Early Management of Alaskan Fisheries

In the pre-Russian period, Alaskans were either Eskimo, Indian, or Aleut, and the individual tribes or villages managed fisheries according to customs, religion, or tribal law. There was some concept of resource ownership, and, in some cases, various individuals were given the right to harvest from specific streams or areas to their own end. Native subsistence harvest during this era has been estimated at over 12 million salmon annually.

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Following the initial Russian landings in Alaska in 1741, came a period of exploration and exploitation by traders of various nations, but primarily Russia. Their initial target was fur, with fisheries serving primarily a supportive (subsistence) role, though there was some minor commercialization. The Russian government chartered the Russian American company in 1799. At that time, the only efforts directed at managing the fisheries were those made by certain commercial interests to exploit the resource to the exclusion of others.

When the United States purchased Alaska in 1867, Alaska was made a customs district under the U.S. Treasury Department. Later, the U.S. Commission of Fish and Fisheries carried out studies on the fisheries resources of Alaska but did not take an active management role; only one agent and assistant were provided to enforce the law and monitor the fisheries along Alaska's 33,904 miles of shoreline. Even though the fisheries were nowhere near as widespread or complex as they are today, obviously little attention was being paid to management of individual stocks, let alone areas. The first cannery was erected in southeast Alaska in 1878 and the fishery expanded rapidly from that time.

Until the 1930's, detailed research and investigation of Alaskan fisheries consisted largely of individual forays by investigators looking at fisheries or fish stocks in various specific areas of Alaska without any overall comprehensive program of fisheries management investigation. These early investigations did, however, raise the danger signals that unless something was done many stocks in Alaska could be expected to decline. These concerns resulted in a series of Federal actions to protect the stocks. Very few of these were adapted

The Canneries and Salmon of Alaska

When the Russians first arrived in Alaska, they, like the Natives, made use of salmon for subsistence. Toward the end of their occupation, they began to develop markets for salted salmon, especially with California and the Hawaiian Islands. The Russians harvested the red salmon in the two major systems closest to their settlements—Karluk River (Kodiak Island) and Redoubt Ozerskoi (near Sitka).

Soon after the purchase of Russian America by the United States in 1867, limited commercial fishing began, especially at Karluk, on Kodiak Island, and in southeast Alaska. There, a pioneering individual or partnership would build sheds or small cabins beside a red salmon stream, handmake barrels from the local timber, harvest the salmon with nets, and salt them in the barrels.

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Soon rumors reached the Pacific Coast that salmon abounded along the 2,000 miles of coast from southeast Alaska to the Bering Sea. A few individuals formed companies to take advantage of the bountiful resource and hurried north. The North Pacific Trading and Packing Company constructed buildings near the Klawock River, on the west coast of Prince of Wales Island in 1878, the same year that Cutting Packing Company began filling cans at Old Sitka.

Alaska remained an unknown land, and others waited to see the outcome. It took 4 years before San Francisco entrepreneurs again ventured to the north. In 1882, Alaska Packing Company moved the Cutting Packing Company's equipment to Cook Inlet. That same year two local salters found investors to incorporate Karluk Packing Company and to put in a cannery at Kodiak. The incredibly abundant red salmon runs of Bristol Bay—at that time well off the shipping lanes—were not exploited until 1884 when Arctic Packing Company, incorporated again with San Francisco money, made a trial pack. It took 5 more years before the Copper River red salmon caught the eye of those who incorporated The Peninsula Trading and Fishing Company. Originally, red salmon accounted for the bulk of the commercial catch, with the most valuable fisheries on the rivers in Bristol Bay and at Kodiak Island's Karluk River.

In the very early days, almost all salmon were caught at the mouths of rivers and streams, generally with a haul

to the individual needs of the salmon stocks but rather broadly addressed management control by prohibiting stream blockages with weirs or nets and setting of nets within certain distances of spawning streams, specifying general weekly closures, allowing for penalties for violations, and adopting gear efficiency reductions. As early as 1903, Federal regulations had already considered time/area closures and restrictions on types of gear and the manner in which they should be used. Unfortunately, these restrictions were not applied in any specific fashion to critical stocks or areas, nor were they capable of adjustment in response to annually changing conditions of the resource.

There continued to be a fundamental lack of information about the resource itself. The managers were in the dark as to what to do to conserve the salmon. It would have been difficult to intelligently manage many of these runs on a flexible basis during the season without such knowledge. Even if more meaningful regulations could have been imposed, there was no practical way to enforce them, as the fisheries management program lacked sufficient human resources for study and enforcement.

Until 1903, the Alaskan fisheries remained under the jurisdiction of the U.S. Treasury Department. In that year, the Alaska fisheries became the province of the Bureau of Fisheries under the new Department of Commerce. The Bureau managed the fisheries until 1938. This outside control of fisheries regulations, coupled with outside commercial interests, led to a three-cornered struggle over the fisheries resource among the Federal government, the canning companies, and the residents of the Territory of Alaska.

One of the critical reasons given for the decline of the salmon fishery was the lack of limitation on the total amount of the fishing gear. It had been pointed out that as the resource deteriorated, competition for the available fish increased in intensity, which put even more pressure on declining stocks. In the absence of the knowledge to flexibly restrict the harvest and/or limit the amounts of gear, further deterioration was inevitable. Numerous regulations were created to limit the efficiency of certain gears in the hope that the harvest level could be reduced in that fashion. As recently as 1950, for instance, power gear was prohibited in Bristol Bay. Areas where harvesting could occur with greatest efficiency were often closed to commercial fishing. Underlying all was a desire to foster concern for a resource then dominated by an atmosphere of cutthroat competition.

Out of the controversy and the concern for the status of the salmon resource, the White Act of 1924 was adopted. The White Act specifically stated in a phrase, later adapted for the Alaska Constitution but directed at the fish trap fishery controversy, that within Alaskan waters, "No exclusive or individual rights of fisheries shall be granted." This set the tone for the next 50 years by depriving the fisheries managers of the right to limit the amount of gear in the fishery.

The White Act also had several other potentially important sections, such as giving broad authority to the Secretary of Commerce to limit catch, size and character of gear, and seasons. It specified the weekend closure of 6:00 p.m.

