

# COMMERCIAL FISHERIES REVIEW

May 1948

Washington 25, D.C.

Vol. 10, No. 5

## COORDINATED PLANS FOR MANAGEMENT OF THE FISHERIES OF THE PACIFIC COAST

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OF FISHERIES, AND THE OREGON FISH COMMISSION\*

### INTRODUCTION

At the meeting of the Pacific Marine Fisheries Commission on January 19 and 20, 1948, the research departments of the three Pacific Coast States were requested to confer at an early date and, after a discussion of the fisheries problems, prepare a written report to be submitted to the Commission prior to the next meeting on April 5 and 6, 1948.

Certain men actively engaged in the various fisheries research programs were chosen to meet with biologists of the other State agencies. This group was to discuss the fisheries problems and jointly compile a report including the basic known data and the requirements necessary for a successful management program for each fishery.

Biologists, representing the staffs of the three Pacific Coast States, met in San Francisco on February 17, 18, and 19, 1948, for this purpose. Biological knowledge was interchanged; existing and proposed programs of study were discussed; present regulations were compared; and future coordinated programs were drawn up in order to fulfill the directives from the Commission. With a few notable exceptions, sufficient knowledge is not available to warrant a change in existing regulations. Programs were drawn up with two views in mind. First, a complete program is presented of the necessary magnitude to rapidly and efficiently arrive at a practical management plan encompassing all phases of the fisheries. But, it is realized that, for the present, sufficient funds are not available to inaugurate large-scale studies on many of the fisheries. Second, the group recommended coordinated research studies on a much smaller scale possible with the present staffs and funds.

With certain of the fisheries--such as tuna--a greatly expanded program will be necessary if results are to be expected within a relatively short time. Unfortunately, most biological research of real value is based on relatively long periods of uninterrupted study.

It should be understood that the problem of properly regulating the harvest of any fisheries must be based on certain fundamental knowledge. It is necessary, when a coordinated conservation program for widely separate areas is considered, to not only thoroughly understand the inter-relationships of the separate or contiguous fisheries, but to obtain basic knowledge necessary throughout the range of the fishery to properly regulate the yield. Before any fishery can be properly managed to obtain constantly the maximum yearly harvest, a number of fundamental concepts must be evaluated:

1. The life history of the fish including a knowledge of the growth, age, and maturity.
2. The habits of the fish, including the range of migration.

3. The effects of the existing fishery on the populations, which includes the loss due to fishing.
4. The losses due to natural causes throughout the life of the fish.

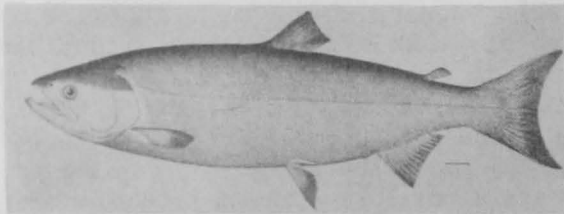
Woven into this pattern must be a knowledge of the rate of replacement by the young and the effects of environmental conditions such as ocean currents, foods, and temperatures on the migrations or availability of the fish. Many times, levels of abundance most suitable from a scientific standpoint are not in harmony with the economic levels of harvest. Then, adjustments must be made to allow for the most economic utilization of the resource by diverting the catch into channels yielding the greatest benefit. Thus, it can be seen that for adequate control and fisheries conservation, considerable effort must be expended to base regulation on facts.

The various sections presented in this report were prepared by study groups of specialists from each State concerned in the research on these fisheries for their respective States. All fisheries are not included in the discussions. Only those problems of concern to two or more of the three States participating in the Compact were discussed and are reported. It is believed that all fisheries of important mutual concern are included.

SUMMARY

The salient features regarding each fishery have been summarized and only the more important phases are gathered together here for consideration.

Salmon



BLUEBACK, RED, OR SOCKEYE SALMON

Although a great many investigations have been made of the salmon inhabiting the rivers of the Pacific Coast, there is relatively little known of the ocean behavior of salmon and the factors at sea which affect their survival. Investigations of the ocean troll fishery have been limited in scope, and until recently, practically no restrictions were placed on the ocean salmon fisheries.

