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FOOD FISHERY POLICIES IN THE WESTERN UNITED STATES*

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INTRODUCTION

Many people have commented in recent years about the plight of United States fisheries. They have pointed out that over the past three decades production has lagged behind consumption to the extent that we now import more than half of the fish we consume. They have drawn invidious comparisons between our largely antiquated fishing fleets and the modern foreign fleets which are sometimes seen fishing just outside our territorial waters. They have complained further that many of our fishery products reach the consumer after having lost much of their flavor and freshness. Unquestionably all of these deficiencies in our fishing economy are interrelated and rooted in complex causes. Some have occurred because of serious decline in the abundance of traditional resources and others because of high costs of labor and shipbuilding relative to those in other countries.

However, we have no overall shortage of fishery resources off our coasts; major fleets from foreign countries seek fish off our shores in preference to fishing off their own. We have no overall shortage of engineering and seafaring skills; we operate an extensive merchant marine and some of the most complex warships in the world. We have no shortage of capital or managerial skills for large enterprise; the headquarters of many of the largest corporations in the world are in the United States. Some people offer the trite explanation that we are meat-eaters, but we import large quantities of fish.

Some of the obstacles to the growth of our fishing economy may lie in governmental policies relating to conservation and development of

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our food fish resources and food fish industry. Both the objectives and the means of achieving food fishery policies involve a system of government control over the business and the resource. We shall examine food fishery policies in the four states bordering on the Pacific Ocean: California, Oregon, Washington and Alaska.[1] Our primary objective is to describe those policies, the authority from which they derive, the objectives and practices of the responsible departments, and the source of the funds which support the departments. We shall attempt to identify and comment on policies concerning conservation of the resources, division of the catch, and conflict over the use of different resources. Special attention will be given to the regulation of fishing.[2]

I. THE FOOD FISHERY RESOURCES

What are the food fishery resources of the Pacific Coast? We need general information about the kinds of fish, how and where they are caught, how valuable they are relative to other natural resources, and how completely we are using them. In other words, technical facts about the resources, on the basis of which policy is formulated, must be discussed.

The Pacific food fish[3] stocks[4] in which the states of California, Oregon, Washington and Alaska have a direct interest are those stocks that are within reach of vessels based in coastal ports: stocks now exploited in the internal waters, territorial sea and high seas off the coasts of the four states, as well as those in the high seas and over the Continental Shelf off the coasts of Canada, Central America and South America as far south as northern Chile; and unused stocks in the Pacific Ocean which lie closer to ports in the United States mainland than to ports in Asia, Hawaii, Samoa, or Tahiti.

[1] These states represent an important part of the United States food fish industry; in 1963 they produced about 23 percent of the aggregate landing of food fish, worth 33 percent of the total value. They have their share of depleted traditional resources, burgeoning conflicts in interests between fisheries and other resources, and troublesome interstate and international problems of control.

[2] We shall not examine the fishery policies for whales or seals because there is no significant use of these animals for food in the United States. Neither shall we examine the effects of tariffs and trade agreements on our fisheries. These federal policies have allowed major imports of fisheries products (*e.g.*, shrimp, groundfish, and tuna) with important consequences for domestic fishermen, but an adequate study of them is beyond the scope of this paper.

[3] Many people falsely assume that large amounts of fish are used for fertilizer. Actually, the protein and carbohydrate fractions are almost all used for food: some oils, skins, shells, etc., are used in industrial products; very small fractions are processed as fertilizer.

[4] We define stock as a group of fish harvested and regulated as a unit. Theoretically, a stock is a single interbreeding population of one species; however, a fishery usually operates on several such populations.

According to federal government statistics, the United States catch from this area in 1963 amounted to 1.117 billion pounds, valued at 124 million dollars.[5] The landings were produced by 33,612 fishermen, who operated 4,791 vessels and 13,269 motor boats.[6] The average vessel or boat was manned by two men, and each man landed an average of about 33,000 pounds. Such averages include the sales by the large number of occasional commercial fishermen who fish from outboard-powered skiffs, as well as the large quantities caught by a few men aboard the few hundred larger vessels.

The species of fish caught and the method of fishing are extremely diverse. The federal compilation of catch statistics[7] lists 46 species for the Pacific Coast States, of which 6 are species groups each containing numerous species. Species vary in habits and location; many require special gear adaptations or fishing techniques. Some species live together and can be caught together; others are segregated. The federal statistics list 48 different kinds of gear,[8] some of which are also grouped in ways which conceal manifold variations.

Not only are these diverse fishery resources more complicated in management than either mineral or forest resources, which are entirely domestic, but their yield is much less valuable.[9] In Alaska fish was long the most valuable natural resource, but the recent increases in road construction and petroleum production have brought the total value of mineral production above that of landed raw fish. The total stumpage value from national forests alone in the four states was nearly equal to the value of fish as landed; this represented, of course, only a part of the value of logs at the mills (which would be comparable to the value of fish as landed).[10]

Comparison of the fish production of the United States from the northeastern Pacific Ocean with that of other countries is revealing. Canada has maintained a vigorous and relatively stable fishery out of

[5] BUREAU OF COMMERCIAL FISHERIES, 1963 FISHERIES STATISTICS OF THE UNITED STATES 269-71.
[6] *Id.* at 267-68.
[7] *Id.* at 269-71.
[8] *Id.* at 267-68.
[9] *Compare* BUREAU OF COMMERCIAL FISHERIES, 1963 FISHERY STATISTICS OF THE UNITED STATES 267 *with* UNITED STATES BUREAU OF CENSUS STATISTICS, 1965 ABSTRACT 710 *and* UNITED STATES DEPARTMENT OF AGRICULTURE, 1964 REPORT OF THE CHIEF OF THE FOREST SERVICE 39 (Table 2). While the total landed value of fisheries in 1963 was $124 million, the yield from mineral production and national forest sales in the four states was $1,727 million and $114 million respectively.
[10] Borque, Chambers, Chiu, Denman, Dowdle, Gordon, Thomas, Tiebout, & Weeks, *The Washington Interindustry Study For 1963*, 25 (3) U. WASH. BUS. REV. 5-10 and Table (1966).

British Columbia ports for many years. The production in 1963 totaled 768 million pounds, valued at $40 million. The principal species groups were: salmon, 117 million pounds, $22 million; halibut, 34 million pounds, $8 million; and herring, 571 million pounds, $6 million.[11] The recently burgeoning fisheries in the northeastern Pacific by fleets of the Soviet Union and Japan are much larger. These fleets started fishing in the eastern Bering Sea in 1959 and have since expanded; in 1963, the Japanese fleets took 691 million pounds in the Bering Sea (about 80 per cent in the eastern part) and Gulf of Alaska. The Soviet Union's catch from the eastern Pacific is not available, but the catch in the Pacific (mostly in the eastern part) north of latitude 40°N. in 1963 is estimated to have been at least 1.888 billion pounds.[12] Thus, in 1963 the fishing by Japan and the Soviet Union off the coast of Alaska yielded an amount about equal to that of the Pacific Coast production by the United States and Canada together.

Such production by foreign nations is firm proof of the presence of major fishery resources off our coasts. Moreover, exploratory fishing by the Bureau of Commercial Fisheries indicates that the eastern Bering Sea and Gulf of Alaska (north of Queen Charlotte Sound) should sustain a fish catch of certain major species of about 1.5 to 2.25 billion pounds,[13] and that substantial resources exist off the coasts of Oregon and Washington. Summary reports of exploratory fishing by the California Cooperative Fisheries Investigation are purported to indicate that the sustainable yield for catches off the coast of California may total 6.5 billion pounds (3 million metric tons) annually,[14] principally composed of anchovies and hake.

Clearly the United States and Canadian fisheries are catching only a small fraction of the estimated *sustainable* harvest off our coasts. Despite the enormous production by Japanese and Soviet Union fleets in this area (and despite possible damage by them to certain stocks), there remain major unharvested stocks of hake[15] and anchovies and many unharvested or underexploited stocks of minor species.

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[11] MONTHLY REV. CAN. FISH. STAT., Dec., 1963, at 13.

[12] INT'L N. PAC. FISH. COMM'N PROCEEDINGS OF THE 12TH ANN. MEETING, 154, 173 (1965). In 1964 the corresponding catches increased: Japan, 960 million pounds, and the Soviet Union, 2.84 billion pounds.

[13] Personal communication from D. L. Alverson, Chief of Exploratory Fishing, Bureau of Commercial Fisheries, Seattle, Washington.

[14] Statement of Wilbert McLeod Chapman to the Subcommittee on Marine Resources of the Assembly Committee on Natural Resources, Planning and Public Works (California), Feb. 24-25, 1966.

[15] These stocks may be used very rapidly. Russian fleets are thought to have taken 100 million pounds from the stocks of hake off Oregon and Washington between April and August 1966.

II. Statutory Authority for Regulation

At the present stage of marine fisheries development man can conserve only by adjusting his catching activities. He can find and exploit unused stocks, thereby reducing the waste of old fish which die naturally. Or, he can restrain his exploitation such that the stock is maintained to produce the maximum sustainable yield and thereby reduce the waste of unused producing grounds. In addition, man can culture the species that live inshore or come inshore to spawn. He can control reproduction, disease, predation, and food for some mollusks, such as oysters, and some fish, such as salmon. He can refrain from damaging the waters which these animals require for reproduction and shelter. He can do a few things to improve the natural environment, such as provide access to spawning grounds for anadromous fish, spat collectors for oysters, or shelters for rockfish. These latter activities seem important in the popular concept of conservation, but in the international context of conservation of marine fish they embrace only a small fraction of the catches.