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seine. Company fishermen payed out nets, varying in length from 100 to 400 fathoms, in a circle using a large skiff, with the shore end of the net attached to a dory near the tide flats. Men on the beach hauled the net in, forcing the salmon into the "bunt" or bag in the central part of the net. The concentrated fish were dipped by net or pughed into waiting skiffs. In areas where the haul seine proved impractical, fishermen used gill nets.

Soon canning companies flocked north and Alaska salmon flooded the market. Small operators found themselves in financial troubles when the price fell or their packs would not sell. Two consolidations came out of this: The Alaska Packers Association and the Pacific Packing and Navigation Company. When the latter failed in 1904, its assets were purchased by Northwestern Fisheries. Alaska Packers Association dominated the salmon industry in most of the regions for a number of years. Over the years, numerous acquisitions of plants were made by the well known packing firms of Libby, McNeill & Libby, Pacific American Fisheries, New England Fish Company, and Nakat Packing Company.

During the first decade of this century, more and more salmon were canned as new plants opened and existing facilities expanded. This trend continued and accelerated during World War I, when a tremendous demand and rapidly mounting prices brought many new companies into the field. The number of canneries increased from 81 in 1914 to 135 in 1918. In the postwar economy, the number rose still further to 146 in 1920.

The 1920's proved to be the decade of expansion, with the location of new processing units based on the local availability of fish. As time was vital in transporting, holding, and processing any type of salmon, canners could reach out only a very limited distance to maintain acceptable quality.

In Southeast, where the supply came from many small and widely scattered sources, the perishability problem encouraged the growth of smaller plants. An average of 67 canneries operated during the 1920's in Southeast, compared to 43 in the Central district and 29 in the Western district. In 1929, thousands (and in some instances over 100,000) cases of 48 cans were put out in each of 156 canneries, the most to operate in one year in Alaska.

The intensity of harvest continued into the 1930's, and the high point in the fishery came in 1936. However, the number of canneries had decreased to 118, mostly because of consolidation of operations by some of the large packing companies and the failure of a number of small operators.

Where did all the fish come from? At

Saturday to 6:00 a.m. Monday of each week in all areas of Alaska, and for the closing of traps during closed seasons. It authorized stiffer penalties for violations, including the seizure of gear. The White Act also prescribed 50 percent escapement level for streams where there were weirs, gateways, or other means by which the number of the runs might be counted or estimated with substantial accuracy.

Prior to 1924 the regulations had had little effect on conserving the salmon resource because of a lack of knowledge or enforcement and the White Act was hailed as the potential savior of the resource. Unfortunately, the long-term effects of these expanded powers were not enough to offset the decline of the resource. A precipitous decline of the fishery as a whole started in the early 1940's and reached a low level during the 1950's.

Many investigators have pointed out that individual stocks of salmon had been declining, even prior to 1900, and that the cumulative effect of the decline on these individual stocks over time reduced the fishery as a whole. Additionally, Alaska went from a relatively mild climatic period in the 1920's and 1930's to a trend of increasingly severe winters in the 1940's and 1950's, culminating with two of the coldest in the early 1970's. There is no doubt that the climate plays a large role in the overall survival of the salmon, but the cause for the severity and length of decline probably still came back to the lack of the manager's ability to predict or assess years of low natural returns and offer the protection required to those specific runs to preserve the broodstock. This lack of information and a management system that did not allow for inseason flexibility in the regulation of harvest intensified and prolonged the decline.

Following attacks on the regulatory policy, the status of the fishery, and the status of the industry, the Commissioner of Fisheries resigned in 1939, and the Bureau of Fisheries was transferred from the Department of Commerce to the Department of the Interior and merged with the Bureau of Biological Survey to form the Fish and Wildlife Service. The Fish and Wildlife Service, and later the Bureau of Commercial Fisheries of the Service, managed Alaska's fisheries during the period 1939-59.

From 1940 to the mid-1950's, liberal regulations were still in place in the face of a declining resource. Many reasons, other than overfishing, were suggested as causing the decline, including predators, overspawning, and other factors. By 1950, the situation had obviously gotten out of hand. Gear was shifting from area to area, maximizing concentrations during the few good runs that did occur. Poaching and illegal fishing were increasing and the more efficient harvest by fish traps, largely in the hands of companies, had intensified the gear and resident and nonresident conflicts. Runs in the early 1950's were so bad that areas of Alaska were declared disaster areas by presidential decree.

Compared with British Columbia, where salmon runs remained healthy, it was evident that poor management had taken its toll, and by 1954, a large increase in the Bureau of Commerical Fisheries budget for more research and enforcement had been instituted. Emergency regulations were adopted and whole areas were closed in the face of poor runs. Area licensing regulations were first imposed in 1956 whereby

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first it was easy to scoop up the returning salmon to such rivers as those draining into Bristol Bay and at Karluk. But intense fishing began to take its toll, and fishermen moved on, searching for and then harvesting fish from every stream in every bay. So long as there were new areas to fish, it was possible for the total supply to maintain a high level even though certain areas were undergoing serious depletion.

Then, because Oriental labor was hired on a guaranteed number of cases, species other than red salmon were processed to fill out the pack. Around 1911, markets for pink salmon were explored, and in World War I, when pink salmon became a staple for the troops, the less colorful salmon became more acceptable to the public. Especially in central and southeast Alaska, canneries began packing mostly pink salmon. Once large power boats with seine nets entered the pink fishery, the open sea—especially in southeast Alaska—could be fished. Packers eventually began canning chum salmon when they found their pack short at the end of the season.

As the fish became scarcer, fishermen developed other gear to catch the salmon efficiently, such as setting a gill net with one end anchored to the shore, instead of drifting the net from a boat. In southeast Alaska, to meet the demand for coho and king salmon for the mild-cure and frozen markets, a troll fishery developed. At first, fishermen rowed small boats and hand-reeled in the gigantic king salmon. Next came power troll boats, and in the late 1940's, power gurdies hauled the lines.

No fishing gear caused more bitter conflicts than the fish trap which became illegal in 1959. The biggest controversy surrounded the fact that traps, a device of logs and webbing which led the fish into a holding pen, caught the fish without the aid of fishermen and frequently were owned by the companies.