Troll Fishery Regulations, Washington, Oregon, and California

Item	Minimum Total Length (inches)		Open Season	
	Chinook	Silver	Chinook	Silver
Washington .....	27	18	All year	July 1 - Nov.15
Oregon .....	27	None	" "	July 1 - Nov.15
California .....	25	25	Apr. 1 - Sept.15	Apr. 1 - Sept.15

The basis for all management studies are adequate records from the fishery; with minor exceptions, these records are available for the commercial fishery, but are as yet wholly inadequate for the sports fishery.

Estimated Sport Catch of Salmon, 1946

Item	Washington	Oregon	California <sup>1/</sup>
	Number	Number	Number
Chinook .....	83,000	43,000	-
Silver .....	142,000	21,000	-
Total .....	225,000	64,000	306,000

<sup>1/</sup>Not broken down by species.

Gigantic water-development programs are proposed for all major river basins along the Pacific Coast. These pose tremendous obstacles in the maintenance of anadromous fish runs. In the case of the salmon resources, large hatcheries for artificial propagation are proposed to take the place of the natural rearing areas. Present hatchery methods have not proved successful enough to warrant optimism over this measure of amelioration. In general, unless artificial propagation increases greatly in efficiency and larger hatcheries become economically feasible the salmon resources cannot be maintained.

Moves are underway to eliminate the commercial fishing from the bays and river estuaries along the Pacific Coast. The salmon at maturity, when entering the rivers are at the prime marketable condition. Because of the many known factors adversely affecting salmon in fresh water and as yet uncorrected, and because of the many as yet unknown features of the ocean life of the salmon, it is believed that through an active coordinated management program, the salmon runs can be maintained at high levels of productivity without the elimination of a valuable industry. The suggested closure of the California inland salmon fishery has no logical basis. The escapement into the Sacramento-San Joaquin River systems has been particularly heavy during recent years, and a heavier harvest, providing the populations remain at present high levels, of these stocks of salmon would be a sound conservation measure.

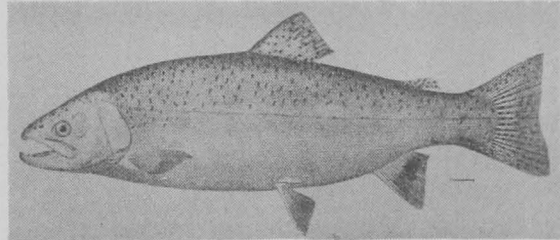
Cooperative studies of the ocean salmon fishery and the exchange of pertinent information on other phases of the salmon problems will begin immediately among the three Pacific Coast States.

### Steelhead

The steelhead is the most widely distributed of the anadromous salmonids. Probably little intermingling of the stocks takes place between the three States, except in the Columbia River system.

Steelhead are similar to salmon except that they spawn more than once, and, in general, the problems involved in maintaining the steelhead runs are identical to those for salmon.

At the present time, steelhead are taken in large quantities by the recreational fishermen in California, Oregon, and Washington, but only in Oregon may they be taken commercially.



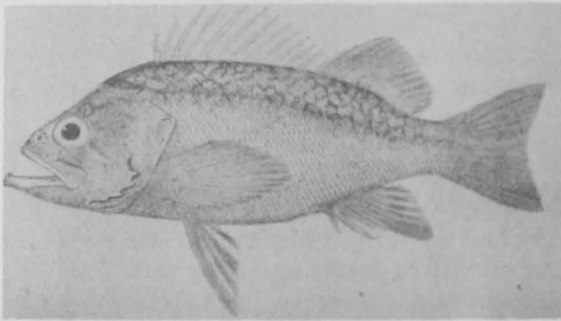
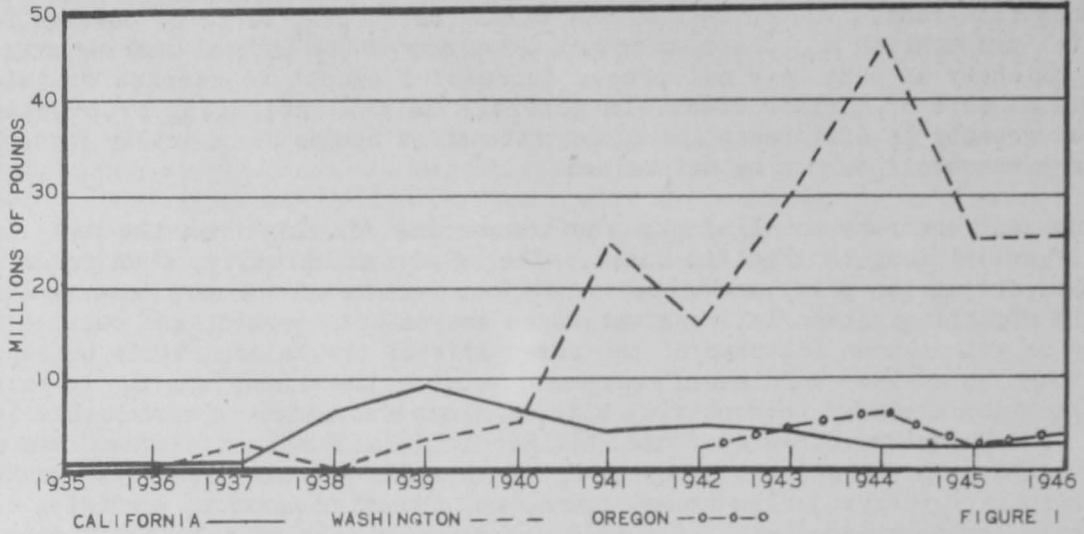
STEELHEAD TROUT

