

OREGON CRAB CONDITION STUDIES DURING THE 1960-61,
1961-62, 1962-63, AND 1963-64 SEASONS

INTRODUCTION

The condition of Dungeness crabs at the inception of each season fluctuates considerably between years. In some years only a small portion of the marketable crabs have soft shells (and reduced yield) and in other years substantial portions have soft shells. The poor quality of crabs during the early part of the 1959-60 season caused considerable concern within the industry and this resulted in a recommendation to the Pacific Marine Fisheries Commission in November 1960 to delay the opening date along the coast. A concurrent recommendation called for uniform opening dates for all areas. The northern California, northern Oregon (Area I, north of Cascade Head), and Washington areas opened December 15. Southern Oregon (Area II, south of Cascade Head) opened November 15. The variable opening dates in Oregon were based upon condition studies in 1948 and 1949.

The Oregon Fish Commission acted in December 1960 to change the opening date for Area I from December 15 to January 1, and for Area II from November 15 to December 1. These new dates would become effective in the 1961-62 season if the Washington season was altered accordingly.

The OFC action created controversy among some segments of the Oregon industry who alleged that the crab condition did not vary sufficiently between areas to warrant different opening dates for Area I and Area II. In accordance with a PMFC request, a 2-year investigation was undertaken to determine the condition of crabs landed in the principal Oregon ports. The findings of this 2-year study were reported at the 1962 annual PMFC meeting. However, because of the extreme variation in condition at the season opening for these 2 years, the study is being continued for another 3 years. This report deals with information collected on crab condition during the 1960-61, 1961-62, 1962-63, and

1963-64 seasons.

METHODS

Through the cooperation of the processing plants and fishermen, crabs were sampled at sea and on the dock for shell condition during the 1960-61 and 1962-63 seasons and only at the dock during the 1961-62, and 1963-64 seasons. 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 to be condition 1, or hard shell. If the shell was flexible under pressure, it was considered 2, or soft shell. If it was soft or compressed readily it was classified as condition 3. Samples were taken weekly when weather and landings permitted until the soft-shell percentage declined to minimum levels. Also, each staff member sampled at least once in every port in order to minimize bias. Width frequencies were taken of all legal soft-shell crabs and a portion of the hard-shell crabs.

In this type of sampling the following assumptions must be made: (1) a crab with a soft or flexible shell is a crab that has not completely filled out since shedding; (2) uniform interpretation of shell condition was made by all samplers; and (3) the samples taken were representative of the crabs being caught in the fishing area.

RESULTS

During the 1960-61, 1961-62, 1962-63, and 1963-64 seasons, 17,080, 10,825, 12,566, and 9,128 crabs were sampled for condition. Sampling took place at all major ports from Astoria to Brookings.

Crab Condition 1960-61

Table 1 summarizes the information collected concerning the condition of crabs landed as measured by the per cent soft-shelled in the samples during the 1960-61 season. In general, the per cent soft-shelled crabs declined steadily

Table 1. Numbers of Crabs Sampled and Per Cent Soft Shelled, by Area Caught and Date Sampled, for the 1960-61 Season.

Week Ending	Area I						Area II							
	Longbeach, Wn.		Columbia R.		Cape Falcon		Cape Lookout		Umpqua R.		Cape Blanco		Rogue R. Reef	
	to Columbia R.		to 1/2 Cape Falcon		to Cape Lookout		to Umpqua R.		to Cape Blanco		to Rogue R. Reef		to Calif. Border	
	No. Sampled	% Soft	No. Sampled	% Soft	No. Sampled	% Soft	No. Sampled	% Soft	No. Sampled	% Soft	No. Sampled	% Soft	No. Sampled	% Soft
Nov. 27	0	--	0	--			161	38	0	--	0	--	0	--
Dec. 13	581	57	0	--			426	20	468	14	279	6	632	36
Dec. 26	195	41	300	29			555	7	0	--	0	--	200	36
Jan. 1	150	37	0	--			73	3	190	5	95	13	250	20
Jan. 8	0	--	159	13			539	5	0	--	0	--	0	--
Jan. 15	0	--	0	--			490	8	0	--	349	10	503	20
Jan. 22	379	13	143	9			734	7	369	6	0	--	0	--
Jan. 29	524	9	0	--			332	9	0	--	500	9	506	13
Feb. 5	0	--	0	--			629	6	0	--	0	--	0	--
Feb. 19	257	7	141	22			0	--	0	--	0	--	0	--
Feb. 26	0	--	0	--			450	2	0	--	0	--	0	--
Mar. 5	0	--	0	--			471	6	488	29	0	--	334	12
Mar. 19	399	5	535	6			0	--	0	--	0	--	0	--
Mar. 26	0	--	0	--			301	3	0	--	0	--	419	5
Apr. 2	149	63	319	10			0	--	0	--	0	--	0	--
Apr. 16	0	--	0	--			391	5	453	2	0	--	0	--
Apr. 30	316	23	0	--			0	--	0	--	0	--	0	--
May 7	441	13	0	--			0	--	0	--	0	--	0	--
Totals	3,391		1,602				6,052		1,968		1,223		2,844	