The control of the marine fisheries was exercised originally, and is still exercised in new fisheries, by fishermen who catch what they can eat, preserve, or sell. However, in the United States, the control is largely and increasingly by food fishery agencies. Many regulations are devised to divide the available catch among those who want to fish. These commonly reduce efficiency and prevent unusual ingenuity on the part of fishermen. Other regulations are imposed upon catching activities to preserve the fish resources, either because they are so vulnerable that stocks could be eliminated by uncontrolled fishing, or because they are to be used solely as bait (some herring and sardines), or as food for other more valuable fish. Other regulations are designed to prevent waste by prohibiting the destruction of spawn, undersized fish, or thin fish. Some regulations protect the consumer; still others protect the fishes' environment.

Regulation for conservation (as internationally defined[16]) requires a basic knowledge of the stocks and the effect of fishing on them. It

[16] Article 2 of the Convention on Fishing and Conservation of the Living Resources of the High Seas, U.N. Doc. A/Conf.13/L.54 (1958), provides this definition:

> "Conservation of the living resources of the high seas" means the aggregate of the measures rendering possible the optimum sustainable yield from those resources so as to secure a maximum supply of food and other marine products. Conservation programmes should be formulated with a view to securing in the first place a supply of food for human consumption.

may take two general forms: encouragement of fishing on little-used stocks, or restraints on fishing stocks which have been exploited beyond the maximum sustainable yield.

The regulation, control, and management of America's fishery resources are undertaken in various ways: laws enacted by Congress or state legislatures; treaties and conventions representing agreement between the United States and other countries; and rules, regulations, and orders promulgated by specially created administrative agencies or international commissions. These devices should be considered in relation to the technical problems of conservation for they express the public conception of how to conserve our food fisheries.

A. International

The United States is a party to several international commissions which influence conservation of the North Pacific Ocean fishery resources: the International North Pacific Fisheries Commission;[17] the International Pacific Halibut Commission;[18] the International Pacific Salmon Fisheries Commission;[19] and the Inter-American Tropical Tuna Commission.[20]

A full treatment of the conservation methods and goals of these commissions is beyond the scope of this paper. The importance of these commissions, especially in the field of scientific reesarch, is substantial,[21] although they do not always assist directly the commercial fishing industry.

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[17] Created by the International Convention for the High Seas Fisheries of the North Pacific Ocean, May 9, 1952, 4 U.S.T. 380, T.I.A.S. No. 2786. Parties are Canada, Japan and the United States.

[18] Created by the Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea, Mar. 2, 1953, 5 U.S.T. 5, T.I.A.S. No. 2900. Parties are Canada and the United States.

[19] Created by the Convention for the Protection, Preservation and Extension of the Sockeye Salmon Fishery of the Fraser River System, May 26, 1930, 50 Stat. 1355, T.S. No. 918. Parties are Canada and the United States. An amendment on July 3, 1957 provided a "Pink Salmon Protocol" to coordinate the programs for the conservation of Fraser River sockeye and pink salmon stocks.

[20] See the Convention Between the United States of America and the Republic of Costa Rica for the Establishment of an Inter-American Tropical Tuna Commission, May 31, 1949, 1 U.S.T. 230, T.I.A.S. No. 2044. Other countries now participating include Ecuador, Mexico, and Panama.

[21] International commissions control the conservation of the halibut stocks which provide landings in Alaska and Washington, the stocks of Fraser River sockeye and pink salmon which provide landings in Washington, and the stocks of Skipjack and yellowfin tuna which provide landings in California. The value of the catch from these stocks amounted to nearly half of the aggregate landing of food fish in Washington and somewhat more than half of the California landings.

B. Federal

Although the federal government has the power to regulate, control, and manage commercial fishing,[22] it has largely left these functions to the states.[23] The federal government's role has been primarily "to develop the basic knowledge about the fishery resources and their environment."[24]

The Department of Interior is concerned with the management, conservation, and development of our natural resources including fish. In 1956, Congress established a comprehensive national policy on fish and wildlife resources[25] and reorganized the Department of Interior.[26] Pursuant to the reorganization, the Bureau of Commercial Fisheries was created to perform all functions related "to the development, advancement, management, conservation and protection of commercial fisheries. . . ."[27] The Fish and Wildlife Act of 1956 authorized the Bureau to carry out certain research and provide services which have culminated in a comprehensive program announced by the Bureau in 1963.[28] The Bureau also coordinated the activities of the various federal bureaus and agencies which affect commercial fishing[29] as well as those of various states and local authorities.[30]

C. State

As previously noted, the federal government has left primary regulation, control and management of the fishery resources to the states.[31] As a result, an important part of commercial fishing in the Pacific Ocean is subject to regulation by the coastal states of California, Ore-

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[22] *E.g.*, U.S. CONST. art I, §§ 8(3) (commerce power), 8(1) (general welfare power).

[23] U.S. DEP'T OF THE INTERIOR, TRIDENT—A LONG RANGE REPORT OF THE BUREAU OF COMMERCIAL FISHERIES 31 (1963) (hereinafter cited as TRIDENT). *See generally* 22 AM. J. FISH & FISHERIES § 34 (1939) and 36A C.J.S. FISH. § (1961). In addition, commercial fishing in international waters is regulated by international commissions.

[24] TRIDENT, *supra* note 23 at iv.

[25] Fish and Wildlife Act of 1956, 16 U.S.C. §§ 742a—54 (1964).

[26] *Id.* § 742b.

[27] *Id.* § 742e.

[28] TRIDENT, *supra* note 23. Areas in which research is planned by the Bureau include oceanography, biology, technology and economics. Services contemplated include providing information on production and trade, market promotion and development, and extension activities. *Id.* at 88. Specific details of this program are discussed *infra*.

[29] *See* discussion *infra* at 241-42. In addition, the Bureau works closely with the Department of State with respect to any international conferences, etc.

[30] Pursuant to the Bureau's program of management recommendations coordinated state regulations are essential to achieve maximum use of the fishery resources and protect each fishery's conservation needs.

[31] *See* text accompanying notes 22 and 23 *supra*.

gon, Washington, and Alaska.[32] While these states are in general agreement as to the goals and objectives of commercial fishing regulation,[33] they demonstrate disagreement as to the means best suited for the realization of these goals.

Commercial fishing in the four coastal states is regulated either almost entirely by the state legislature,[34] or largely by administrative agencies.[35] We shall examine and compare the measures devised by each state to regulate commercial fishing, focusing particular attention upon those designed for conservation.

The California state constitution provides for a 5-member Fish and Game Commission,[36] a Fish and Game Preservation Fund[37] consisting of all monies collected under any conservation law, and the right of the people to fish in state waters.[38] The Fish and Game Commission is given the power to regulate the taking and possession of fish (among other marine products) for other than commercial purposes.[39]

In California (Figure 1, appendix), commercial fishing is regulated by laws passed by the state legislature which meets every two years. Two special legislative interim committees,[40] the Fish and Game Commission, and the Department of Fish and Game, hold hearings, make recommendations and propose legislation.[41] In addition, a Marine Research Committee is empowered to engage in "research in the development of commercial fisheries."[42] Clearly, such a system is not

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[32] Although the jurisdiction of the coastal state extends only 3 miles into the Pacific Ocean under present international law, the states may regulate fishing beyond the territorial limits indirectly through regulation of activities within the State's jurisdiction. Frach v. Schoettler, 46 Wn. 2d 281, 280 P.2d 1038 (1955). *See also* Skiriotes v. Florida, 313 U.S. 69 (1941). The recent federal legislation establishing a 9-mile fisheries zone contiguous to the territorial sea expressly refrains from extending the jurisdiction of the states to the resources beneath and in the waters within the fisheries zone. 80 Stat. 908 (1966).

A controversial exception to the states' regulatory power is the Indian fisheries. The states have no authority to regulate the Indian fishing on their reservations and uncertain authority over the Indian fishing off their reservations.

[33] *See* discussion of policies, *infra*. *See generally* 36A C.J.S. Fish. 26(a) (1961).

[34] *E.g.*, CAL. FISH & GAME CODE § 200 (1958). The California Fish and Game Commission has no jurisdiction over commercial fishing.

[35] ALASKA STAT. § 16.05.020(2) (1962); ORE. REV. STAT. § 506.036 (1965); WASH. REV. CODE § 75.08.012, .020 (1959). *See* discussion *infra* at 239-41.

[36] CAL. CONST. art 4, § 25½.

[37] *Id.* art 4, § 25⅝.

[38] *Id.* art. 1, § 25.

[39] CAL. FISH. & GAME CODE § 200 (1965).

[40] Assembly Interim Committee on Fish and Game, and the Senate Factfinding Committee of Natural Resources.

[41] CAL. FISH. & GAME CODE § 222 (1965).

[42] *Id.* To date, the Committee's research has been primarily concerned with sardine stocks in the ocean off California. *See* the 10 volumes (to Jan. 1965) of Reports of the California Co-operative Oceanic Fisheries Investigations.

likely to take ill-considered action; but it cannot take effective conservation action on short notice in response to any emergency situation. It may be assumed that this system reduces the use of technical knowledge of fish stocks obtained by the Department of Fish and Game and enhances the opportunity for public pressure to be effective in controlling the regulations. Such public pressure has delayed and restricted the use of the very large anchovy resource off California.[43]

On the other hand, the administrative agency system employed by the other three states is better designed to apply technical knowledge to the conservation of the fishery resources of the North Pacific. Administrative agencies with regulatory authority can issue orders or regulations on very short notice to take care of any changing situation requiring flexible conservation measures.