Although the steelhead sports regulations vary from State to State, in general, bag limits and seasons during the year are used to limit the take and protect the fish. No limit is placed on the total number of steelhead that can be taken, only the individual fisherman is limited. Ideally, only the annual production from a stream system should be taken.

### Otter Trawl

More than 20 species of fish are included in otter trawl landings. The more important species are: the English, petrale, dover, and sand soles, the dogfish shark, several species of rockfish, black cod, lingcod, and flounders.

PACIFIC COAST SHARK LANDINGS BY STATE  
(CALCULATED FROM LIVER POUNDAGES)

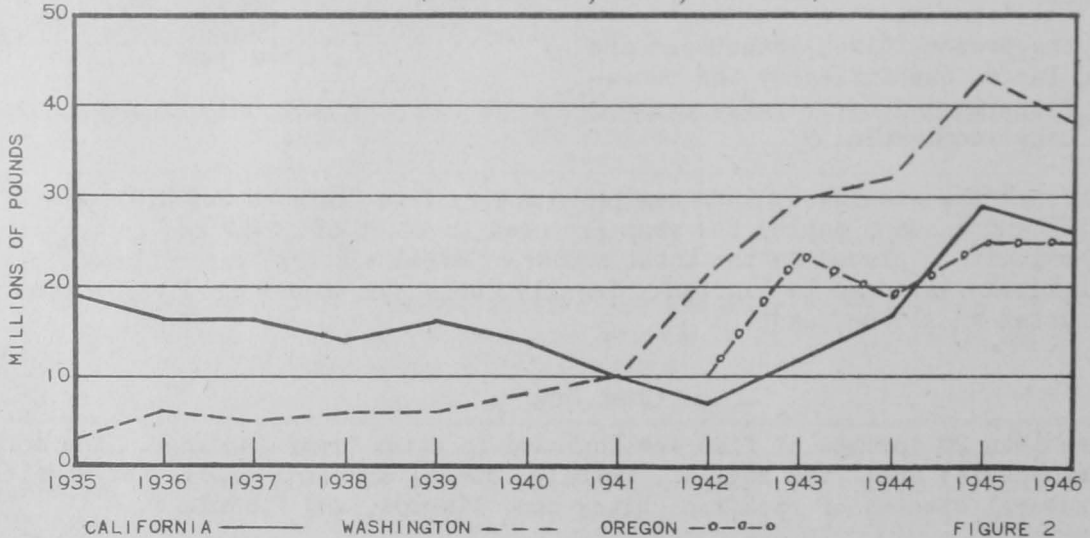


ORANGE ROCKFISH

The soupfin shark fishery has been shown to be declining rapidly all along the coast until now it is hardly profitable. Since evidence is available that the soupfin migrate freely all along the Pacific Coast, coordinated regulations are necessary to rehabilitate the stocks.

Evidence is available that the populations of most of the valuable sole and flounders have been declining because of increased fishing intensity. Data is not yet available as to the intermingling of the stocks of bottom fish.

