

PALATABILITY OF PACIFIC ROCKFISH FILLETS

By R. Paul Elliott* and Kathryn L. Osterhaug**

SUMMARY

Fresh fillets from nine species of Pacific rockfish (*Sebastes* species) were examined and found to have good flavor, odor, and appearance. However, the tenderness of the cooked fillets decreased as the size of the individual fish increased.

Of the five species obtained in quantities sufficient to yield decisive data, all were close together with regard to tenderness, except *Sebastes melanops*, which was considerably more tender than the rest.

It is suggested that use of the tougher fillets from the larger individual rockfish be avoided and that fillets from *Sebastes melanops* be marketed separately instead of being grouped with fillets of other rockfish under the label "rockfish fillets."

When World War II began, the United States Army, in seeking out untapped resources to feed its expanding millions, found that the infant Pacific rockfish industry was a desirable source of protein food. The rockfish lent itself readily



to filleting and freezing and was available in potentially large quantities. As a result of the Army's interest, the rockfish landings, which were practically non-existent in the early 30's, rose to approximately 33 million pounds in 1945. In that year, rockfish accounted for over half of the total otter trawl landings of the Pacific Coast.

Early in 1946, the United States Army ceased its purchases almost entirely. In addition, heavy imports of low-priced frozen fillets from foreign countries were received in areas where rockfish had begun to gain a place in civilian consumption. As a direct result of these events, Pacific Coast fish purchasers imposed a landing limit of 5,000 pounds of rockfish per vessel per trip, or about 10 percent of the potential capacity of the average vessel. The limit was removed later, but not until many vessels had left otter trawling to enter the tuna fishery. Despite the fact that the limit was removed, landings have continued small.

Civilian acceptance of rockfish has become the primary problem of the people engaged in the Pacific Coast otter trawling industry, and they have inquired as to whether some species of rockfish might have a less desirable flavor and texture

* Bacteriologist
 ** Technologist (Home Economics) } Fishery Technological Laboratory, Seattle, Wash.

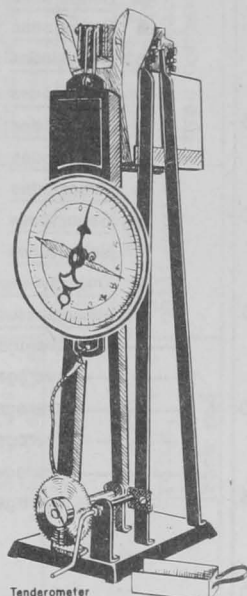
Acknowledgment: The authors wish to express their appreciation of the work of Mr. Charles Phenicie of the State of Washington Department of Fisheries in identifying the fish used in this study and in assisting in the measurements of length.

than others and might, when mixed with a pack of desirable species, cause consumer dissatisfaction. The Fish and Wildlife Service endeavored to answer this question.

For the laboratory tests, fish were obtained in the freshest possible condition as they were landed. At first, one fillet from each fish was retained raw for organoleptic tests, and the other fillet was baked 20 minutes at 350° F. for organoleptic and tenderometer tests. Later, the organoleptic tests were discontinued and only the tenderometer tests on the cooked flesh were made.

The organoleptic tests were made by a panel of four to six experienced testers, who observed the appearance and odor of the raw flesh and the appearance and flavor of the cooked fillet. After the cooked fillets had cooled, tenderometer readings were taken with the apparatus described by Shockey, McKee, and Hamm, 1944.

Results of the tenderometer tests are shown graphically in Figure 1 (see p. 6), in which the weights required to shear a sample of cooked fish flesh are plotted against the length of the fish. The five species that were most common on Seattle's waterfront were obtained sufficiently often so that reasonably decisive, comparative data could be obtained.^{1/} These species are the first five listed in Table 1 (see p. 7) and Figure 1. Other species were not found often, but those encountered were tested and the data included in Figure 1.