In Oregon (Figure 2, appendix) a special agency, the Fish Commission, regulates commercial fishing. It consists of three members who are appointed by the Governor,[44] guided by statutory mandate,[45] and vested with extensive statutory authority over commercial fishing. The Commission promulgates rules and regulations as necessary,[46] undertakes scientific research,[47] and exercises extensive power with respect to real property,[48] as well as other miscellaneous powers. However, it has no jurisdiction over game fish.[49]

The Commission appoints the Director of State Fisheries,[50] who is responsible to the Commission for the administration of the commercial fishing laws and their enforcement.[51] The Commission may delegate to the Director any of its administrative authorities, powers, and duties under the commercial fishing laws.[52]

The Commission's regulatory power is subject to certain procedural safeguards. Before adopting, amending, or repealing any rule, the Commission must hold a public hearing "for the purpose of deter-

[43] *See* inventory data in FISH. & GAME COMM'N. 3B CAL. FISH. & WILDLIFE PLAN 438 (1965) (hereinafter cited as WILDLIFE PLAN).
[44] ORE. REV. STAT. § 506.105 (1965).
[45] *Id.* § 506.036(2) provides:

> The duty of protection, preservation, propagation, cultivation, development, and promotion of all fishes under its jurisdiction within the waters of this state is delegated to and imposed upon the commission.

[46] *See id.* §§ 506.141 (1), .146.
[47] *Id.* § 506.136 (1).
[48] *Id.* § 506.201.
[49] *Id.* § 506.040.
[50] *Id.* § 506.255. *Compare* with Alaska and Washington, where the commissioner or director is appointed by the governor.
[51] *Id.* § 506.260.
[52] *Id.* § 506.265.

mining . . . whether the ultimate supply of . . . fish . . . will be affected injuriously or conserved and enhanced by the effect of the rule or its amendment or repeal."[53]

In Washington, also, commercial fishing is regulated by a special agency, the Department of Fisheries (Figure 3, appendix), created in 1949. The Department's duty and purpose are:[54]

> to preserve, protect, perpetuate and manage the food fish and shellfish in the waters of the state and the offshore waters thereof to the end that such food fish and shellfish shall not be taken, possessed, sold or disposed of at such times and in such manner as will impair the supply thereof.

Unlike the Oregon and Alaska agencies, the Washington State Department of Fisheries is under the charge and general supervision of one person, the Director of Fisheries, who is appointed by the governor. Guided by the foregoing mandate, the Director has general administrative power over the Department,[55] extensive power to promulgate rules and regulations,[56] and responsibility for the enforcement of all laws and regulations pertaining to commercial fishing.[57]

The Department of Fisheries' rulemaking power is subject to procedures prescribed by the Administrative Procedure Act.[58] However, agencies may issue "emergency" rules and amendments without complying with the prescribed procedure if:[59]

> the agency finds that immediate adoption or amendment of a rule is necessary for the preservation of the public health, safety, or general welfare, and that observance of the requirements of notice and opportunity to present views on the proposed action would be contrary to the public interest. . . .

In addition, the Washington Legislature regulated commercial fishing directly through a number of statutes.[60]

Pursuant to the state constitution,[61] the Alaska Legislature created a

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[53] *Id.* § 506.151.
[54] WASH. REV. CODE § 75.08.012 (1955).
[55] *Id.* § 75.08.014.
[56] *Id.* § 75.08.080.
[57] *Id.* § 75.08.020. In addition, the usual enforcement provisions, including criminal sanctions, are provided: *id.* §§ 75.08.150—.280. The director also regulates recreational (personal use) fishing for fish and shellfish in salt water. *Id.* §§ 75.04.070 —.100.
[58] *Id.* ch. 34.04 (1959).
[59] *Id.* § 34.04.030.
[60] *Id.* § 75.12.110 (1959). The legislature's regulation is sometimes motivated by nonconservation considerations. This section has discouraged drying fish for fish meal.
[61] ALASKA CONST., art. VIII, § 2.

10-member Board of Fish and Game (Figure 4, appendix).[62] The Board is empowered to make rules[63] and is guided by a constitutional mandate to maintain fish resources on the sustained yield principle.[64] The legislature also regulates commercial fishing to a limited extent.[65]

An important part of the Alaska regulatory scheme is the Commissioner of the Department of Fish and Game.[66] He has extensive regulatory powers over food fisheries, recreational fisheries, and hunting[67] and responsibility for the administration of the department.[68] He also has extensive emergency regulatory powers[69] and such additional authority as the Board may delegate to him.[70] The Alaska agency, like Washington's, is governed by the Alaska Administrative Procedure Act.[71]

III. Current Objectives and Plans

The policies of the food fishery agencies derive from the statutes, but usually the statutes express the objectives of the department in general terms, and hence, statements and publications by administrators of departments form an important additional source of policy.

A. Federal

The federal food fishery policies are exercised principally through the Bureau of Commercial Fisheries of the Fish and Wildlife Service of the United States Department of the Interior. The Bureau is one of two bureaus established in the Fish and Wildlife Service by the Fish and Wildlife Act of 1956. This Act and subsequent Acts form the basis for the present-day policy of the Bureau of Commercial Fisheries. The policy was published and stated explicitly in 1963 as follows:[72]

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[62] Alaska Stat. § 16.05.220 (1962). Each member must have a "general knowledge of the fish and game resources of the state...." The members are appointed by the governor.

[63] *Id.* § 16.05.240 (1962).

[64] Alaska Const. art 8, § 4. Extensive rule-making powers are set forth in Alaska Stat. § 16.05.250 (1962).

[65] *E.g.*, Alaska Stat. §§ 16.05.440—.720 (licensing of commercial fishermen, vessels, and gear); *id.* §§ 16.10.060—.130 (prohibiting fish traps and other illegal fishing devices); *id.* §§ 16.10.140—.170 (limiting the harvest of herring spawn).

[66] He serves by appointment of the governor for a term of 5 years. *Id.* § 16.05.010 (1962).

[67] *Id.* 16.05.050.

[68] *Id.* § 16.05.020 (1).

[69] *Id.* § 16.05.060.

[70] *Id.* § 16.05.270 provides, *inter alia,* that "For the purpose of administering §§ 250 & 260 of this chapter, the Board may delegate authority to the commissioner to act in its behalf."

[71] Alaska Stat. § 44.62 (1962).

[72] Trident, *supra* note 23 at 18.

The Congress established a sound and comprehensive national policy in the Fish and Wildlife Act of 1956:

> It is the National Fishery Policy to:
>
> (1) Increase and maintain forever, for the people of the United States, a fishery resource capable of yielding the maximum annual product;
>
> (2) Strengthen and maintain a vigorous fishery industry by assuring full and fair access to its raw materials and full and fair access to the American market;
>
> (3) Do these things in partnership with the States and in full accordance with our international obligations, and without sacrificing the system of free enterprise.

The statement continued with recognition of the complicated problems of coordinating the functions relating to fisheries of the several federal bureaus and the diverse state agencies:

> The Government should leave to private initiative all the functions that citizens can perform privately. It should use the level of Government closest to the community for all public functions that can be handled at such level. Cooperative governmental arrangements should be utilized where appropriate to obtain economical performance and popular approval. National action should be reserved for residual participation where State and local governments are not fully adequate, and for continuing responsibilities which only the National Government can undertake.

Many other federal agencies exercise their assignments in ways which profoundly affect the fisheries which in any way depend on fresh waters or estuarine waters of the United States. The U.S. Army Corps of Engineers of the Department of Defense and the Bureau of Reclamation of the Department of Interior, after satisfying the requirements of the Federal Power Commission, may dam or divert rivers and thereby interfere with the movement or habitat of fish. The United States Forest Service of the Department of Agriculture has responsibility for the management of streams on national forests which in Alaska comprise a major part of the salmon spawning area. The Atomic Energy Commission is involved in any project using nuclear energy and these projects commonly require large amounts of cooling water. The Water Pollution Control Administration, recently established in the Department of Interior, assumes the functions formerly exercised by the U.S. Public Health Service with respect to water

pollution. These functions and the activities of many state and local agencies bear on the quality of the waters along our coasts.

B. State

In California, Governor Edmund G. Brown authorized a thorough study of the natural resources of the state. The results of this study pertaining to the food fish resources appeared in late 1965 and early 1966.[73] Statements in this plan concerning the marine food fish policy are especially revealing.

In a summary statement on state policy,[74] the following recommendation appears:

> The conservation of fish and wildlife is an integral part of the total economic development and recreation program of the State. In implementing this program, general tax sources should be used to support those program achievements which clearly benefit the general public.

In a section on management programs with respect to marine resources these statements appear:[75]

> Except in bays and estuaries and immediately surrounding waste discharge outfalls, the problems of most marine species are problems of managing human use, rather than managing or protecting habitat. Species use will be managed to produce maximum sustained yield. Methods will be sought to make greater use of under-utilized species, such as hake, through experimental gear development and exploratory fishing. These and other approaches will be used to foster the growth and economic development of the commercial fisheries, in harmony with the recreational fisheries and other users. Establishment of seal and sea lion refuges will be considered along with management programs to insure control of excess numbers of these animals in certain areas. A shellfish laboratory will be established to learn facts and devise techniques needed for fuller development and utilization of the shellfish resource.

Further, in a section on management recommendations, are the following statements:[76]

> To manage marine resources for the optimum sustainable harvest giving priority to recreational uses where a species or species-group under State jurisdiction is incapable of supporting both the reasonable requirement of the sport fishery and the existing or potential commercial harvest. Where the optimum sustainable harvest in a species or species-group is insufficient to support both the recreational and commercial

[73] *See* the three volumes of WILDLIFE PLAN, *supra* note 43.
[74] *Id.* vol. 1, at 29.
[75] *Id.* at 34.
[76] *Id.* at 33.

> demand, first priority should be given to satisfying the reasonable and legitimate demands of the recreational fishery; the commercial fishery should be encouraged to use any harvestable surplus remaining after the recreational demand is satisfied.