PACIFIC COAST BOTTOM FISH LANDINGS BY STATE  
(LESS HALIBUT, SHARK, AND CRAB)





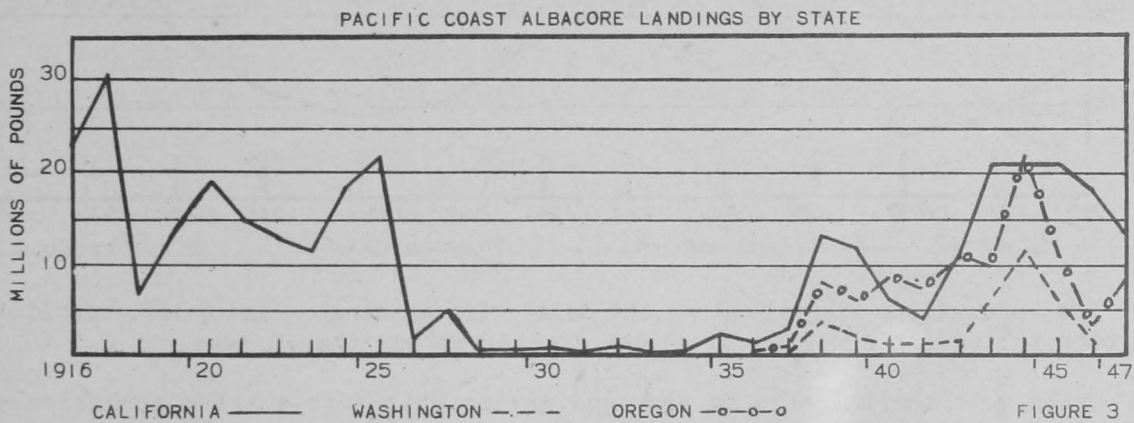
Otter trawl net mesh experiments in both California and Washington showed the advantages of using a 5-inch mesh net over a smaller mesh in the added escapement of the younger immature fish. This corresponds with similar results on the East Coast of the United States and in Europe.

A coordinated program designed to place into action a management plan along the entire coast is proposed as well as a suggested immediate cooperative program.

Tuna

Albacore fishing has violently fluctuated and suggests fishing is not fully exploiting stocks.

The American albacore may be a different stock from the Japanese and Hawaiian albacore.



In general, the Pacific Coast fishery occurs on two size groups in most years, and the northern and southern fishery are fishing at about the same time of the year on the same size group. The fish are landed primarily in July, August, September, and October; the poor landings in some years appear to be due to the absence of one or the other or both size groups from the inshore fishing area.

The Japanese have two albacore fisheries, one occurring in inshore waters much as our present fishery; the other and larger Japanese fishery occurs about 2,000 miles offshore. The possibility comes to mind whether or not stocks do not occur in offshore waters of the Pacific Coast.

Coordinated studies on tuna will entail a large sum of money, considerable staff, and several years. Exploratory work offshore and experimental fishing as well as biological work is suggested. A tentative budget of \$500,000 outlay and an annual operating budget of \$150,000 for several years are suggested.

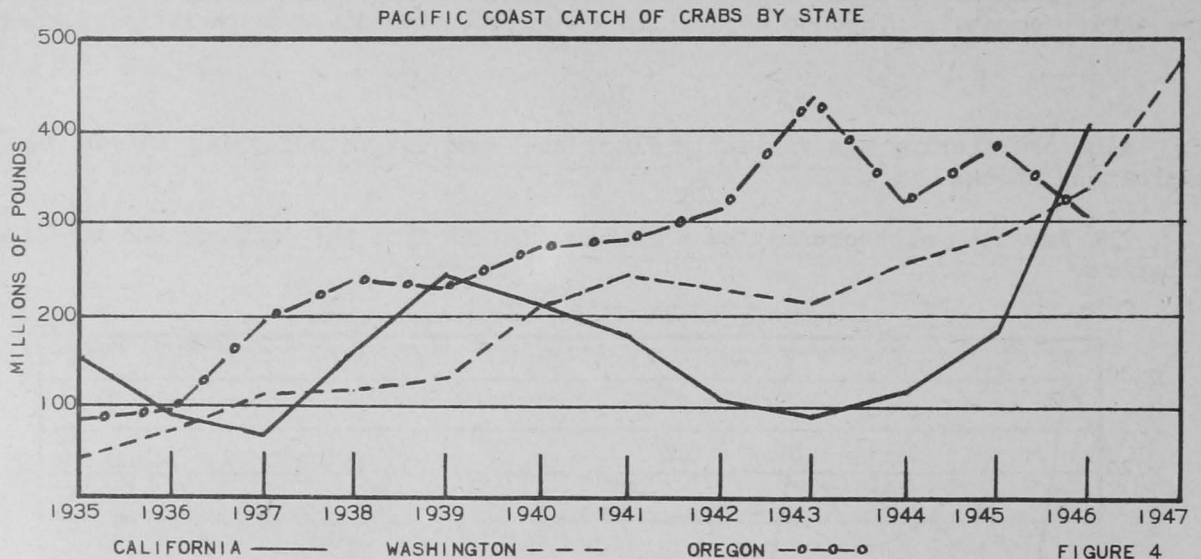
An immediate limited program for coordinated studies with the present limited staff is presented.