Traps were regulated, like other fishing gear, and a man opened and closed it during nonfishing periods. These trap watchmen, who lived in a shack mounted in the middle of the device, also kept it lighted at night—a requirement to facilitate navigation. They also attempted to deter trap robbers or pirates who came to steal fish from the traps.

Despite attempted conservation measures, some years not enough salmon returned to make it profitable for fishermen and for every cannery. Packers turned back the lease machinery, tried to sell the remainder, but often left it to rust in place. Today only a few canneries put salmon through the canning line. Most of Alaska's salmon are now frozen or shipped fresh.

fishermen and gear were registered for specific areas and prohibited from moving between areas. These regulations prevented the convergence of mobile fleets upon specific runs of one area after another; however, no limitations were placed on the total amount of gear. At the time of statehood, 1959, the number of fishermen in each salmon registration area had increased to the level which existed prior to the implementation of these regulations.

Concern for the resource and desire for local control led to the formation of the Alaska Fisheries Board and Department in 1949, and the imposition of territorial fish taxes by the Alaska Legislature of the same year. Although this department had no specific authority, it did provide a mechanism for additional scientific research and commentary on Federal regulations and provided the basis for the present Department of Fish and Game.

With Alaska statehood in 1959, fish traps were abolished and other forms of gear rapidly expanded in numbers to fill the gap. In 1960, the management of Alaska's commercial fisheries was turned over to the Alaska Board and Department of Fish and Game, and in particular the Division of Commercial Fisheries. The most dramatic change in the management system from previous eras occurred under Title 16 where the Department of Fish and Game was given the authority to promulgate emergency orders to summarily open or close seasons or change weekly closed periods. This authority enabled flexible inseason management which, coupled with an expanded biological data base built upon the data gathered by the Fish and Wildlife Service in the late 1950's, was perhaps the single most important factor for regulatory rehabilitation of Alaskan salmon fisheries. The Alaska State Legislature passed statutes to regulate licensing and some aspects of allocation of the resource. The Board of Fish and Game became the Joint Boards of Fisheries and Game. The Board of Fisheries holds numerous hearings regarding regulations and policies affecting Alaska's fisheries throughout the state. The board maintains a system of advisory committees to get local input to the making of these regulations.

In April 1973, a bill creating the first comprehensive limited entry program in the United States was enacted by the Alaska State Legislature and signed into law. The overall objective of the legislation is to stabilize the number of units of commercial gear in each fishery allowing for effective resource management and an adequate livelihood for Alaska's fishermen.

In the 1960's there was some recovery and leveling off of the salmon fishery production. There was, however, a short term decline again in the early 1970's apparently due to extremely adverse weather conditions, but again by the latter 1970's, the resource and harvest had increased. In the early 1970's, the Department of Fish and Game undertook an expanded enhancement and rehabilitation program. Domestic fisheries for the king and snow (Tanner) crab and shrimp expanded rapidly in the 1960's. By the early 1970's, the Pacific halibut resource off the coast of Alaska was in serious decline partially due to the incidental harvest of juvenile halibut by the foreign fisheries and perhaps partially related to domestic overharvesting of adults.

The Alaskan commercial, recreational, and subsistence fisheries of the late 1970's and 1980's are a far cry from the challenges facing managers in the 1930's or even at statehood. While our task in the early years seemed just as formidable due to a lack of information, personnel, and program support, the actual magnitude of the management job today is far greater in the number of fisheries and number of species involved. It has grown dramatically with nearly every major finfish and shellfish stock in the state under harvest pressures capable of taking all of the available surplus and more if the management system does not correctly regulate.

The department's research and management program has also grown, although usually at a pace somewhat behind the development of the fisheries themselves. In 1959, when the state was preparing to take over management of its recreational, subsistence, and commercial fisheries, there were 40 professional permanent personnel in the Divisions of Fisheries Biological Research, Sport, and Commercial Fisheries with a budget of less than $1 million. This compares to a budget in 1987 of over $40,000,000 for the FRED, Commercial Fisheries, and Sport Fisheries Divisions, with nearly 400 employees.

There is no doubt that the dramatic recovery of the salmon resources in Alaska to a level where the harvest exceeds even those of the 1930's has been in large part due to improved natural survival conditions and reduction of high seas interceptions, but the effective management of these resources is what both sustains this productivity and has allowed for the appropriate utilization of these tremendous surpluses that are occurring beyond escapement needs. Good stock assessment and the ability to apply this information to inseason management has allowed the department to identify the surpluses as they occur, by major stock unit, and direct the harvest onto those stock units. This is a physical and regulatory flexibility that did not exist in the Federal era or even in terms of management ability during early statehood.

The era of the pioneering naturalists is past. We are now in the era of real fisheries science. The people in the department practicing this science are immeasurably better qualified, trained, and equally as well motivated, as those who initiated the process, and deserve the continued support of the fishing public that they serve, and the legislators and administrators who provide them the funding fuel to continue the job of maximizing the benefit from the resources to Alaskans.

California's Early Fisheries, Research, and Records

In 1870, the year before the U.S. Commission of Fish and Fisheries was established, California's legislature set up its own Board of Fish Commissioners under "An act to provide for the restoration and preservation of fish in the waters of this state." Signed by Gov. H. H. Haight, it was approved on 2 April and three Commissioners were appointed: B. B. Redding, S. R. Throckmorton, and J. D. Farwell. The initial appropriation of $5,000 was used primarily to import new varieties of fish and protect native fishes viewed as valuable food fishes (Bryant, 1921).

California's Fish Commission was appointed to look after the welfare of fish in general, but salmon in particular (Scofield, 1939). Eventually, the need to protect game was recognized, and the Commission was given jurisdiction over game in 1878 and was retitled the California Fish and Game Commission (CFGC).

During its first decade, the Commission was active in introducing several different varieties of both food and game fishes which, at that time, were "regarded as being among the greatest achievements in fish culture and acclimatization" (Shebley, 1911). Among the species introduced were black bass, glass-eyed perch, yellow perch, catfish, tautog, brook trout, saltwater eels, lobsters, oysters, shad, horn-pouts, silver eels, eastern (Atlantic) salmon, rock bass, whitefish, and more, mostly from the U.S. east coast. During 1876-77 an attempt was also made to introduce the awa from Hawaii. Striped bass were successfully introduced in 1879, carp in 1880, and the Commission published its first report on the edible fishes of the Pacific Coast in 1881.