1/ Cape Falcon is 43 miles north of Cascade Head, the northern boundary of Area II.

after the season opened in all fishing areas. However, there was a decided difference in the condition of crabs between fishing areas for the same time period during the early portion of the season. For the week ending January 1, the soft-shell percentage for southern Washington was 37 (the previous week it was 41 compared to 29 for Area I). For Area II, exclusive of the southernmost portion (Rogue River Reef to the California border), soft-shell percentages were 3, 5, and 13, respectively moving southward. Curiously, the Rogue River Reef-California border sub-area had a percentage of 20 which is comparable to that in Area I. This area has only recently been extensively exploited by Oregon fishermen. Further study is indicated to determine whether this condition is consistent. The data indicate that a later opening in 1960 for all areas would have reduced the proportion of soft-shelled crabs landed, and that crab condition varies markedly between areas.

Crab Condition 1961-62

Table 2 summarizes the information collected concerning the condition of crabs sampled during the 1961-62 season. Crab condition was better on the opening in all areas in 1961-62 than in 1960-61, except for those crabs taken just south of the Columbia River. This area contained an unusually high percentage of soft-shelled crabs. In general the trend was for the soft-shell percentage to decline as the season progressed. However, what appeared to be a group of late-shedding crabs entered the fishery in mid-January and increased the soft-shell percentages at Coos Bay and Brookings. Differences in condition between areas were not pronounced as in 1960-61, perhaps because of the lower incidence of soft-shelled crabs in 1961-62.

Crab Condition 1962-63

Table 3 summarizes the information collected concerning the condition of crabs sampled during the 1962-63 season. Crab condition at the season opening was better than in the previous 2 seasons. However, in late winter and early

Table 2. Numbers of Crabs Sampled and Per Cent Soft Shelled, by Area Caught and Date Sampled, for the 1961-62 Season.

Week Ending	Area I						Area II							
	Longbeach, Wn. to Columbia R.		Columbia R. to 1/ Cape Falcon		Cape Falcon to Cape Lookout		Cape Lookout to Umpqua R.		Umpqua R. to Cape Blanco		Cape Blanco to Rogue R. Reef		Rogue R. Reef to Calif. Border	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft
Dec. 10	0	--	0	--	--	--	198	13	212	11	0	--	225	10
Dec. 17	0	--	0	--	--	--	429	10	422	12	488	14	307	10
Dec. 24	0	--	0	--	--	--	0	--	0	--	0	--	0	--
Dec. 31	0	--	0	--	--	--	438	12	0	--	0	--	0	--
Season opened January 1, 1961														
Jan. 7	0	--	0	--	--	--	0	--	703	19	0	--	463	25
Jan. 14	441	21	205	50	No Samples	--	0	--	0	--	0	--	0	--
Jan. 21	432	7	128	17	No Samples	--	421	4	315	23	296	0.0	369	16
Jan. 28	0	--	0	--	No Samples	--	0	--	0	--	0	--	0	--
Feb. 4	307	5	232	14	No Samples	--	250	7	315	7	0	--	323	5
Feb. 11	464	4	0	--	No Samples	--	0	--	0	--	0	--	0	--
Feb. 18	0	--	0	--	No Samples	--	0	--	0	--	0	--	0	--
Feb. 25	0	--	208	3	No Samples	--	360	1	200	15	0	--	358	7
Mar. 4	222	3	0	--	No Samples	--	0	--	0	--	0	--	0	--
Mar. 11	407	4	0	--	No Samples	--	0	--	0	--	0	--	0	--
Mar. 18	339	5	0	--	No Samples	--	348	9	0	--	0	--	0	--
Totals	2,612		773				2,444		2,167		784		2,045	

1/ Cape Falcon is 43 miles north of Cascade Head, the northern boundary of Area II.

Table 3. Numbers of Crabs Sampled and Per Cent Soft Shelled, by Area Caught and Date Sampled, for the 1962-63 Season.

Week Ending	Area I						Area II							
	Longbeach, Wn.		Columbia R.		Cape Falcon		Cape Lookout		Umpqua R.		Cape Blanco		Rogue R. Reef	
	to Columbia R.		to 1/ Cape Falcon		to Cape Lookout		to Umpqua R.		to Cape Blanco		to Rogue R. Reef		to Calif. Border	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft
Dec. 9	0	--	0	--	0	--	0	--	0	--	0	--	82	6
Dec. 16	0	--	0	--	0	--	330	5	0	--	0	--	0	--
Dec. 23	0	--	0	--	0	--	793	6	115	5	230	7	204	2
Dec. 30	476	2/ 34	0	--	0	--	409	5	350	7	257	9	210	6
Jan. 6	755	13	0	--	0	--	0	--	0	--	0	--	0	--
Jan. 13	776	18	483	16	0	--	436	6	289	6	0	--	423	9
Jan. 20	290	5	119	19	0	--	873	5	223	5	108	18	175	5
Jan. 27	482	5	0	--	0	--	376	5	311	7	0	--	589	6
Feb. 3	149	9	0	--	0	--	368	12	0	--	0	--	0	--
Feb. 10	0	--	0	--	0	--	0	--	0	--	0	--	0	--
Feb. 17	418	23	0	--	141	16	0	--	0	--	0	--	282	6
Feb. 24	191	6	0	--	0	--	0	--	0	--	0	--	0	--
Mar. 3	425	13	0	--	0	--	0	--	0	--	0	--	0	--
Mar. 10	144	12	244	20	0	--	100	20	0	--	0	--	0	--
Totals	4,046		846		141		3,685		1,288		595		1,965	

1/ Cape Falcon is 43 miles north of Cascade Head, the northern boundary of Area II.