The planners also outlined and discussed the division of tasks among international, federal, California Department of Fish and Game, and other agencies.[77] Especially pertinent are their suggestions for federal tasks:

> (1) Meet international treaty obligations, (2) Cooperate with the states, (3) Conduct research, (4) Administer Federal lands, (5) Meet obligations of the Fish and Wildlife Coordination Act, (6) Administer the Federal Aid in Fish and Wildlife Restoration of the Commercial Fisheries Research and Development programs, (7) Preserve rare, endangered migratory species, (8) Develop commercial fisheries, (9) Enforce Federal laws and regulations.

Suggested tasks of the California Department of Fish and Game are to:

> (1) Maintain and manage all of the State's fish and wildlife resources including rare and endangered resident species, (2) Conduct research and collect statistical data to facilitate the maintenance and management of the State's fish and wildlife resources, (3) Cooperate with the Federal Government and other states, (4) Enforce laws and regulations governing fish and wildlife.

Other state departments are to be concerned especially with resource conflicts. Suggested tasks for the universities include (1) conducting basic and fundamental research, and (2) solving highly complex problems.

None of the other states has prepared such a comprehensive plan, but the senior officials have made a variety of statements about objectives and plans.

The Oregon Fish Commission quoted its enabling legislation as follows:[78]

> The purpose of the Commission is to protect, preserve, propagate, cultivate, develop and promote all of the fishes within the state or within waters in which the state has joint or other jurisdiction with any other state or government, including salmon, shad, striped bass, sturgeon, anadromous or food and shellfish, and animals living intertidally on the bottom, except trout of all species.

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[77] *Id.* at 45.

[78] [1962-1963] ORE. FISH. COMM'N BIENNIAL REP., at 4.

The following appeared in the same publication at 5:

> The story of the Oregon Fish Commission is the story of the food fish resource of the state, its scientific management, enhancement, and ability to persist under the demands of the modern standard of living.

In the State of Washington, Director Thor C. Tollefson[79] stated that the Department of Fisheries was working on a 10-year program which would:

> (1) Triple production from our salmon hatcheries and fish farms, (2) increase our trawl (bottomfish) fisheries, and add new species to those now landed and sold, (3) make our oyster industry more stable through increasing supplies of seed and in searching for new techniques and understanding to apply to present problems of growth, fattening, and mortality, (4) add to natural salmon spawning grounds through a speeded up, expanded, and improved stream clearance campaign, (5) make predictions of salmon runs more accurate through the refining and improvement of present migration, escapement and landings evaluations and forecasts. Not only will management of the harvest and escapement be improved, but industry costs and efforts will be reduced, releasing monies for product improvement and lower costs to consumers, (6) give citizens and visitors alike more beach areas for clam digging and other recreation, (7) return bigger profits in fish and shellfish to fishermen through adequate continuing research for more efficient means of assuring stocks of salmon and shellfish. The goal, then, of the Department of Fisheries is to make available the maximum sustained economic and recreational benefits from the fish and shellfish under its jurisdiction.

In Alaska, the Commissioner (the executive officer of the Department of Fish and Game) shall "manage, protect, maintain, improve, and extend the fish and game resources of the state in the interest of the economy and general well-being of the state."[80]

The Alaska Fish and Game Department and the Alaska Fish and Game Commission were created by the Territory of Alaska in 1957 to carry out the following purposes:[81]

> (a) To assist in the conservation of Alaska's fisheries by appropriate measure, including steps to overcome the present depleted condition of the salmon runs; (b) to foster the ownership, management and control of fishing equipment and gear by residents of Alaska; (c) to cooperate with U.S. Fish and Wildlife Service.

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[79] Seattle Post-Intelligencer series starting on April 3, 1966.
[80] ALASKA STAT. § 16.05.020 (1962).
[81] Ch. 68, 19th Territorial Legislature, approved Mar. 21, 1949. The purposes of the Department of Fish and Game in the new state remain the same.

The Pacific Coast States were concerned about the ocean resources which they shared and which frequently were harvested by fishermen from more than one state or even by fishermen from Canada (further, it is suggested that the states were anxious to head off possible regulation of these fisheries by the federal government). After considerable negotiation the states of Washington, Oregon, and California adopted a compact at the Western Legislative Conference on November 21, 1946. This was approved by the Congress of the United States in an Act approved July 24, 1947.[82] Article I states:

> The purposes of this compact are and shall be to promote the better utilization of fisheries, marine, shell and anadromous, which are of mutual concern, and to develop a joint program of protection and prevention of physical waste of such fisheries in all of those areas of the Pacific Ocean over which the states of California, Oregon and Washington jointly or separately now have or may hereafter acquire jurisdiction.

Article VII states:

> The fisheries research agencies of the signatory states shall act in collaboration as the official research agency of the Pacific marine fisheries commission [*sic*].

IV. INCOME AND DISBURSEMENTS OF FOOD FISHERY AGENCIES

A. Income

A study of income sources and disbursement trends of the fishery agencies provides evidence of the major influences on policies and the principal expressions of the policies. It is interesting to note the prevalence of federal funds in an area where the states give primary direction to policy. The amounts disbursed for regulation and services and those disbursed for environmental protection should be noted and compared.

Much of the income of the food fishery agencies comes from the general funds of the federal and state governments (however, the California Department of Fish and Game is supported by the Fish and Game Preservation Fund[83]). Other income to the states accrues from

[82] 61 Stat. 419 (1947). Subsequently amended by 76 Stat. 763 (1962) to permit Alaska, Hawaii, or any state having rivers tributary to the Pacific Ocean to join. Idaho joined on July 1, 1963.

[83] The source of agency income can be contrasted with the source of funds for sport fishery and game activities, which are commonly supported by special funds derived largely from license fees and special taxes.

fees levied on commercial fishermen and special taxes on the catch. Usually the funds realized from such special taxes on food fisheries are not identified or earmarked, although it seems desirable to separate them here because special taxes provide money for special services.

The license fee structure varies markedly among the four states (Table 1, appendix). The fees are payable annually; usually a separate fee is levied on each kind of fishing, on the individual fisherman, on each dealer and buyer; sometimes the fee is graduated according to the size of gear. The fee on the individual fisherman is commonly two to three times as much for the nonresident fisherman as for the resident. The gear fees are graduated roughly in accordance with the profitability of the kind of fishing.

The general level of the license fees seems to be the result of gradual compromises between departmental need for funds and industry pressure to keep fees low; it is not commensurate with the privilege of harvesting a public resource. In no case is a license fee more than about 1 percent of the value of what a good fisherman or fishing vessel can catch during the season.

The largest state income from license fees in a recent fiscal year (Table 2, appendix) was collected by Alaska: a total of $619,000 from commercial fishing vessels, gear, and fishermen's licenses. Incomes received by other states were much smaller, the smallest, $92,000, having been collected by Oregon.

A larger source of state income is the catch tax. Rates vary widely for different species of fish and among states; the overall average rates range from less than 1 percent of the total landed value in California to about 5 percent in Alaska. State incomes in the last reported fiscal year ranged from $140,000 in Oregon to $2,479 million in Alaska (Table 2, appendix).

Income from these license fees and catch taxes is commonly received into the general treasury of each of the states and not earmarked for the department except in California. Therefore, we show the receipts from fees and licenses and then additional monies received from the state general fund by the departments. In Washington and Oregon it is apparent that the major source of income for food fishery activities is general tax receipts and a secondary source is federal funds.

In California and Alaska the food fishery responsibilities are only part of the responsibilities of the fish and game agencies. The California Department has a total income of approximately $14 million an-

nually, of which only about 13 percent is used to carry out food fishery responsibilities. In contrast, the Alaska Department used about half of its income of $5.445 million in the fiscal year 1965.

Much of the federal funds comes from the general tax funds of the United States. A large part is expended directly by the federal agencies and international commissions, but still a considerable amount is disbursed to state food fishery agencies for subcontracts, primarily for activities in connection with salmon in the Columbia Basin.[84]

In the aggregate, it appears that about 63 percent of the monies available to the fishery agencies come from federal funds, about 15 percent from state general funds, and about 16.5 percent from special fees and licenses.[85] There are notable differences among states: Alaska receives little federal money and derives a large income from special taxes on the catch; on the other hand, Oregon receives considerably more federal money and less income from its much smaller commercial fishery.

B. Disbursements

We have established two categories of disbursements (Table 3, appendix): "regulation or service" and "environmental protection or substitutes." The first category utilizes funds to regulate the fishery resource or to serve the fisheries industry and includes: research for regulation, regulatory and enforcement activities, sanitary regulation, inspection services, market news, technological research, construction of vessels, loans, etc. The second category covers expenditures on activities arising from other uses of the environment which are detrimental to the food fisheries and includes: salmon hatcheries, fish transport and barrier devices, research on the effects of pesticides, logging and pollution, seismic survey, etc.

Since these categories are not those of administrative appropriations in any department, our estimates are necessarily approximate. The common departmental arrangement is to divide the budget among the major operational divisions, which usually are administration, research, engineering, fish culture, and enforcement. Difficulties arise because enforcement is sometimes a function of state departments other than

[84] Additional federal funds for food fishery purposes will go routinely to the states under the Commercial Fisheries Research and Development Act, 78 Stat. 197 (1964), and the Anadromous Fish Act 79 Stat. 1125 (1965).

[85] The remaining funds include payments made by oil companies for state monitoring of seismic surveys, income from special agreements with water resource agencies for fish protective devices, etc. These comprise a very minor part of the income for food fishery activities.

the food fishery department and because of overlap between recreational and food fishery functions in some activities.