By 1898, six fish hatcheries were operating, along with several egg collecting stations; the Sisson Hatchery alone was handling 16 million eggs at one time. By 1903-04, more attempts were made to introduce the grayling and the land-locked salmon, but without success. An unsuccessful attempt to introduce the ayu from Japan was made in 1920.

One of the first problems confronted by the Commission was pollution of coastal streams by sawdust from local mills. Fish passage around dams was also a problem, and a state law to require such facilities was secured early. A major problem in 1876-77 was the declining run of salmon in the Sacramento and San Joaquin Rivers. On the other hand, shad had become so plentiful by 1885 that the Commission recommended repeal of the closed season on the species.

Politics also was a problem in the latter 1880's and a Board of Fish Commissioners report to then Gov. R. W. Waterman, pulled few punches:

"The work of the [Fish] Commission was progressing very satisfactorily, until disturbed by the attempt on your part [the Governor's] to reorganize the Commission by placing thereon persons of your own selection. This attempted removal of the members of the Commission [Routier and Harvey] discredited the acts of the Commission, destroyed public confidence in the legality of their official acts, and defeated all efforts to an efficient discharge of their duties." (Biennial Rep. State Board Fish Commiss. 1886-88).

Licensing of commercial fishermen began on 21 March 1887 to get a better handle on salmon data and management. By the latter 1880's, the screening of irrigation ditches to protect anadromous fish was gaining increased attention, and problems were also recognized in conflicting county laws regarding the mesh of salmon nets which made law enforcement difficult. By the early 1890's, the sale of fish and game in San Francisco during closed seasons was an important problem.

Early on the CFGC was concerned with scientific investigations, and Biennial Reports often presented articles by such well-known scientists as Cloudsley Rutter, W. M. Lockington, David Starr Jordan, Carl H. Eigenmann and others. Until about 1914, the salmon industry was California's most important commercial fishery industry, receiving considerable attention. In 1897 the U.S. Bureau of Fisheries sent A. B. Alexander to Marin County to study salmon life history—especially first-year stream residency, and that work was later taken over by N. B. Scofield when Alexander returned to duty on the fisheries steamer *Albatross*. The following year, salmon life history was studied by Cloudsley Rutter for the U.S. Bureau of Fisheries and by Scofield for the CFGC. In 1911, C. H. Gilbert of Stanford University studied seaward salmon migrations by marking 100,000 fry, though success was very limited.

In 1912, Charles L. Gilmore was directed to survey State streams and record all available data on fish distribution, and in 1913 the Commission began emphasizing scientific investigation of fish and game problems, with help from experts from the State University at Berkeley and Stanford University. Charles H. Gilbert began a study of the life histories of salmon and trout, while Frank W. Weymouth conducted a study of the life history, abundance, of edible (Dungeness) crabs. In addition, Harold Heath conducted research on clams and Charles L. Edwards studied abalones.

In 1914, a Department of Commercial Fisheries was created within the CFGC, to handle the growing needs of that sector, particularly the developing albacore and sardine packing industries, but also the salmon canning industry. By then, sturgeon had been nearly eliminated

This report was prepared from a variety of early California Fish and Game Department reports and bulletins; views or opinions expressed or implied do not necessarily reflect the position of the Department or the National Marine Fisheries Service, NOAA.

(Scofield, 1939), and salmon were being exploited "to the danger point through mild-curing and canning for shipment" (Scofield, 1939).

Sale of fish in local markets was not a large endeavor around 1914; it was the growing number of canning plants for albacore and sardines that led the new department "to conserve and at the same time assist these industries." Other tunas were only experimentally being packed, and mackerel canning was not developed until 14 years later. Scofield (1939) noted that "The three sardine canneries of 1914 with a combined capacity of one hundred tons per day could be stored in the warehouse of one of our plants of today, and one of our present day fishing vessels frequently delivers more sardines in one boat load than was possible for the entire sardine fleet of 1914."

In 1914 marine recreational fishing was small in scale and unorganized but for a few big game fishing clubs for tuna and swordfish. There was no fleet of party or charter boats, nor were there many shore boats carrying passengers to anchored fishing barges off the coast.

Scofield (1939) also noted that "In 1914 the idea of basing administrative policy upon the results of carefully compiled field studies was not generally accepted as necessary or even possible, but the past twenty-five years have justified the more far-seeing founders of the Bureau." With formation of the Department of Commercial Fisheries, studies began on the life histories and habits of marine fishes, and in 1917, W. F. Thompson was hired to investigate albacore. (Later, he was put in charge of the State Fisheries Laboratory.) According to Bryant (1924), the fishery investigations were modeled after those of Scotland, were unique to the United States, and special effort was made to keep the studies continuous.

A state patrol boat for scientific work was added in 1918, and a system to record fish catch statistics was also initiated. By 1920, the Commission was operating 16 fish hatcheries and 6 egg collecting stations, primarily for salmonids (Bryant, 1921).

Records of California's commercial fish catch date from 1872. Those annual catches, partly estimated, were published in 1879 in the "Report of the Commissioners of Fisheries of the State of California." Surveys of the San Francisco markets were made again in 1885 and 1886, and estimates were made of the landings at San Diego and Los Angeles (Fish Bull. 86).

A law requiring a license to fish commercially was passed in 1909, and in 1911 a law was enacted requiring wholesale dealers to obtain a license and record their purchases—weight and kind of fish, transaction date, and the name of the seller. Records had to be kept in books open to periodic inspection by CFGC deputies. Those records constituted the beginning of California's fishery data statistical system. In 1915 the wholesale dealers were required to submit their data in monthly statements. In 1917, a new law mandated a revised record gathering system. Every wholesale dealer or processor of fish was required to fill out, at the time of purchase, a receipt in duplicate for the fish purchased, showing the date, name of fisherman, weight in pounds of each variety, and the price per pound. A signature was required on each receipt, with the original going to the fisherman. The duplicate copy, for the dealer's records, was to be held for 6 months, from which the state obtained its statistics. This law changed the required record keeping from a set of books to individual receipts of transactions. However, the law provided no original record for the state and the law was modified in 1919 making the receipts to be in triplicate, with the original (white), the duplicate (yellow), and the state's triplicate copy in pink, thus establishing the well known "pink ticket." A later alteration in 1950 added a fourth ticket, orange, for use by the issuing company which expedited the forwarding of the pink ticket to the DFG.