2/ Represents one landing made at Newport on December 26, 1962.

spring the soft-shell incidence increased in some localized areas in both Area I and Area II. This appeared to be the result of crabs entering an early molt cycle. Area I crabs exhibited a declining soft-shell percentage until early spring. Area II crabs, except at Port Orford, maintained about the same level of soft shells throughout the sampling period.

In the 1962-63 season production was the poorest on record since the fishery has been exploited to its fullest extent.

Crab Condition 1963-64

Table 4 summarizes the information collected concerning the condition of crabs sampled during the 1963-64 season. Condition of the opening was the best on the north coast that it has been during the 4-year sampling period. The middle and south coastal areas were similar to the 1962-63 season. In general it may be said that condition was good at the opening and continued so until February when again, as in 1962-63, an early molt occurred and some soft crabs entered the middle coast fishery. Production for the 1963-64 season will be about the same as in 1962-63.

Crab Widths

Information was also collected concerning the mean width of hard- and soft-shelled crabs sampled during the 4 different seasons. The soft-shelled crabs in nearly all samples were smaller than the hard-shelled crabs. Further, the mean width of soft-shelled crabs declined throughout the season in most areas. One or more of the following possibilities may account for this: (1) crabs which were sublegal during the early portion of the season molted and reached marketable size but had not hardened up; (2) freshets may have caused bay crabs to emigrate to the sea—these are smaller crabs and a substantial portion of them are soft at any time of year; or (3) smaller crabs have thinner shells and may have been categorized as soft merely because the thinner shells offered less

Table 4. Numbers of Crabs Sampled and Per Cent Soft Shelled, by Area Caught and Date Sampled, for the 1963-64 Season.

Week Ending	Area I						Area II							
	Longbeach, Wn.		Columbia R.		Cape Falcon		Cape Lookout		Umpqua R.		Cape Blanco		Rogue R. Reef	
	to Columbia R.		to 1/ Cape Falcon		to Cape Lookout		to Umpqua River		to Cape Blanco		to Rogue R. Reef		to Calif. Border	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft	Sampled	Soft
Dec. 8	314	5.4	278	8.3	—	—	367	8.2	238	2.9	889	1.9	0	—
Dec. 15	274	10.9	218	7.8 2/	—	—	1,562	7.6	—	—	427	3.5	0	—
Dec. 22	221	14.0	244	4.9	—	—	426	10.6	310	2.6	703	3.3	0	—
Dec. 29	0	—	0	—	—	—	0	—	0	—	0	—	0	—
Jan. 5	0	—	346	56.6 3/	No Sample	—	0	—	0	—	0	—	572	5.1
Jan. 12	0	—	0	—	—	—	0	—	0	—	0	—	0	—
Jan. 19	0	—	0	—	—	—	0	—	0	—	0	—	0	—
Jan. 26	0	—	0	—	—	—	0	—	0	—	0	—	0	—
Feb. 2	0	—	0	—	—	—	442	2.5	0	—	0	—	0	—
Feb. 9	204	1.5	0	—	—	—	439	15.0	580	1.4	74	0.0	0	—
Totals	1,013		1,086				3,236		1,128		2,093		572	

1/ Cape Falcon is 43 miles north of Cascade Head, the northern boundary of Area II.

2/ Composite sample containing crabs from the North and South sides of the Columbia River.

3/ The shell crab had been sorted out prior to sampling.

resistance to squeezing.

CONCLUSIONS

Four seasons of crab sampling substantiate the difference in condition of crabs from different areas, particularly in 1960-61. The differences within Area II on the opening in 1961 and 1962 were minimal. However, in 1961 some crabs caught soon after the season opening just off the mouth of the Umpqua River were softer than those landed at the opening. The area of origin of these soft crabs is one that traditionally contains small crabs during the winter which probably come out of the Umpqua River during freshets. In 1962-63 and 1963-64 the increased soft-shell percentage in some localized areas in late winter and early spring appears to have been caused by an early molt cycle for some segments of the crab population.

In general the 4-year study shows considerable variation in crab condition at the season opening. However, the data do indicate that a later opening in most years would result in a higher percentage of crabs in prime condition, particularly so in the years of poor condition.

This study would seem to indicate to date that a relationship may exist between crab abundance and condition at the season opening. During the past few years of declining abundance the condition at the opening date has been better than in years of peak abundance. Further observation is needed to substantiate this point.

C. Dale Snow
Shellfish Investigation

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