay crabs from all estuaries (but predominately Yaquina Bay) during the period 1957-63.

estuary to fishing during the entire year. Originally it was found that the estuaries south of the Columbia displayed no definite pattern as to the time of soft-shell occurrence. It was assumed that the Columbia River followed the same pattern. However, studies conducted in 1957-58 showed that the Columbia River followed the same trend as the ocean. Tagging studies at that time showed that for tagged crabs released in the ocean, all recoveries were made in the river. Of tags released in the river, 42% of the recoveries were from the ocean and 58% from the river. This indicates a free interchange and mixing between the river and ocean. During this study soft-shell condition was also examined. It was found that the soft-shell periods within the river and the ocean were virtually the same (Table 3). This further substantiates the theory that no difference between the Columbia River and ocean populations exists.

Table 3. Per Cent Soft-Shell Crabs Found in the Columbia River and Ocean During 1957-58.

Month	Columbia River		Ocean 1958
	1957	1958	
July	--	13.3	--
August	--	21.1	35.6
September	28.6	54.7	--
October	20.7	64.5	--
November	8.0	36.2	--
December	8.0	31.3	9.5-19.7

SUMMARY AND CONCLUSIONS

Three years of intensive sampling and several more years of intermittent sampling show a difference in percentage soft-shell crabs in Area I and II. It is anticipated that Area I fishermen will not be satisfied if the present seasons are maintained, and likewise, a change to a uniform opening or a shift in present opening dates would not satisfy everyone. Therefore, if it is deemed desirable to have a uniform opening date, the staff recommends that the season open December 1 and close no later than August 15. This represents a

time period desired by most fishermen and falls within a time period that is acceptable to the staff in accord with the biological findings. These dates should also be acceptable to California and possibly Washington.

The recent increase in the number of people (both personal users and commercial crabbers) backing crabs prior to landing is creating enforcement problems and concern for the fishery. Therefore, it is the staff recommendation that the regulations be altered to make it unlawful to back crabs prior to landing and transporting to place of consumption.

It is the belief of the staff that the triangular closed areas off the mouths of Nehalem and Alsea bays are not accomplishing the purpose for which they were established, and because these area closures can only be enforced during part of the year, it is recommended that they be abolished.

Biologically there is little, if any, justification for limiting commercial crab fishing to ring-nets only. However, because of the conflict of use within the estuaries and the ability of some commercial crabbers to use extensive strings of gear within the bays and also because of the fact that some fishermen may take advantage of a loop-hole in present regulations, the staff recommends no change in this regulation at this time.

Even though bay and ocean crabs constitute a single population and it would be desirable to have a single minimum size for all commercially caught crabs, the staff recommends no change at this time. It is believed that the effect of this change would be quite drastic upon the inside fishery. It is doubtful if the inside fishery is having any effect upon the outside crab catch. Therefore the staff recommends no change and will continue to observe the problem.

Because some people appear to be taking advantage of the liberal nature of present regulations it is the staff recommendation that personal-use fishermen be limited to 12 crabs per day or in possession.

Findings reveal no difference between Columbia River estuary crab

populations and the adjacent ocean populations as indicated by migration and shell condition. Therefore, it is the staff recommendation that the Columbia River be regulated in the same manner as the ocean.

C. Dale Snow
Oregon Fish Commission
September 26, 1963