The 1917 California legislature also passed the Fisheries Tax Bill, providing that all packers, canners, and curers of fish and all wholesale dealers in crustaceans or mollusks pay the state a tax of 2.5 cents per 100 pounds of fish received for use in other than its fresh condition, or of crustaceans and mollusks received irrespective of the form in which they are to be used, with the money set aside for use for fisheries patrol and investigation work in the districts from which the revenue was derived.

Other new laws that year gave the State Market Director the power to control the fresh fish markets in the state by fixing the maximum price to be charged by the retailer, wholesaler, and the fishermen for all kinds of fish used

Recoveries From the First Thousand Sardines Tagged

"In the January, 1938, issue [of *California Fish and Game*] (page 69) there was an account of the experimental marking of 964 sardines as a trial to see whether the fish would live with a serially numbered metal tag inserted in the body cavity and to see whether these tags could be recovered from the fish meal of reduction plants by use of electro-magnets. The first 964 marked sardines were released in Santa Monica Bay in southern California in the spring of 1936 with considerable doubt as to whether or not we would ever hear of them again, but we were agreeably surprised and encouraged when one of the tags was picked up a few weeks later by a magnet installed in the fish reduction plant of one of the canneries in southern California. This led us to hope that two or three more tags might be recovered the following season of 1936-1937, but our expectations were more than fulfilled when 57 tags were found that season in the metal scrap gathered by the electro-magnets. Twenty-eight tags were found the following season and 7 more were recovered during the 1938-1939 season so that up to March 31, 1939, a total of 93 have appeared as the result of the first trial marking in the spring of 1936." (Source: Calif. Fish Game 25(3):252-253.)

in the fresh state. Wholesale and retail fish dealers were to buy a license with the revenue therefrom to be mainly used to advertise and popularize the lesser known fishes. The aim was to stimulate the sale of fresh fish which would thereby reduce the cost of fish owing to the larger volume of sales. Yet another bill taxed harvested wet kelp at 1.5 cents per ton, with two-thirds going to the CFGC for patrol work and one-third going to the Scripps Institution of Oceanography for research on kelp—an important source of potash, which Germany had cut off.

The state's early efforts at compiling fish catch and processing data proved to be very good, and the system, with little alteration, has been in use for many decades.

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The Origins of Louisiana Conservation

The first record of the predecessor agency of the Louisiana Department of Wildlife and Fisheries dates back to 1857 when Louisiana's General Assembly (the Legislature) passed a law designed to protect game birds in St. Bernard Parish. Control of this law was given to the Police Jury.

Later, as New Orleans, one of Louisiana's earliest and largest cities, grew, supportive industries developed nearby. One of the most desirable commodities produced was oysters, both for local consumption and for shipping. Demand soon exceeded supply, and more and more people utilized nearby oyster reefs to satisfy this demand.

In 1870, because of numerous complaints that oyster reefs in coastal Louisiana were being rapidly depleted and destroyed, the Legislature passed Act 18, which closed the oyster season from 1 April to 15 September, and provided penalties for taking oysters. In 1871, Act 91 reduced the oyster season closure from 1 May to 15 September.

The first concerted attempt by the state to regulate the oyster industry occurred in 1886 with the passage of Act 106. Patterned after legislation in Maryland, the act divided the state into three oyster districts and authorized the governor to appoint an Oyster Commissioner for each district. The act also authorized the leasing of waterbottoms (3 acres per person) to individuals or corporations and established licenses enabling lessors to harvest and protect their oysters and reefs. Although state laws were now in effect, enforcement was difficult because the local judiciary was responsible for apprehension and punishment of violators.

Act 110 of 1892 abolished the three oyster districts and gave individual parishes exclusive jurisdiction of the waters within each parish. Each parish appointed its own oyster inspector and required its own license. Oysters occurring in each parish were considered parish property and only parish residents were allowed to harvest them. This led to even greater conflicts because of competition and unmarked parish boundaries in open water areas. Enforcement, which continued to be ineffective because of local politics, compounded the problem. The act also increased to 10 acres the amount of waterbottom available for leasing to one person.

In 1900, the legislature, realizing the ineffectiveness of the current oyster policy, appointed a legislative investigative commission composed of two senators and three representatives to study the industry. Their report to the General Assembly in 1902 resulted in the adoption of Act 153 which created a five-member Oyster Commission of Louisiana and gave it statewide control over the industry. The commission, which first met on 11 August 1902, later became the Oyster, Waterbottoms, and Seafood Division, the first and therefore oldest division of the Department.

The plight of our once abundant natural oyster beds was not the only thing coming under scrutiny around the turn of the century. Led by President Theodore Roosevelt, a national conservation movement was gaining strength. This interest in conservation was brought together at the Conference of Governors called by President Roosevelt at the White House on 13-15 May 1908. In calling the conference, Roosevelt stated: "There is no other question now before the nation of equal gravity with the question of the conservation of our natural resources."

In response to a call by Roosevelt, and at the insistence of the late Governor John M. Parker, a friend and hunting companion of the president, the 1908 Louisiana General Assembly created, by virtue of Act 278, the Board of Commissioners for the Protection of Birds, Game, and Fish. This board was given authority to appoint game wardens and fund their activities by requiring licenses of everyone who hunted game.

The first headquarters for this new agency was New Orleans, because of the importance of this area to commercial fishermen. Oysters, shrimp, fish, furbearers, and waterfowl were then in great demand. Ice and railroad transportation facilities were available in New

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Orleans, and waterways connecting the city with the marsh areas allowed quick delivery and distribution to northern markets.

Under Act 265 of 1910, the Oyster Commission of Louisiana was consolidated with the Board of Commissioners for the Protection of Birds, Game, and Fish, and new officers were appointed to administer its affairs. This Commission, immediately began a thorough investigation of the oyster industry of the state and a new system of management.

In 1912, Act 127 consolidated all activities under the name "Conservation Commission of Louisiana." This commission was constitutionally created as a department of the State Government, provided for the necessary employees and defined their duties and qualifications in relation to the protection of birds, fish, shellfish, wild quadrupeds, forestry, and mineral resources of the state.