As a comparison, salmon, sole, crabmeat, and tenderloin beefsteak also were tested with the tenderometer. These results are given in Table 2 along with the average of all the tenderometer readings on rockfish. It is evident from the data in Table 2 that all the rockfish fillets were considerably more tender than the

Table 2 - A Comparison of the Tenderness of Rockfish Fillets and Other Foods

Numbers of samples tested	Food tested	Pounds to shear 10 grams cooked flesh ^{1/}
87	Rockfish fillets tested	27 (Average of all)
1	Crabmeat (dungeness) leg meat	16 (Average of 6 readings)
1	Crabmeat (dungeness) body meat	16 (" " " ")
1	Sole (<i>Hippoglossus stenolepis</i>)	8 (" " " ")
1	Salmon (<i>Oncorhynchus kisutch</i>)	6 (" " " ")
1	Beef tenderloin steak (Grade "good")	68 (" " " ")

^{1/}All samples, except the crabmeat, were cooked exactly as the rockfish (baked 20 minutes at 350° F.). The crabmeat was commercially prepared, fresh-picked crabmeat.

beefsteak. (The average rockfish reading of 27 indicates a considerably more tender product than does the reading of 68 for the tenderloin.) Although not as tender as sole or salmon, nor quite as tender as Dungeness crabmeat, the rockfish was more similar to crabmeat than to any other product tested. This similarity has been used to advantage in the preparation of mock crabmeat dishes as suggested by Osterhaug (1946).

^{1/}This study was limited to the commercially important species landed at Seattle and was a study of the condition of the strictly fresh fish--not of storage changes.