The classification of disbursements reveals the greatly differing responsibilities of the states and the offices of the Federal Bureau of Commercial Fisheries. In the Pacific Northwest, the Oregon Fish Commission, the Washington Department of Fisheries, and the Seattle Laboratory of the Bureau of Commercial Fisheries spend a major part of their funds on activities necessitated by conflicts arising from the use of water, largely, for construction and operation of salmon hatcheries and implementation of salmon protective programs in the Columbia River Basin. In California and Alaska, only a small part of the funds supports such activity and the majority of the money is used for regulation or service to the industry.

The funds spent by the fishery agencies for the Columbia River salmon are but a small part of the overall expenditures for fish protection or compensation. Nonfishery agencies which are building dams, irrigation works or otherwise disturbing the habitat are required by law to invest in fishways, fish barriers, and hatcheries. The total investment in fishways and fish protective devices in Washington, Oregon and California as of January 1, 1959 was approximately $146 million.[86] Because one or more of the fishery agencies must approve each fish protective structure, and in many cases actually advise on construction, it is obvious that a large proportion of each agency's activities is concerned with such facilities. Information indicates that practically all of the investment in fish protective facilities and hatcheries has taken place since 1930, and most of it since 1943.[87] If the current average annual investment is estimated at $10 million and the average annual maintenance and amortization of debt are estimated at 10 percent of the total investment, and the annual expenditures of the Seattle office of the Bureau of Commercial Fisheries, the Washington Department of Fisheries, and the Oregon Fish Commission for environmental protection or substitutes are added, it is clear that the annual expenditure from public funds for the welfare of Columbia River salmon is somewhat greater than for all of the rest of food fishery resources on the Pacific Coast combined.[88] This is not meant to imply

[86] M. MOORE, K. MCLEOD & D. REED, FISHERIES, FISH FARMING, FISHERIES MANAGEMENT 300 (1960).

[87] *Id.*

[88] Recreational fishermen and sportsmen's organizations in Oregon, Idaho and Washington have moved vigorously to prohibit commercial fishing in the Columbia River. It is the opinion of informed observers that the salmon fishery of this river will probably be reserved for recreational use in the near future.

that these expenditures are ill-advised but rather that comparatively little is being done for regulation and development of other fishery resources.

V. ROLE OF RESEARCH—A SPECIAL NOTE

In the delegation of responsibilities for the welfare of the fish resource and the fishery industry, the state and federal legislatures have required that directors and staff be technically qualified and have made substantial continuing appropriations for research.[89] By such action the legislatures have sought to correct the limitations in the legislative process in dealing with technical matters and to satisfy the need for better knowledge. The legislatures have substituted in varying degrees an executive process for a legislative process and through the provision of facilities for research presumably expect the executive decisions to be based on scientific information.

All of the agencies face formidable research problems. So little is known about the fish resources and the fish that almost any scientifically sound observation, analysis, or theory is of value. For example, information concerning the identity of the species of fish, the reactions of a fish to its environment, the effects of associated species, the circulatory and food-producing systems of the oceans is basic to applied studies of the effect of fishing on the stocks, the changes in fish flesh with preservation, or the effectiveness of fishing gear—knowledge on which governmental and industrial decisions can be based. These studies span a broad range of disciplines, including zoology, oceanography, chemistry, physics, engineering, economics, food science, as well as numerous subdisciplines.

All of the agencies are organized to perform research and employ research personnel. The U.S. Bureau of Commercial Fisheries is heavily committed to research and supports several major laboratories. The Inter-American Tropical Tuna Commission, the International Pacific Halibut Commission, and the International Pacific Salmon Fisheries Commission are occupied almost completely with research.[90] The total outlay on research was about $10 million in the last reported fiscal year (Table 4, appendix), nearly 40 percent of the aggregate income of the food fishery agencies (Table 2, appendix).

[89] Except for the Pacific Marine Fisheries Commission and the International North Pacific Fisheries Commission, both of which are coordinating organizations.

[90] The International Pacific Salmon Fisheries Commission was required to perform research for 8 years before making any recommendations about regulations.

The product of any research process is information. It becomes available to the public which has paid for it only when published. Such publication serves a scientific purpose in recording the results of the work and is also evidence of the basis on which the fishery agencies make their decisions. Only after fully documented publication can the decisions be judged to be scientific decisions. Thus, the agencies' scientific activity as well as their ability to discharge their assigned responsibilities may be judged by the quantity and quality of their publications.

We have classified and counted publications concerned with the marine food fisheries or marine environment in official journals of the food fish agencies during the 6 years 1960 to 1965[91] (Table 5, appendix). There are three categories of publications: (1) those relative to regulation or service; (2) those concerned with environmental protection or substitutes; and (3) those dealing with methods and background (basic research).[92]

The category of regulation or service includes: descriptions of fisheries; explorations of new stocks or fishing grounds; reports of age and size composition, population dynamics, or abundance of stocks; records of catch, migration or segregation of stocks; economic studies; stream catalogs and stream surveys; forecasts; reviews of foreign fisheries off the Pacific Coast; reports of fishing gear congresses; evaluation and establishment of standards for fish products; and solutions to production problems, such as bluing of king crab or heating of fishmeal.

The category of environmental protection or substitutes includes papers on spawning channels, hatchery operations, fish feeding, fish diet, disease control, fish passage, enumeration of migrating fish, effects of pollution, and the effects of explosives.

The category of methods and background includes reports of basic research in biology, oceanography, chemistry, and ecology—tools and techniques, food and feeding habits, taxonomy and nomenclature, age and growth, faunal lists, literature reviews, chemistry of fish oils, fish nutrition, fish diseases, and temperature and chemical structure of the ocean.

Nearly half of the papers are concerned with regulation or service to the industry, more than a third with methods and backgrounds, and

[91] Publication is also made in outside journals, sometimes to reach special audiences or to expedite publication. Presumably material directly related to agency policies would appear in the official publications.

[92] Categories 1 & 2 were established previously as categories of disbursements.

about one-sixth with environmental maintenance. The balance among agencies is somewhat surprising. The federal agencies with responsibilities for providing fundamental knowledge would be expected to yield the highest proportion of papers on methods and background, but the California agency produced the largest proportion in this category. However, many of the papers from the California agency are notes on the biology and distribution of fish. Publications by agencies of the States of Washington[93] and Oregon have been scanty despite their considerable research budgets.

The lack of certain publications is revealing. In the normal sequence of the development of scientific information for the regulation of fishery resources, a basic understanding is established, the stocks are defined, their migrations and population dynamics are described, and finally the effect of fishing on the stock and the maximum sustainable yield are determined. Specific determinations of the effect of fishing and recommendations for regulatory measures based on research were published only by the international commissions; research by the state and federal agencies was not carried to this point during the period under review. Notably lacking also are papers providing evidence of unutilized or underutilized stocks of food fish. Such reports were published almost exclusively by one laboratory of the federal government.

VI. GENERAL OBSERVATIONS

The food fish resources are unusual in their complexity. There are numerous species, each with different habits. Of most species there are several distinct stocks, some of which are exploited to the maximum or beyond while others, some very large, are unutilized. Of the five species of salmon, for instance, there are thousands of separate stocks which return to individual spawning grounds in different river systems, each of which needs separate regulation, though this is not always practicable. Many species migrate thousands of miles at sea and may even cross the Pacific; *e.g.* the salmons, steelhead trout, albacore, skipjack, blackcod, and grayfish. All species occupy international waters; some off the coasts of other countries. A few species traditionally prized have been under study and management by interna-

[93] A great majority of the publications from Washington appeared in a single book published in 1960. A personal communication indicated that publication has been against department policy for several years, but a substantial number of manuscripts have been accumulated.

tional commissions for some time. Some species, such as oysters, are cultured on lands leased from the states. Some species multiply greatly regardless of the amount of fishing; others are so vulnerable that a stock can be seriously damaged by a one-day delay in a regulatory decision.

The industry, though not large, is similarly complicated. There are about 34,000 fishermen, 18,000 operating boats, and several dozen different kinds of gear (the federal statistics list 48, including several general categories). Most gear is licensed separately, at different fees. Most operations are carried on in remote coastal areas or at sea, and fish are landed at dozens of different locations. Patrol and enforcement is therefore difficult.

Further complications arise from changes in the fish's environment created by civilization's burgeoning demands for water and land. Changes in the waterways from the clearing of land, the ditching of pastures, the diversion of water for irrigation, the storage of water for power, the use of water for diluting waste or the leaching of pesticides affect anadromous fish, such as the salmon which ascend streams to spawn, and many inshore species, such as smelt, shrimp, and mollusks. Marine pollution has become a problem in some instances; tuna on the high seas have been found carrying pesticides.

Faced with such complexities and provided with inadequate budgets, the food fishery agencies, which are the primary policy formulators, are regularly forced to compromise, to temporize with makeshift arrangements, to make rules and regulations prematurely, and to neglect long-range problems. They proceed from crisis to crisis, and commonly commit enough errors to encourage their political enemies. The difficulty of managing the food fish resources seems much greater than that of the forest or mineral resources which at the present time are much more valuable in the Western United States.

A. The Dual Responsibility

Each of the food fishery agencies has a dual responsibility—protection of the food fishery resource and maintenance of a vigorous fishing industry. However, each of these agencies faces problems as they have developed over the years and as they are molded by public attitudes. Unfortunately, most people think of fishing in terms of recreation and few know or understand the food fish industry. They would preserve the resources, not conserve them (in the sense of the interna-

tional definition). They have no consciousness of the waste of resources resulting from an underharvested fishery. Fearing destruction of the resources, they look with suspicion on those who would utilize them. They little understand the concept of sustainable yield.

The public's reaction to foreign fishing off our shores is a case in point. They demand that the fishermen be forced out, claiming that the resource is being destroyed and that gear or catch restrictions are being violated. Much the same reaction prevails with respect to large, efficient American fishing vessels among small-boat fishermen or recreational fishermen. It is all too common an occurrence for inshore trawlers to find junk dumped in their trawling grounds or for great public outcry and newspaper publicity to arise over the incidental catch of a few fish of recreational importance.