This act was amended by Act 105 of 1918, which stated "the Department of Conservation is hereby created. It shall be controlled by an officer to be known as the Commissioner of Conservation. The Commission shall be appointed by the Governor, by and with the consent of the Senate for a term of four years."

This is probably the reason many oldtimers still refer to the "Conservation Camps" or "Conservation Department" when talking about the field stations located at Oyster Seed Grounds, the Port of Entry, and the Marine Laboratory. Also, field personnel working in the coastal areas are sometimes referred to as "conservation men" or "conservation agents."

After rapid growth of this Department, a new and enlarged museum was located at 237 Royal Street. In October 1930, a monthly publication (now the *Louisiana Conservationist*) was available, becoming a quarterly magazine in July 1932.

Public demand shifted emphasis to freshwater fish hatcheries at this time, and hatchery facilities were completed at Bayou Des Allemands, Lake Bruen (sic), Improved Lake St. John, and Beechwood. Of these early efforts, only Beechwood remains active. Freshwater fish preserves were also established or planned for Lakes Ouachita and Bisteneau, and one in DeSoto Parish.

During these years, the first "shell plants" for the production of oysters occurred. Mississippi packers "planted" or deposited 45,000 barrels of oyster shells in Louisiana waters, without cost to the state of Louisiana. Additonally, 12,000 barrels were purchased by Louisiana and donated to Terrebonne and Lafourche parish fishermen as cultch material. The first plantings of shell for rehabilitation purposes in Louisiana were made by H. F. Moore and T. E. B. Pope of the U.S. Bureau of Fisheries in the years between 1906 and 1909. They made a series of experimental plantings in various bays of Louisiana using oyster and clam shell as cultch. These experiments revealed the ability to establish productive oyster reefs, and also pointed out that the presence of conchs (*Thais* sp.) rendered high-salinity areas unsuitable for this purpose.

Recreational interests were also considered by this fledgling agency, as indicated by the construction of the hatcheries. Cooperative efforts included coverage of the Grand Isle Tarpon Rodeo, which was begun in September 1928. John Donovan, Hugh Wilkinson, Alfred Danzigu, and R. J. Howell were chiefly responsible for the foundation of this rodeo. As previously noted, 26 boats participated in the 1935 rodeo. In 1986, at least 260 boats were actively involved.

Commercial fishing was also growing, although somewhat restricted by World War II. The great demand for high quality oysters caused the price per sack to increase from 75 cents to $2.50 in about 4 years. In efforts to increase the area suitable for oyster cultivation, 58,607 barrels of shell were deposited during the summer of 1944—29,185 barrels in Sister Lake, Terrebonne Parish, and 29,022 barrels in Lake Felicity, Lafourche Parish. Leases were puchased from private individuals to provide a state seed oyster reservation in Sister Lake, watchmen were hired, and housing facilities were secured. This allowed continued use of this area for production of seed oysters available to oyster fishermen on a regulated basis. This seed oyster area remains active today, providing a valuable free service to the oyster industry.

Finally, on 7 November 1944, the Louisiana Wildlife and Fisheries Commission was created by the people of Louisiana by a majority of 39,739 votes. On 11 Decmber 1944, then Governor Jimmie H. Davis appointed John G. Appel as the first Commissioner. This act officially created the Commission, or the Department as it is now known. The Legislature and Constitution of Louisiana charged this new agency with the responsibility of protecting, conserving, and propagating the wildlife of Louisiana. This responsibility included wild game, nongame quadrupeds or animals, oysters, fish, and other aquatic life.

To fulfill the legislature mandates, Commissioner Appel established six major programs: 1) Control of the water hyacinth, 2) control of predators, 3) enlarged fish rescue and restocking programs, 4) enlarged education and public relations programs, 5) enlarged enforcement programs, and 6) obtaining public shooting grounds.

In 1944, 33,239 fishing licenses were sold, with funds being utilized to carry out operations of the Department. Several recommendations were also made for future consideration. Among these were establishment of a "Gulf Biological Station." This facility was established in the late 1950's and is now known as the Lyle St. Amant Marine Biological Laboratory. Other recommendations included allowing game fish farming and sale of fish produced, initiating scientific studies of blue crabs, and resuming studies of the commercially important shrimp. These shrimp were then known as four species: the "Brazilian" shrimp (red-grooved), the unusual "white Brazilian" (white-grooved), the "white" or "native" shrimp (common sea shrimp), and the seabob. We now know these shrimp to be only three species, the Brazilian or brown shrimp, the white shrimp (combining the white Brazilian and the common sea shrimp) and the seabob. To provide information to the legislature and also to the citizens of Louisiana, the first biennial report was published in 1946, covering the years 1944-45.

In 1976, the agency name was again

changed to the Louisiana Department of Wildlife and Fisheries.

From initial efforts to protect game birds in St. Bernard Parish, developed today's Louisiana Department of Wildlife and Fisheries. This agency is now responsible for research, management, and supervision of a seafood industry which is the nation's leader. Production of shrimp, oysters, crabs, and finfish was recorded at over 1 billion pounds in 1986. Additionally, recreational interests contribute an enormous amount to the economy of Louisiana while utilizing game management areas, fishing, hunting on public shooting grounds and pursuing other interests which the Department is responsible for.

The Department's functions are basically the same—to conserve, protect and propagate the renewable resources of the state. To accomplish this, the Department is divided into three basic entities—the Office of Wildlife, the Office of Coastal and Marine Resources, and the Office of the Secretary. The Office of the Secretary provides administrative guidance for the Department, Education services, and Enforcement, while the Office of Wildlife insures management for upland game, waterfowl, furbearers, fresh water aquatics, and game birds. Marine aquatics, seismic operations, aviation, environmental matters, and dredge and fill operations are the responsibility of the Office of Coastal and Marine Resources.

Just as the mightly oak shades everything under it with its protective branches, the Department has provided management, research and protection for Louisiana's renewable natural resources for the past 130 years. With the cooperation of Louisiana citizens, this protective shade shall continue.