BUCKET OF FISH WITH APPROXIMATELY 600 LBS. OF YELLOWFIN TUNA BEING SWUNG TO RECEIVING TROUGH OF DECK. CHAIN ON BOTTOM OF BUCKET USED IN DUMPING. WEIGHING SHED IN RIGHT BACKGROUND.

### Crabs

A tremendous increase has occurred in the crab landings along the Pacific Coast in the past 10 years. This fishery lands over one million dozens of crabs annually and the catch is still increasing.



The regulations vary all along the coast with Washington and California limiting both the season and size to a much greater extent than Oregon.

Crabs molt their shells to grow and during this soft-shelled condition are unfit for market. They are extremely vulnerable at this time and should be protected. The molting season varies all along the coast due to differences in the oceanographic conditions, and therefore, the season necessarily varies from State to State. The present size limit varies considerably between the three States with California's limit considerably greater than either of the other two States. Over 2 years of study have provided the State of Washington with adequate basis for regulation of the crabs. Both California and Oregon are beginning to evaluate the effects of the fishery on the crabs and will re-adjust their regulations after data are obtained.



DUNGENESS CRAB

### Anchovy

This fishing is still a minor fishery but promises to develop within the next few years. An expansion has already occurred in California, especially since the failure of the sardine catch.

The northern anchovies are being canned at the present time in California.

Few laws protect the anchovy at the present time; they may be used for food or for bait, but not for reduction.

Little biological work has been done on the northern anchovy, and the full extent of the available unexploited stocks are not known.

Preliminary scale examination in California indicates this fish is not a long-lived fish; probably living to a maximum of 5 or 6 years in California.

No good record is being kept of the catch along the coast; the portion of the catch used for bait for tuna boats is unknown at the present time.

This is a forage fish and is used extensively by other desirable species for food.

### Sardines

This fishery extends from British Columbia to Mexico, and the fish are primarily reduced into oil and meal with substantial quantities canned.

The catch reached a peak in 1936-37 when 790,000 tons were taken and has declined to a probable catch of about 100,000 tons in 1947-48.

Seasonal Catch of Sardines Along the Pacific Coast

Season <sup>1/</sup>	British Columbia	Washington	Oregon	Total Pacific NW	Total Calif.	Grand Total	Calif. Percent of Total
	Tons	Tons	Tons	Tons	Tons	Tons	
1916-17	-	-	-	-	27,530	27,530	100
1917-18	80	-	-	80	72,580	72,660	100
1918-19	3,640	-	-	3,640	75,540	79,180	95
1919-20	3,280	-	-	3,280	67,030	70,310	95
1920-21	4,400	-	-	4,400	38,450	42,850	90
1921-22	990	-	-	990	36,500	37,490	97
1922-23	1,020	-	-	1,020	65,110	66,130	98
1923-24	970	-	-	970	83,930	84,900	99
1924-25	1,370	-	-	1,370	173,020	174,390	99
1925-26	15,950	-	-	15,950	137,270	153,220	90
1926-27	48,500	-	-	48,500	152,210	200,710	76
1927-28	68,430	-	-	68,430	187,260	255,690	73
1928-29	80,510	-	-	80,510	254,484	334,994	76
1929-30	86,340	-	-	86,340	325,170	411,510	79
1930-31	75,070	-	-	75,070	185,120	260,190	71
1931-32	73,600	-	-	73,600	164,650	238,250	69
1932-33	44,350	-	-	44,350	250,680	295,030	85
1933-34	4,050	-	-	4,050	383,440	387,490	99
1934-35	43,000	-	-	43,000	600,020	643,020	93
1935-36	45,920	10	26,230	71,560	560,500	632,060	89
1936-37	44,450	6,560	14,200	65,210	726,100	791,310	92
1937-38	48,080	17,100	16,660	81,840	416,530	498,370	84
1938-39	51,770	26,480	17,020	95,270	575,260	670,530	86
1939-40	5,520	17,760	22,330	45,610	542,250	587,860	92
1940-41	28,770	810	3,160	32,740	460,580	493,320	93
1941-42	60,050	17,100	15,850	93,000	587,370	680,370	86
1942-43	65,880	580	1,950	68,410	504,660	573,070	88
1943-44	88,740	10,440	1,820	101,000	478,130	579,130	83
1944-45	59,120	20	-	59,140	554,910	614,050	90
1945-46	34,300	2,310	90	36,700	403,680	440,380	92
1946-47	3,990	6,140	3,960	14,090	233,600	247,690	94