Even the commercial fishing may be partly recreational; with the necessary gear anyone can engage in commercial fishing for a modest fee. Many do go during vacation periods from jobs ashore and value the experience highly as recreation so that the value of the catch is incidental. Political pressure from such fishermen leaves the agency no choice except to reduce the efficiency of fishermen with larger vessels, generally full-time fishermen.

Thus it is not surprising that agencies consider that their first responsibility is to the resource and provide little assistance to the industry.

B. The Divided Authority

The marine food fisheries lie squarely across the gray area between federal and state responsibility. In the United States they are traditionally the responsibility of state governments, yet they are pursued in international waters where the states have limited powers. The overall responsibility is divided among four state agencies, three regions of the federal agency, four international commissions, and an interstate coordinating commission. Some of these agencies also have responsibilities for recreational fishing and numerous other federal, state, and local agencies engage in activities which affect the fish or their environment.

All of the agencies are independent government entities supported by different groups of people. They have separate legal authority and responsibility, different backgrounds of experience and tradition, independent programs and objectives. They plan and budget separately

although their operations may be coordinated in a number of ways.

The division of responsibility between federal and state agencies has been a source of difficulty since our nation was founded. The difficulties continue with respect to fisheries and the states jealously guard their responsibility to regulate. The federal agency with overlapping responsibility makes it a policy to operate in partnership with the states, but the state agencies most directly affect the overall welfare of the fishery and the fish resources.

C. The Conflict with Water Use

The fishery agencies can conserve our marine food fish stocks only by regulating the rate of harvest unless the stocks occupy inshore waters or ascend the rivers. When they do, the fishery agencies are faced with the dual responsibilities of regulating the catch and of protecting inshore and anadromous fish from the changing environment. The latter is so frequently necessary and extensive that it requires a large proportion of the funds and attention of the fishery agencies.

D. The Limitation of Research

There are complaints that fishery research is a waste of money, that the major problems are never solved. Occasionally there are attempts to reduce drastically the research budgets (which comprise about 40 percent of the food fish budgets). Some criticism is probably justified because of the limitations of the research programs.

Most notable is the limitation in scope. The agencies have engaged almost entirely in biological research on the fish and the fish populations. Only the federal agency has supported or undertaken significant research in chemistry, food technology, engineering, and technological or product development. Since 1960 the agencies have little investigated the economic, social, or legal aspects of fishery problems, and the operation or organization of either the fish business or government agency.

Even the biological research suffers shortcomings. Much of it is conducted under pressure of agency deadlines by people with limited access to libraries or computers and with little or no editorial assistance. Consequently, too few investigations are conducted thoroughly enough to warrant publication. The research programs have been carried to the point of specific recommendations for regulation with publication of full supporting data only in the instance of the interna-

tional commissions. The state regulations are commonly unsupported by research publications.

Very little of the biological research has focused on unused or underused resources. Most of the programs have been concerned with the recovery of depleted resources.

VII. CONCLUSIONS

The primary instruments of food fishery policy are the laws passed by the state legislatures to control and protect the fisheries or to delegate regulatory authority to the state departments of fisheries. The federal government has authority but works in partnership with the states, especially on international fisheries problems.

The policies are all said to be directed toward protection of the resource as well as maintenance of a vigorous fishing industry but protection of the resource receives almost all of the emphasis. The majority of the funds spent on food fisheries is used to protect the environment of salmon or to finance hatchery propagation to compensate for the lost environment. The industry receives almost no help from the state to reduce costs. Instead, the states are committed to a policy of unlimited entry into the fishery, and usually protect the resource by regulations which reduce the efficiency of the fishery and increase costs.

Most of the fishery funds not used for protecting or propagating salmon are used for research and enforcement of regulations. The research is directed partly toward gaining a greater understanding of the fish or their environment, partly toward studying the fish stocks being exploited, and partly toward improving the methods of protecting the environment of the fish or growing them in hatcheries.

A large part of the research and regulatory effort is expended on stocks of fish already damaged by heavy use or loss of environment. Little is done to stimulate use of underused resources.

Despite the substantial research carried out by most fishery agencies, too little is extended to the point where levels of maximum sustainable yield for the various stocks are found. Only the international commissions have supported fully their recommended regulations by scientific publications which show the relation between fishing effort and yield.

The reasons for these policies appear to lie largely in the complexity of the fisheries and the public attitudes toward them. The fisheries

are diverse in species, stocks, and products and similarly diverse in methods and locations. Fishery products are much less valuable than forest or mineral products in the West Coast States. The fisheries are complicated and expensive to administer; the industry pays as direct taxes only about one-sixth of the income of the fishery agencies. The general public, which pays for the administration, has little understanding of the complexities of food fishery policies and the great suspicion that the resources will inevitably be ruined by fishing.

The consequences are "conservation" policies which do not fulfill the international definitions of conservation in two important respects. First, a large part of the restraining regulations promulgated by the states were not designed to obtain the maximum sustainable yield; rather, they were designed to divide the catch among all who want to fish. Second, few policies encourage more use of underused stocks in order to obtain the maximum sustainable yield.

APPENDIX

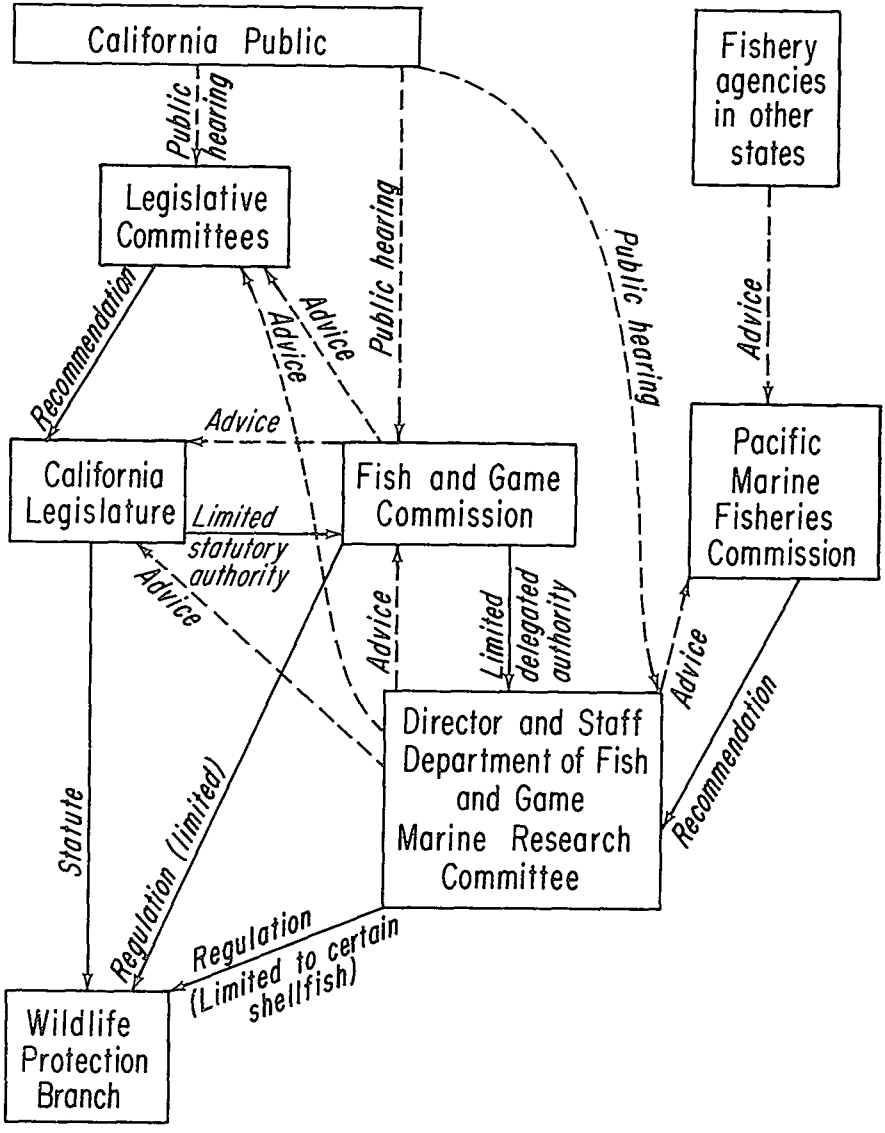
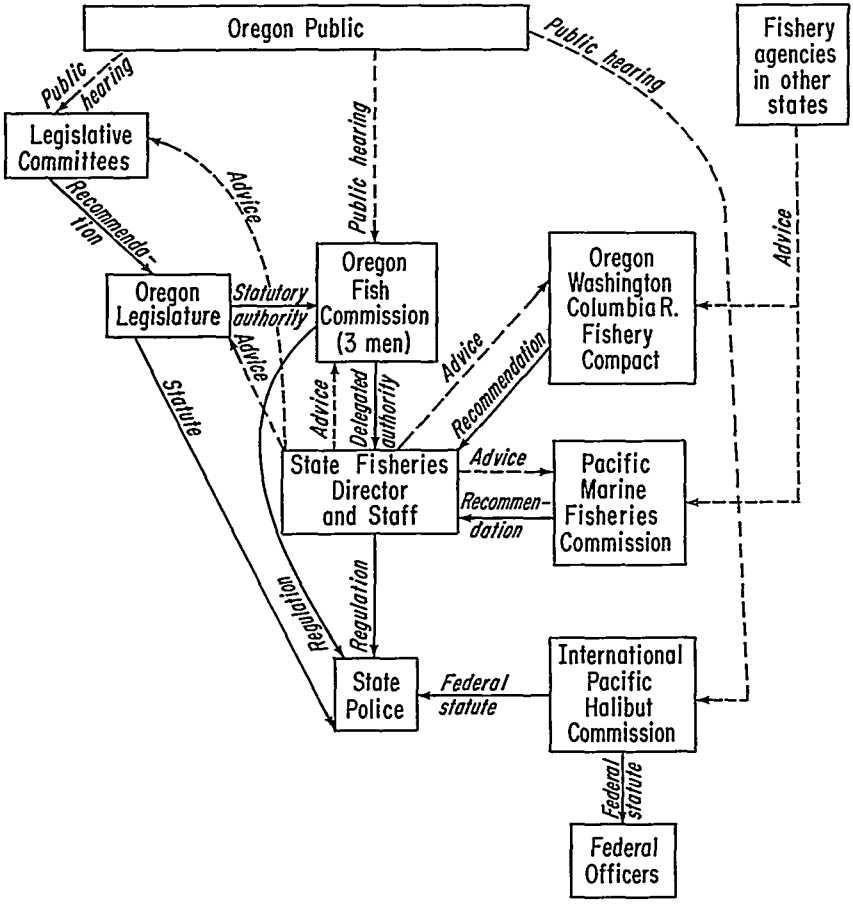