Marine Conservation and Management in Maine

Maine's Department of Marine Resources, now with four Bureaus (Administration, Marine Development, Marine Sciences, and Marine Patrol), began in 1867 with the establishment of Commissioners of Fisheries. In 1895, the agency was renamed Commissioner of Inland Fisheries and Game and a new Commissioner of Sea and Shore Fisheries was authorized, representing the first clear distinction between inland and coastal natural resources. In 1917, the Commissioner was replaced by a Commission of Sea and Shore Fisheries, and in 1931, the Commission became the Department of Sea and Shore Fisheries and the post of Commissioner was reestablished.

Both the Advisory Council of the Department of Sea and Shore Fisheries and the Atlantic Sea Run Salmon Commission were created in 1947. The State Government reorganization legislation of 1973, the 106th Legislature established the Department of Marine Resources, along with an expanded Marine Resources Advisory Council. Additional duties and responsibilities were assigned to the agency and its Council, along with those which previously were the responsibility of the Department of Sea and Shore Fisheries and its Advisory Council. A new nine-member Lobster Advisory Council was established by the Legislature to assist the Commissioner on matters related to the lobster industry.

The Department of Marine Resources was established to conserve and develop marine and estuarine resources of the State of Maine by conducting and sponsoring scientific research, promoting and developing the Maine commercial fishing industry, and by advising agencies of government concerned with development or activity in coastal waters.

The Advisory Council to Marine Resources was established on 13 August 1947 with the broad responsibility to provide advice to the Commissioner on policy matters affecting the fishing industry and to outline the problems and needs of the segments of the industry they represent. In addition, certain specific duties were established by law in 1973 including the approval of aquaculture lease permits, changes in fishing regulations, and related matters.

The Bureau of Marine Development was created in 1957 and the common theme for all of its divisions and programs is the development of Maine's marine fisheries industries. This theme is addressed, for example, through efforts in restoring lost fish runs (e.g., alewives), groundfish industry expansion, technical gear and fishing technique development, a variety of technical services to seafood processors, and market development through trade and consumer education and assistance. The Bureau is comprised of five major divisions each of which is responsible for several progams: Anadromous Fish, Economic Development, Fisheries Technology Services, Industry Services, and Marketing. The Bureau's activities involve a multitude of issues ranging from marine science to marine education to market analysis.

The Bureau of Marine Patrol, established in 1978 but formerly known as the Coastal Warden Service, is one of the oldest law enforcement agencies in the State and was established to protect, manage, and conserve the renewable marine resources within the territorial limits of the State of Maine. Over the years the Legislature has expanded the areas of responsibility to the enforcement of other laws and regulations of the State of Maine.

The Wardens Service, so named in 1947, was originally established as "Fish

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Wardens" in 1843, who were appointed by the Governor and Council until 1917 when the appointment authority was transferred to the Commissioner of Sea and Shore Fisheries. The Bureau has been an integral segment of the Department throughout its existence. Within the span of two decades the scope of the Bureau's responsibilities have been widened to include many new areas of activity which fall outside the traditional needs of the fishing industry and the marine environment.

Some of the areas of responsibility of the Bureau include, under Federal laws, the Bluefin Tuna Act, Marine Mammal Protection Act, Endangered Species Act, Extended Fisheries Jurisdiction Management and Conervation Act (200-mile limit), and cooperation with various Federal law enforcement agencies. Under State law, other enforcement responsibilities include criminal law activities, Boating Registration and Safety laws, search and rescue, and environmental laws.

The Bureau of Marine Sciences was established administratively in 1946 to provide a scientific basis for the rational use of the marine and estuarine resources of the State of Maine. It is the oldest continuously operating marine research agency in the Gulf of Maine. The primary responsibilities of the Bureau are to: Conduct and sponsor scientific research, develop management programs for the marine and estuarine species under the jurisdiction of the state, provide advisory services to agencies of state, Federal, and local government; provide information and technical assistance to all segments of Maine's commercial and recreational fishing industry, and provide information and education services to the public.

New Hampshire's Marine Fisheries History

New Hampshire's relatively small coast (18 miles) has long supported an active and growing fishing industry. Major estuaries, such as the Great Bay estuarine complex and Hampton-Seabrook estuary, provide habitats for important fisheries resources as well as potential spawning and nursery habitat for many species.

Commercial fisheries are conducted within the major estuarine systems (inland coastal waters) and along the open coast within and outside state territorial waters. The inland coastal waters, especially Great Bay estuary, offer a variety of fisheries. Little Bay and the Piscataqua River support a lobster fishery for both the commercial and recreational fisherman. Smelt, alewives, blueback herring, eels, and crabs are subject to inland fishing during the year. Lobster, groundfish, shrimp, and many other species are caught by larger boats fishing off the New Hampshire coast.

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Early annual and/or biennial reports of New Hampshire's Fish and Game Commissioners provide considerable data on fisheries history. In 1891, reference was made to weir fishing in the Squamscott River. Weirs could not be closer than 2 miles from one another. B. P. Chadwick, detective for the State of New Hampshire, stated in the report: "The long-continued use of the deadly weir in this river is another element of destruction that has been instrumental in reducing the fisheries to their present low condition. The young of nearly all our species of food fish are taken by them, thus it is that millions of young fish are uselessly destroyed. . . Any method of fishing that destroys a large portion of the young fish must be abandoned, if we are to succeed in fish culture."

In 1890, the commissioners called for laws to be amended to cover selling or catching of egg-bearing female lobsters. And detective Chadwick, in the 1893 report, referred to "the construction of the lobster law in connection with the shipments of undersized lobsters to places beyond the state limits," and fines levied for trafficking same. He also discussed the need to regulate trap construction "to allow 80 percent of all the small lobsters now destroyed" to escape. He also spoke of the problem of taking smelt with fine mesh nets in Great Bay and called for regulating the mesh size to allow small fish to escape.

The 1893 report listed 365 persons engaged in commercial fisheries, and 4,354,568 pounds of fish taken for a value of $88,511. It cited a decline in the vessel fishery from 23 in 1880 to 15 in 1889.

The 1928 report noted that $284.77 was spent from a seed lobster account, but no details about the project were given. From then through the early 1930's, virtually no mention was made of marine species. We do know, however, that there were certain lobster regulations in place at that time.