<sup>1/</sup>Each season includes June through the following May.

Note: These records have been supplied by the governments of Canada, Wash., Ore., Calif., and the U. S. Fish and Wildlife Service.



Studies have demonstrated that all fisheries along the Coast are derived from the same population, and fisheries on various grounds place a drain on the common supply.

The fish migrate north in the late spring and summer from California and south in the fall and winter to spawn mainly in southern California.

The Canadian and California fisheries agencies and the U.S. Fish and Wildlife Service have carried on extensive biological investigations of the sardine and Oregon and Washington to a lesser degree. All investigations are coordinated at the present time.

The complete failure of the fishery during the past two years has caused a serious crisis in the industry, largely centered in California.

It is believed that heavy fishing intensity, coupled with a poor survival from spawning have reduced the populations to a dangerously low level. This may also be reflected in other fisheries using the sardines for food. Management of the fisheries should not be delayed and should be based on a control of the annual landings.

#### Shad

The shad fisheries of the three Pacific Coast States produce about 3,000,000 pounds each year, valued at nearly \$1,000,000.

Present regulations on the fishery primarily protect salmon and steelhead in Washington and Oregon and the striped bass in California.

The fishery is confined to the time of the spawning migration.

If the proposed elimination of netting on California inland waters succeeds, the shad fishing will cease to exist.

#### Striped Bass

An important sports fishery for this introduced species exists in California and Oregon, with a commercial fishery landing about 200,000 pounds annually existing in Oregon.

Comprehensive studies are underway in California along broad management lines. Work in Oregon is being confined to food studies to determine whether this fish is a serious predator on young salmon.

#### Oysters

The oyster industry has expanded rapidly since the first introduction of Japanese oysters early after the turn of the century. The annual harvest is now valued at approximately \$5,000,000 to the growers.

A problem of mutual concern is the danger of introducing serious oyster diseases and predators. These have already been introduced into Washington and have ruined much valuable land.



Present adequate laws are in effect in California and slightly less stringent regulations control the introduction and transfer of oysters in Washington. No restrictions limit the introduction or spread of diseases and pests in Oregon.

#### Latent Fisheries

Most biologists familiar with the Pacific fisheries agree that there are considerable undeveloped fisheries along the Coast. To develop these resources will entail considerable exploratory research at a considerable expense.

#### Statistics

The basis for all fisheries management is comprehensive and accurate records of the fishery; both the landings of the various species and the amount of fishing necessary to make such catches.

It was agreed that certain basic data was necessary in order to have adequate statistical records for management. Certain phases of the necessary data is not uniformly available in all three States and recommendations for correcting this inadequacy were suggested.

#### Oceanography

Eventually a program of physical and chemical oceanography will be necessary to explain the occurrences and define the limits, availability, and movements of the fisheries resources of the Pacific Ocean. Maximum utilization of the resources of the sea will be possible only after an understanding of the environmental conditions.

### RECOMMENDATIONS

#### General

While specific recommendations follow each section of the report, the following are the salient features of the proposals suggested for cooperative studies and coordinated management of the Pacific Coast fisheries.

Long-term studies are recommended for salmon, tuna, otter trawl, and crab fisheries. To accomplish these broad programs, encompassing all necessary aspects of fisheries management, within a reasonable span of time more funds for an expanded staff and additional equipment must be made available.

Cooperative programs are, however, recommended for all the above-mentioned fisheries, based on the limited funds and personnel now available to the three State agencies.