FIGURE 1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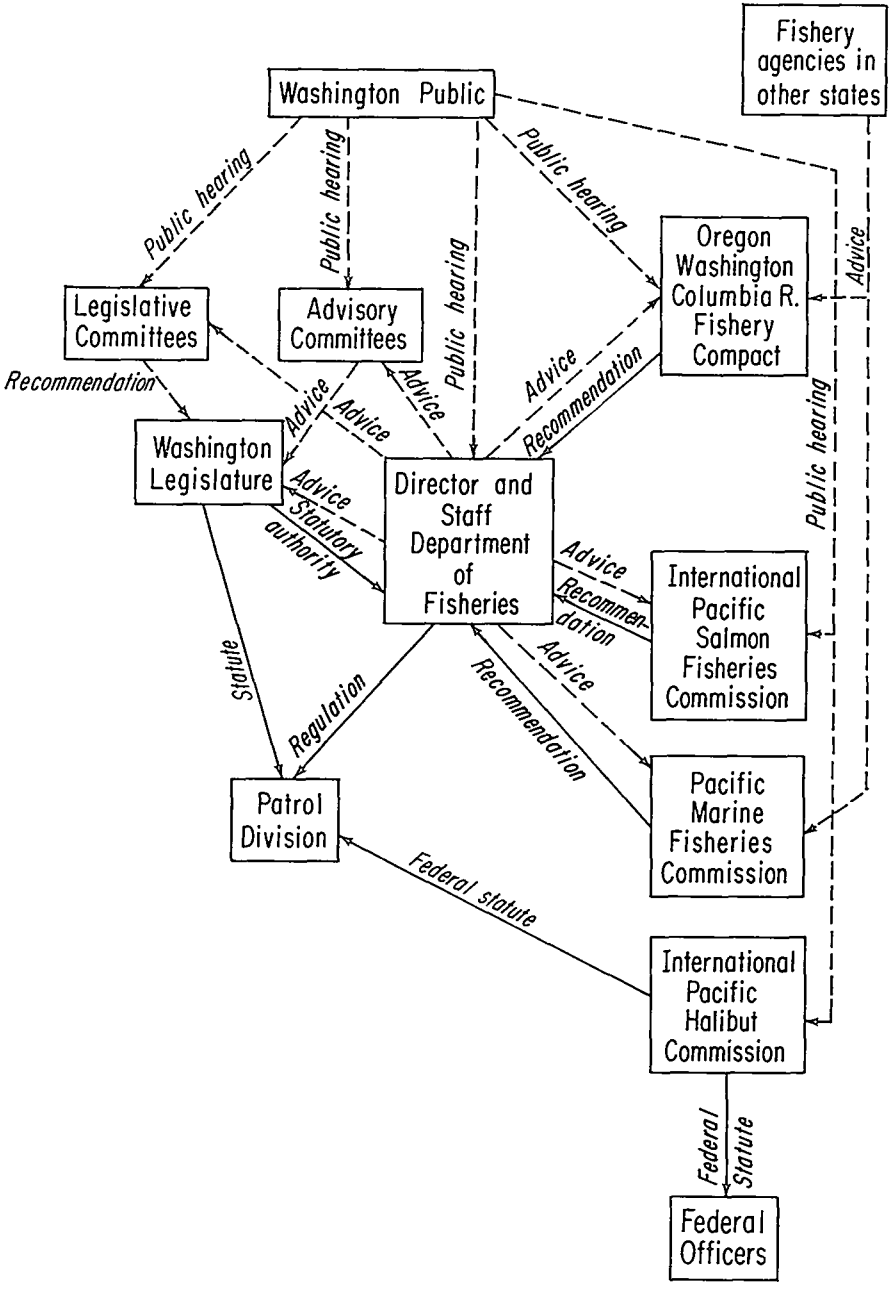
Public hearing
Fishery agencies in other states
Public hearing
Legislative Committees
Public hearing
Advice
Recommendation
Public hearing
Oregon Legislature
Statutory authority
Oregon Fish Commission (3 men)
Oregon Washington Columbia R. Fishery Compact
Advice
Advice
Advice
Delegated authority
Advice
Recommendation
Statute
State Fisheries Director and Staff
Advice
Recommendation
Pacific Marine Fisheries Commission
Regulation
Regulation
State Police
Federal statute
International Pacific Halibut Commission
Federal statute
Federal Officers

FIGURE 2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Legislative Committees
Advisory Committees
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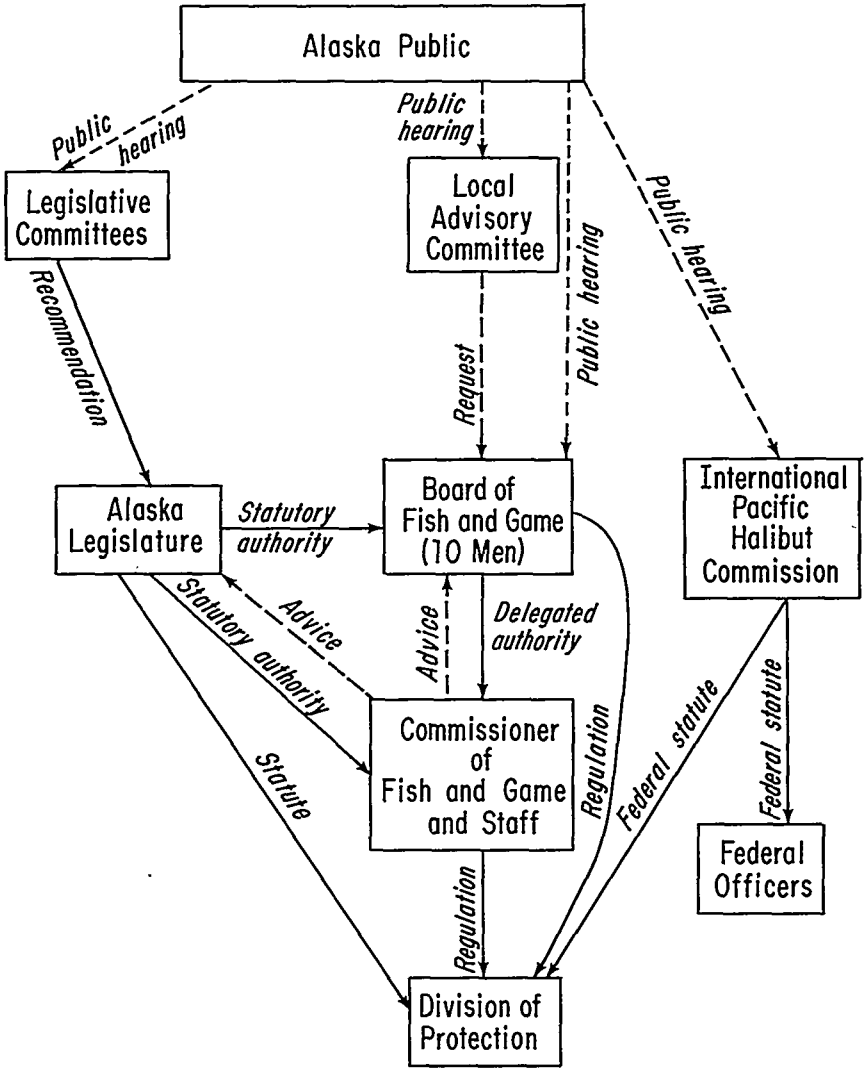
Recommendation
Public hearing
Washington Legislature
Advice
Statutory authority
Director and Staff Department of Fisheries
Advice
Recommendation
International Pacific Salmon Fisheries Commission
Statute
Regulation
Recommendation
Advice
Pacific Marine Fisheries Commission
Patrol Division
Federal statute
International Pacific Halibut Commission
Federal
Statute
Federal Officers

FIGURE 3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Recommendation
Request
Alaska Legislature
Statutory authority
Board of Fish and Game (10 Men)
International Pacific Halibut Commission
Statutory authority
Advice
Advice
Delegated authority
Commissioner of Fish and Game and Staff
Statute
Regulation
Federal statute
Federal statute
Federal Officers
Regulation
Division of Protection

FIGURE 4

Table 1. Principal Commercial Fishing License Fees and Taxes in 1966

Type of license	California		Oregon		Washington		Alaska	
	R	NR	R	NR	R	NR	R	NR
Fishing gear								
Individual	$15.00		$ 15.00				$10.00	$ 15.00
Vessel	$10.00		20.00		$ 10.00		10.00	30.00
Purse seine					145.00	$230.00	40.00	120.00[1]
Gill net			5.00	$45.00	35.00	70.00	10.00	30.00[1]
Set net			5.00	45.00	35.00	70.00	5.00	15.00[2]
Set line			5.00	45.00	35.00	70.00	25.00	50.00
Troll					27.50	55.00	15.00	45.00
Otter trawl					87.50	135.00	50.00	150.00
Shellfish pot					35.00	60.00	15.00	45.00[3]
Clam digger					5.00		5.00	15.00
Fish marketing								
Wholesale dealer	25.00		50.00		37.50			
Fish buyer			10.00		7.50			
Fish canner	75.00		100.00		37.50			
Retailer			10.00		5.00			
Shellfish canner			50.00					
Catch or poundage fees	[6]		[4]		2%			4.8%[5]

R-Resident; NR-Nonresident.