More recently, in the 1948-50 biennial period, a 32-foot ocean-going boat was constructed to patrol the coastal fisheries. And, in 1965, legislation was passed charging the department with the regulation and promotion of all recreational and commercial marine fisheries in the saltwater areas of the state. Monies collected from licenses and fines (for illegally taking clams, oysters, lobsters, and crabs) were henceforth maintained in a separate Marine Fisheries Fund account. The Department saw a great need at this point to do economic evaluation studies, based on sound statistics, to enhance and assess the state's marine resources.

Also in 1965, efforts were made to

control blue mussel beds which had spread to and destroyed certain softshell clam flats; and the Department contracted with the University of New Hampshire to study the soft-shell clam population in Hampton-Seabrook Harbor and the possibility of seed oyster production in Great Bay.

During the 1966-68 biennium, efforts were made to restore alewife runs to the Taylor, Winnicut and Little Rivers in North Hampton; anglers helped tag striped bass to get migration and range data, and scuba diving biologists determined oyster quantities in Great Bay.

During this period a survey was conducted to determine the number of smelt fishermen and average catch at Great Bay. An estimate of total catch was calculated to provide a measurement of the fishery value to the state and an index to smelt abundance. Smelt eggs were collected on burlap trays in Winnicut River, Greenland, and transported to Berry Brook in an effort to reestablish a smelt run.

In recent years the Department has monitored the composition of catch of New Hampshire's northern shrimp commercial fishery; participated in the Gulf of Maine Shrimp Surveys; collected fishery data; monitored for paralytic shellfish poisoning, and much more. Plans for the Great Bay Reserve are currently being developed by the Office of State Planning and Fish and Game. The area will be managed by Fish and Game, with the Marine Fisheries Division hiring a manager and an educator to work on the reserve.

Over the last 6 years, New Hampshire's commercial fishing fleet has grown in both the numbers of boats and the amount of fish caught. Important reasons for these changes are the imposition of the 200-mile fishing limit, the development and expansion of the state's commercial fishing piers, and overall growth of New Hampshire's economy. In 1981, the value of all fish landed commercially in New Hampshire was over $4 million dollars. With better marketing techniques it is expected sales will continue to increase.

Texas' Fisheries: A Brief History

In 1874, the State of Texas recognized problems with some of its fishery resources by passing its first protective law: Restrictions on coastal seining and netting. Some of the concerns voiced during that era included: 1) Recognition of diminishing availability of freshwater and saltwater fishes, 2) recognition of the benefits of a diversified fishery, 3) recognition of the problems associated with the oyster industry, and 4) recognition of the benefits of a fish stocking program.

The "Fisheries Division" of the Texas Parks and Wildlife Department was first set up in 1879 as the "Texas Fish Commission." The Division's primary responsibility then, as now, was to protect and manage the state's aquatic resources.

Also in 1879, the legislature directed that fish ladders be constructed over mill dams, with the Fish Commission to enforce the law. Two years later, in 1881, the state's first fish hatchery, Barton Springs, was built for propagation of the then popular "German carp." However, 4 years later in 1885 the Fish Commission was abolished owing to public opposition to the introduction of the carp and the tightening of game protective laws. (Two years earlier, all Texas counties had claimed exemption from all state game laws.)

By 1887, fishing was restricted in bay areas due to perceived destruction of spawn by seines, and in 1895 the Texas Fish and Oyster Commission was established. In 1897, the legislature outlawed the use of poison, lime, or explosives to take fish in public waters, and a decade later the "Game Department" was added to the Fish and Oyster Commission "provided it could sell enough licenses to pay its own way."

In 1911, the Game, Fish, and Oyster Commission was given charge of shell, marl, and sand management, and in 1913, a new fish hatchery was built in Dallas from the proceeds from the sale of sand and shell. In 1919, there were only six game wardens to patrol the entire state while appropriations for oyster culture were set at $15,000. Another state fish hatchery was built in the mid 1920's, and a dozen more were constructed in the following 25 years that serve both freshwater and saltwater.

In 1937, the Coastal Division was added to the Commission, and in 1938 the first artificial fish pass program began. Then, in 1948, the state's Marine Laboratory was dedicated in Rockport. The word "Oyster" was dropped from the department's name in 1951, and in 1953 the department made its first transplant of marine fish from salt to fresh water.

Saltwater fishermen were first licensed in 1957 and the angling fee was raised from $1.65 to $2.15. Also, a statewide Water Quality Survey was started to combat pollution, and in 1958 an artificial snapper reef was established at Port Aransas. The Shrimp Conservation Act was passed in 1959, and in 1960 saltwater fish were successfully transplanted from the Gulf of Mexico to Imperial Reservoir in Reeves and Pecos Counties.

A major reorganization was accom-

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plished in 1961 as the Game and Fish Commission was set up with a nine-member commission, executive secretary, a staff in Austin, and with five regional headquarters. Then, in 1963, the State Parks Board was merged with the Game and Fish Commission to form the Texas Parks and Wildlife Department with a three-member Commission.

The state joined the Federal Aid to Commercial Fisheries research and development program in 1966 and, 2 years later, the legislature set up the Seafood Marketing Program to inform consumers about Texas' seafood products. By the early 1970's state researchers were making considerable advances in the culture of such marine fishes as red and black drum, Atlantic croaker, flounder, and spotted seatrout, and reported a major breakthrough in hatching 150,000 spotted seatrout at Olmito Hatchery in Brownsville in 1973.

In 1974, research at the Port Aransas laboratory resulted in the first successful redfish natural reproduction in captivity, while the first state saltwater fish harvest survey was initiated in 1974. Shell permits were also revised, with tough dredging rules adopted, and studies were started to protect bay environments.

Limited surveys on sport fishing harvests prior to 1974 provided preliminary data on recreational catches, and in 1974 the TPWD expanded its efforts to survey coastal recreational angling surveys to evaluate catch, fishing effort, types of fish, and fish size as well as gain data on anglers and their fishing gear, baits used, etc.

In 1975 the TPWD established a continuous coastwide assessment of finfish based on a random sampling program, and since, to provide a long-term comparison needed to manage finfish and shellfish populations, they have worked to standardize monitoring programs for the study of fish, shrimp, blue crabs, and oysters. Those studies have provided the basis for action taken by the Commission and the Texas legislature to reverse declines in red drum, spotted seatrout, and oysters.