Our latent fisheries must be developed; first, by locating new methods of fishing and new locations where fish are found in commercial quantities; and second, by developing with the use of technological research methods of marketing little utilized species occurring in quantities in this section of the Pacific.

It is further recommended that studies of the ocean waters be carried out to determine the factors influencing the movements, occurrences, success of reproduction, and survival of fish in the ocean.



## Specific

It is recommended that:

1. A more effective stream improvement plan be placed into effect on a coast-wise basis, including improvement of spawning areas, removal of barriers, elimination of serious pollution blocks, effective laddering of natural and artificial obstructions, and the screening of diversions.
2. A study of methods of the evaluation of the fisheries resources, especially salmonoid fish, possibly with the aid of a competent economist be made.
3. An immediate study of the salmon troll fishery along the California-Oregon boundary be conducted with the objective of adjusting regulations to make them uniform in a single fishing area.
4. Regulated commercial and sport salmon fisheries be maintained on the inland waters of the Pacific Coast where studies indicate the resources can permit an annual harvest or where other controllable and correctable factors are the primary cause of the decline.
5. The legal status of the rights of the fisheries resources to an adequate water supply be ascertained.
6. Coordinated and uniform regulations of steelhead fisheries on the main stream of the Columbia River for both sports and commercial fisheries be formulated.
7. Free exchange of data being collected by each state on all fisheries will hasten conservation plans and prevent duplication of effort.
8. The tuna fishery not be curtailed now, but exploratory studies to further increase the range of the fishery and the yield be made.
9. The maximum utilization of the anchovy not be hurried because of the importance of this fish as food for other larger fish.

## Improvements in Statistics

It is recommended that:

1. All three states inaugurate boat catch records and methods of measuring improvements in efficiency of fishing where not now in effect. Both are essential tools in analyzing catch records.
2. Each state provide a record of the gear used and the locality of catch on the individual boat trip ticket. The area caught be recorded by using the serially numbered block area system already accepted by the three states.
3. Each state adopt a list of official common names for that State of all fish caught with accompanying scientific names so all may know what fish is referred to. These lists be exchanged before adoption so that uniformity may be accomplished wherever possible.
4. Each state number its boats, licensed in that state, and each number remain with the boat indefinitely. Numbering systems between states would remain separate; boats fishing in two states would have two boat numbers. The boat numbers would accompany other information on each landing report.
5. Each state publish summaries of the fish catch by calendar year and by monthly figures.



## Changes in Regulations

It is recommended that:

1. One year after adoption by the States of Washington and Oregon, a minimum size regulation for otter trawl nets of five-inch mesh, measured from the center of knot to center of knot, be placed into effect.
2. Sink gill nets be made illegal gear in the ocean and bays for use in capturing sharks, and certain other fish, to protect the dwindling supplies of soupfin sharks. The regulation to become effective eighteen months after enactment.
3. A closed season for soft-shelled crabs be enacted in Oregon during 1948 after the appearance of numbers of molting crabs. The seasons need not be uniform along the coast or perhaps even within the states, but should fully protect the crabs during the molting period.
4. Oregon consider adjusting its minimum size limits on crabs after completion of present studies on age and growth of Oregon crabs. Data from Washington indicate a greater size limit may ultimately increase the annual yield.
5. Although an effective organization for coordinated studies of the pilchard fishery now exists, it is agreed after a study of the data that management of the sardine or pilchard fishery not be delayed.
6. The State of Oregon require inspection of all oysters and other marine or fresh water exotic species from being transferred in or out of the State as well as within the State to prevent the introduction or spread of undesirable diseases, pests or species of fish or shellfish.
7. Washington revise its oyster inspection law to cover the introduction of any exotic marine forms whatsoever, patterned after the California law.



## FREEZING FISH AT SEA

Fish should be considered a food even more perishable than agricultural products, since it is adjusted to temperatures generally lower than the atmosphere. Fish is either killed in catching or shortly thereafter and, as dead tissue, is subject to enzymatic breakdown which is doubled for each 10° F. increase in temperature. To duplicate the practices applied to other food products it is necessary to freeze fish immediately after they are taken from the water. The merits of this procedure have been under discussion among the commercial producers of fish for a number of years. In some segments of the industry it is an accomplished practice--in others no satisfactory solution for the many accompanying problems has been devised.

--Fishery Leaflet 278