[1] For first 100 fm.
[2] For each 50 fm.
[3] For first 100 pots.
[4] Graduated fees are assessed ranging up to $0.011 per lb. on salmon.
[5] Tax rate is estimated by dividing FY 1963 tax receipts by average of 1962 and 1963 catch value. According to Alaska Stat. §§ 43.75.010-120 tax on salmon is computed at 3% of wholesale value of finished product, tax on herring is 1% of value of raw herring, and tax on crab is 2% of value of raw crabs.
[6] The rate for salmon is $0.005 per lb.; for shellfish or canned or processed fish other than salmon, $0.05 per 100 lbs. There is no charge for fish other than salmon which are utilized fresh for human consumption. An extra tax of $0.05 per 100 lbs. is charged for sardines, Pacific mackerel, jack mackerel, squid, herring, or anchovies.

Source: California—Personal communication. Oregon—Fisheries Code, § 82 (1966). Washington—Dept. Fish. 1965 Fee Schedule. Alaska—Stat. tit. 43, ch. 75.

Table 2. Income (in thousands of dollars) for Food Fishery Activities, and Sources[1]

Agency	Year	License fees	Catch tax	Additional from state general fund[2]	Federal funds	Other	Total
California Fish and Game	FY 1965	198	405		125[4]	1,095[5]	1,823
Oregon Fish Commission[7]	FY 1964	92	140	1,917	1,367	68	3,583
Washington Dept. of Fisheries	FY 1965	242	292	2,650	423	353	3,959
Alaska Dept. of Fish and Game	FY 1965	619	2,598[6]	(-426)			2,791
Pacific Marine Fisheries Commission	FY 1965			43			43
Inter American Tropical Tuna Commission[3]	FY 1965				(U.S. 392)		392
International Pacific Halibut Commission[3]	FY 1965				(U.S. 187)		187
International Pacific Salmon Fisheries Commission[3]	FY 1965				(U.S. 370)		370
International North Pacific Fisheries Commission[3]	FY 1965				(U.S. 25)		25
U.S. Bureau of Commercial Fisheries							
San Pedro	FY 1965				1,879		1,879
Seattle	FY 1965				12,163		12,163
Juneau	FY 1965				2,417		2,417
Total—approximate, exclusive of duplication		1,151	3,435	4,184	17,558	1,516	27,844

[1] Unofficial and approximate (because of special appropriations, transfers, reversions, carry-overs and differing fiscal periods). Sources: Annual or biennial reports and personal communications.

[2] Exclusive of fees paid by food fish industrty.

[3] U.S. State Department appropriations. These funds are only part of commissions' income. The U.S. share is about 90% of IATTC, 50% of IPHC and IPSC, and 33% of INPFC.

[4] Total federal funds earmarked for marine resources were $250,000 of which about half was allotted for marine recreational fisheries.

[5] About two-thirds from Fish and Game Fund and the balance presumably compensation for use of water.

[6] Includes collectitons from a special tax on freezer ships of $119,000.

[7] According to Oregon law all license and catch tax money is paid directly to the general fund and is unrelated to departmental appropriations.

Table 3. Disbursements for Food Fishery Activities by Class (in thousands of dollars)[1]

Agency	Year	Regulation or service	Environmental protection or substitutes	Total
California Fish and Game	FY 1965	1,362	336[8]	1,698[7]
Oregon Fish Commission	FY 1964	271	1,961[8]	2,232[2]
Washington Department of Fisheries	FY 1965	1,431[9]	2,494[8]	3,925
Alaska Department of Fish and Game	FY 1965	2,755	36	2,791
Pacific Marine Fisheries Commission	FY 1965	15	28	43[3]
Inter-American Tropical Tuna Commission	FY 1965	392		392[4]
International Pacific Halibut Commission	FY 1965	187		187[4]
International Pacific Salmon Fisheries Commission	FY 1965	185	185	370[5,4]
International North Pacific Fisheries Commission	FY 1965	25		25[4]
U.S. Bureau of Commercial Fisheries				
San Pedro	FY 1965	1,879		1,879
Seattle	FY 1965	6,286[6]	5,772[8]	12,058
Juneau	FY 1965	2,215	201	2,417
Total (including duplication)		17,003	11,013	28,017

[1] Classification is unofficial and amounts are approximate.

[2] Large amounts of the receipts shown in Table 5 were carried over or reverted to the general fund. Does not include cost of enforcement.

[3] Prorated according to decisions made at the annual meetings of 1963 and 1964.

[4] Total is for U.S. share of funds only and is assumed to have equaled original allotment.

[5] Source of information is personal communication.

[6] Includes $3,226,000 in construction funds, an unusually large amount.

[7] An approximate breakdown of funds spent on marine resources activities, including an estimated $1,572,000 for marine recreational fisheries. Includes enforcement.

[8] A majority of these items is for the culture of chinook and coho salmon, species which are of great interest to recreational fisheries.

[9] Includes substantial amount—perhaps one-third—spent on services to marine recreational fisheries.

Table 4. Outlays by Fishery Agencies for Food Fishery Research (in thousands of dollars)

Agency	Period	Amount	Source
California Fish and Game[1]	Recent year	1,200	Communication from the Department
Oregon Fish Commission	FY 1964	270	[1962-1964] BIENNIAL. REP. 27-28
Washington Department of Fisheries	FY 1965	948	Personal communication
Alaska Department of Fish and Game[2]	FY 1964	428	[1963-1964] PROGRESS REP. 91
Inter-American Tropical Tuna Commission[3]	FY 1965	392	1964 ANN. REP. 10
International Pacific Halibut Commission[3]	FY 1965	187	National Canners Fishery Information Bulletin 172 (Sept. 4, 1964)
International Pacific Salmon Fisheries Commission[3]	FY 1965	370	*Id.* at 172
Bureau of Commercial Fisheries[4]			
San Pedro	FY 1965	1,686	Personal Communication from Regional Officer of BCF
Seattle	FY 1965	2,943	*Id.*
Juneau	FY 1965	1,831	*Id.*
	Total	10,255	

[1] A rough approximation.

[2] Entire outlay by the Division of Biological Research, which includes a small amount devoted to game and sport fish investigations; FY 1964 used because Division of Biological Research was incorporated into divisions of Commercial Fisheries in FY 1965.

[3] Assumed to have been devoted entirely to research or investigations, although a small amount was spent by each commission on business.

[4] Includes funds spent on research in: biology, technology, exploratory fishing, gear, and river basins.

Table 5. Official Agency Research Publications on Marine Food Fisheries and Environment by Class (1960 to 1965 inclusive)

Agency	Series	Methods and background	Regulation or service	Environmental maintenance and resource conflicts
CFG	California Fish and Game	92	30	21
	Bulletins	10	9	1
	Biennial Reports		3	
	Administrative Reports (mimeo)		12	31
	Cal. Coop. Fish Invest. Reports[1]	53	8	
	Total	155	62	53
OFC	Investigational Reports		1	1
	Status—Columbia River Fisheries[2] (mimeo)		6	
	Technical Bulletins			
	Oregon State University		2	
	Biennial Reports		3	
	Total		12	1
WDF	Research Bulletins			2
	Fisheries Research Papers	1	3	1
	Fisheries (book)		26	19
	Annual Reports[3]		6	
	Total	1	35	22
ADF&G	Research Reports	2		
	Statistical Leaflet		6	
	Informational Leaflet (mimeo)	17	41	8
	Annual Reports[3]		1	
	Progress Reports[3]		1	
	Total	19	49	8

PMFC[5]	Bulletins	2	12	
	Annual Reports	2	46	8
	Total	4	58	8
IATTC	Bulletins	30	20	
	Annual Reports[3]		6	
	Total	30	26	
IPHC	Reports[4]		12	
IPSFC	Bulletins		5	2
	Progress Reports (mimeo)	2	3	2
	Annual Reports[3]		6	
	Total	2	14	4
INPFC[6]	Bulletins	13	18	
	Statistical Yearbooks (mimeo)		6	
	Annual Reports[3]		6	
	Total	13	30	
BCF[7]	Fishery Bulletins	11	6	8
	Fishery Industrial Research	7	5	
	Special Scientific Reports—Fisheries (mimeo)	41	19	20
	Commercial Fisheries Review	2	38	1
	Circulars		8	
	Total	61	76	29
	Grand total	285	362	125

[1] A publication by California Department of Fish and Game with contributions from many sources. Personnel from the California Department contributed 12 of the publications and personnel from the Bureau of Commercial Fisheries in California contributed 9.
[2] Prepared jointly with the Washington Department of Fisheries.
[3] Contains many short articles about fisheries and departmental activities which were not counted separately.
[4] Annual reports and investigational reports are in a single, numbered series.
[5] Most publications originated in state agencies.
[6] Count is for publications by U.S. authors only; most publications are by BCF personnel. Note: Includes articles about marine sport fisheries.
[7] BCF authors published also in INPFC series and in Cal. Coop. Fish Invest. Reports.