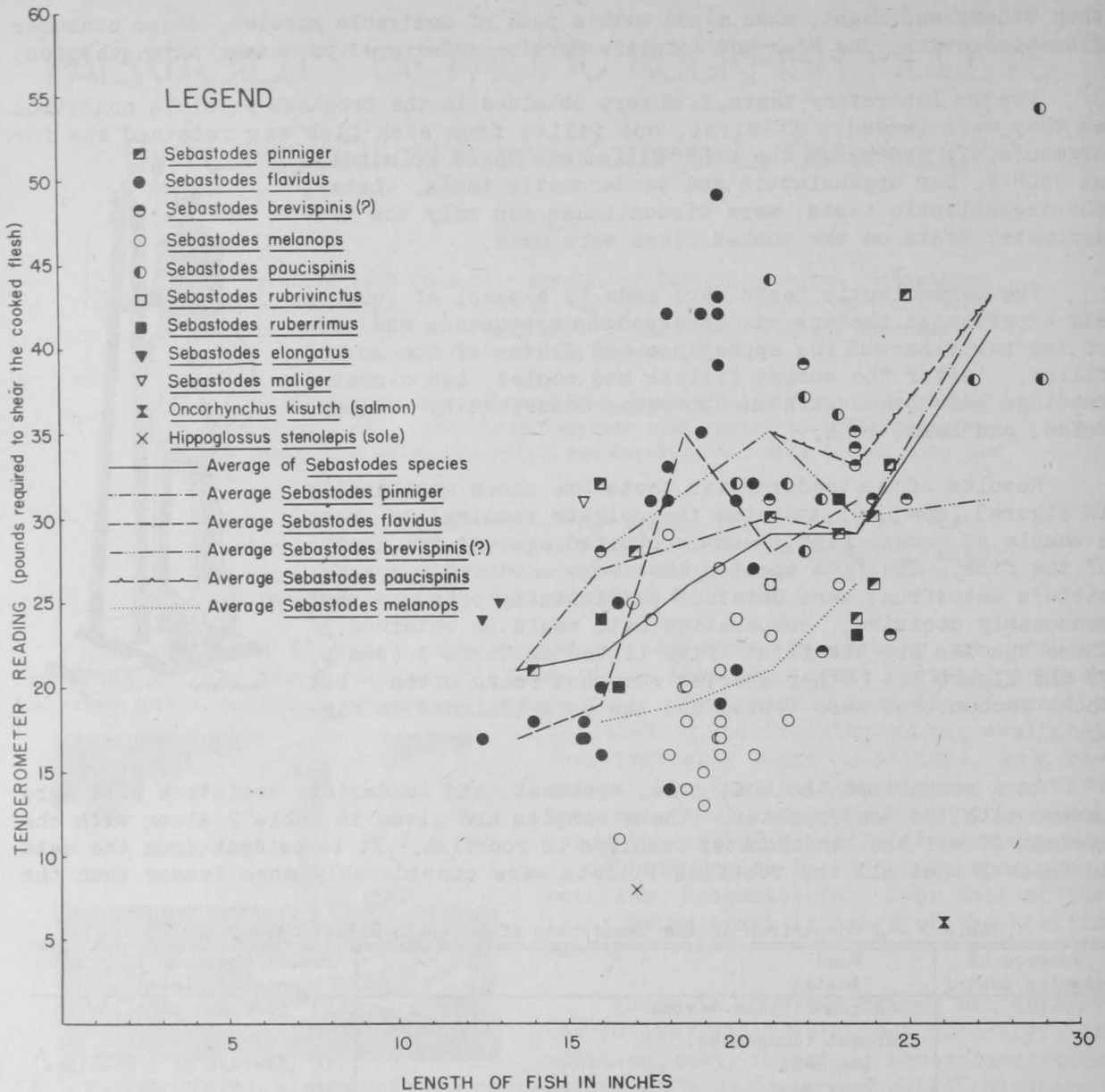


FIGURE 1 - TENDERNESS OF THE BAKED FLESH OF VARIOUS SPECIES OF PACIFIC ROCKFISH. EACH VALUE IS THE AVERAGE OF SIX READINGS OF THE TENDEROMETER.

The results of the organoleptic tests revealed that there were no consistent differences among the various species tested in regard to appearance, odor, and flavor. The data on tenderness (Figure 1) show, that of the five more common species, only Sebastes melanops was considerably more tender than the rest, and that there was a definite decrease in the tenderness of all species as the length of the fish increased. These findings make it apparent that the industry may gain by marketing the fillets of Sebastes melanops separately, rather than with those of other species, and by not marketing fillets from the unusually large specimens of any of the species.

Table 1 - Common Names of Rockfish Used in the Study^{1/}

Scientific names	Seattle, Washington		Monterey, Calif. (From Phillips - 1939)			Color, description
	Common names	Remarks concerning the Seattle fishery	Authorized common name	Fishermen's name	Market listing	
<u>Sebastes pinniger</u>	orange rockfish red rockfish red rock cod canary red snapper	The species landed in greatest quantity in Seattle.	none	codalarga filione	red rock cod	Orange-red on a gray background.
<u>Sebastes brevispinis</u>	black bass.	Second or third in importance in Seattle landings. This species does not occur in commercial quantities south of Vancouver Island.	-	-	-	Grayish-black above the lateral line. Some have greenish tails. Belly, white; pink or reddish pectoral, pelvic and anal fins.
<u>Sebastes flavidus</u>	sea bass black bass yellow tail	Second or third in importance in Seattle landings.	yellow-tailed rockfish	yellowtail- rock cod	yellowtail- rock cod	Olive-green to dark greenish-brown. Tail strongly tinged with yellow.
<u>Sebastes melanops</u>	black bass	A shallow water fish. Not a highly important otter-trawl fish. Caught more often by gillnetters, longliners, and sportsfishermen in surf-fishing.	none	black rock cod cherna nero black bass	bluefish black rock cod	Very dark, almost black above. Numerous dark specks on body. Tail not yellow.
<u>Sebastes paucispinis</u>	rock salmon	Small numbers landed. Reputedly poor keeping quality.	bocaccio	bocaccio	bocaccio	Pale, dull orange-red, darker above.
<u>Sebastes ruberrimus</u>	red snapper "true" red snapper	Not of importance in otter-trawl fishery. Caught by set lines (halibut fishery).	none	pot belly drum tambor vecchia	red rock cod	Coral-red throughout.
<u>Sebastes rubrivinctus</u>	convict	Small numbers landed.	none	convict fish shoflies Spanish flag	red rock cod	Pink or white with five vertical cross bands of deep crimson.
<u>Sebastes maliger</u>	none	Small numbers landed. Shallow water.	none	gopher	gopher rock cod	Orange-brown spots on head and front part of body.
<u>Sebastes elongatus</u>	none	Small numbers landed.	striped rock fish	serina, rainha, reina, strawberry rock cod	small boc- accio or chili-pepper	Light red with horizontal olive-green bands. Space between eyes concave.

^{1/}All these species are termed "rockfish" or "rock cod".

It was the investigators' opinion that, with proper selection and good presentation, Pacific rockfish should attain common use in the American diet. By popularizing this fish, the United States will be making better use of its protein resources.

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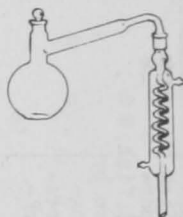
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PACIFIC FLOUNDERS

Tagging, done in California by the California Division of Fish and Game, indicates that flounders migrate considerable distances. For instance, tags inserted in fish off San Francisco have later been recovered near Eureka. This finding is important in connection with possible future conservation policies, because it suggests that the flounder stock can be composed of intermigrating groups of fish. If so, it will obviously be impossible to make useful regulations on a local basis.

--Senate Document No. 51