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Unheeded warnings: A history of Monterey's sardine fishery

Payne, Stephen Michael, Ph.D.

University of California, Santa Barbara, 1987

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UNIVERSITY OF CALIFORNIA
Santa Barbara

Unheeded Warnings:
A History of Monterey's Sardine Fishery

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Philosophy

in

History

by

Stephen Michael Payne

Committee in Charge:

Professor W. Elliot Brownlee, Chair

Professor Richard E. Oglesby

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June 1987

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iii

IN MEMORY OF
Donna Darr Nichols Payne
and
Richard Kent Mayberry

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ABSTRACT

Unheeded Warnings:
A History of Monterey's Sardine Fishery

by

Stephen Michael Payne

This case study focuses on the rise and decline of sardine fishery at Monterey, California from 1900 until 1950. Monterey developed into the most important sardine fishing port on the West Coast of North America and one of the top fishing ports in the world during this time period.

This study is not an attempt to pinpoint the exact reason for the decline of the sardine fishery; scientists are in agreement that natural fluctuations and overfishing led to the decline. Rather, this is a study of the process of managing a natural resource. The State Legislature was responsible for the fishery and relied on California Department of Fish and Game scientists to make recommendations. In addition, the fish processors, canners and fish reductionists, felt that they were in the best position to manage the fishery and exerted a considerable influence in Sacramento. Interestingly, the fishermen themselves had little to do with the management process, basically because they were immigrants who had

little political power and worked, under contract, for the processors.

The philosophical background of both the processors and fishery scientists were different. The fish processors came from a business background that developed during the Progressive Era. Their attempts to manage the sardine fishery were based on scientific management concepts; businessmen, they believed, were the best qualified people to manage an industry. In a similar manner the fishery scientists also came from a Progressive Era background and they too felt that the management of the sardine fishery should come out of the process of scientific management. However, they felt that decisions concerning the fishery should be made in light of scientific evidence, not the needs of business.

One key to the management process was that there was no significant change in the set philosophy by either the processors or the fishery scientists. The result was a constant battle between the two groups over the control of the fishery. The legislature listened to the plight of the fish processors and sardines were overfished before the major parties reached an agreement over the proper way to oversee the fishery.

TABLE OF CONTENTS

	Page
Acknowledgments	v
Vita and Fields of Study	viii
Abstract	x
I. Introduction	1
II. From Maine to California: The Development of Monterey's Sardine Fishery, 1865-1914	34
III. Winning the Battle at Home: The First World War and the Development of Monterey's Sardine Industry, 1915-1919	74
IV. The Growth of the Giant: Technological and Fishing Ground Expansion, 1920-1929	96
V. Controlling the Giant: Investigation, Regulation, and litigation of the Monterey Sardine Industry, 1919-1929	116
VI. Monterey's Golden Years: The Reduction Fishery 1930-1945	162
VII. A Progressive Legacy: Scientific Management in the Corporate Age	199
VIII. La Crise Sardiniare: Unheeded Warnings, 1945-1950s	228
IX. Public Policy During the Sardine Era: A Legacy of Indecision	248
Appendix I	
Sardine Data, Raw Fish to Finished Product	288
Appendix II	
Sardine Data, Prices and Wages Paid in Dollars	290
Bibliography	292

CHAPTER I

INTRODUCTION

[1]

The California sardine fishery remains one of those black spots in the history of the management of a resource. Simply put, from the fishery's inception until the demise of what had grown into the state's largest fishery, no public policy provided for the conservation of the sardine. Not until two decades after the sardines were no longer an economically viable part of California's commercial fishery did the California State Legislature finally pass a law to protect what was by then a commercial fishery depleted to the point of being economically nonviable. Between 1919 to 1946, while lawmakers did regulate the fishery, the laws they passed did not directly deal with conservation issues.

The failure to develop a policy of conservation for the sardine was not due to a lack of knowledge. Scientists working for the California Department of Fish and Game and in other agencies, both public and private, repeatedly warned those who shaped public policy of the dangers inherent in a lack of a strong public policy regarding sardine conservation. These warnings went

unheeded.

Commercial fishing is basically a pre-industrial occupation that has taken on the trappings of the industrial age by incorporating modern machinery, while, the act or art of fishing has remained relatively unchanged. The fish canneries of the early twentieth century, however, shifted their enterprises from cottage industries to modern industrial businesses.

This shift to an industrial fishery virtually eliminated fishermen from the management process of the fishery. Decisions were made, initially, by fish processors, then, after the California Legislature mandated the Department of Fish and Game to manage the state's commercial fisheries, fish scientists joined the processors.

Monterey is the natural place for an examination of the decision making process surrounding the California sardine fishery as this port became, in the decade before the outbreak of World War One, the center of California's sardine industry. Only after the end of the World War Two did Monterey's canneries fail to out-perform those of the rest of the state. Further, during these years, 1914 to 1945, the canners of Monterey usually put up more sardines than all the ports along the Pacific rim of North America. The amount of sardines was so large that Monterey was

California's leading fishing port, for all fish, during eleven of the seventeen years between 1927 and 1944.

The California sardine industry developed during the period in American history known as the progressive era [2] and many of the concepts associated with that time period are found in the history of the sardine industry. In addition to progressive political ideals of good government, the state, like the nation, was deeply involved with the emerging corporate identity of the progressives. [3]

The fish processors, canners and reduction plant operators, sought regulations and controls from the legislature that would help the industry expand. The Department of Fish and Game scientists, however, sought regulations and controls from the legislature that would safeguard the fishery for long term use.

The corporate philosophy of the progressive era was not based on laissez faire capitalism. Rather, the new managers sought protection from cut-throat competition through government regulation and controls. Only through the proper controls, the managers believed, could business prosper and survive. [4]

During the period before and after the beginning of the twentieth century, Americans distrusted government

control while holding high the myth of individual accomplishment. However, Americans were increasingly turning first to voluntary group associations, then to differing levels of government from local to federal for help in solving problems within the newly emerging corporate America. [5] The concept that the role of government in the California sardine industry was to help the industry survive was a crucial element that surfaced many times throughout the history of the industry.

Governmental involvement in private enterprise was not a new phenomenon. Throughout the Nineteenth century state governments became increasingly involved in the regulation and economic well-being of private enterprise. In Massachusetts the state government exercised regulatory powers while subsidizing private business. In Pennsylvania government officials sat as public directors on mixed government and private corporations. Furthermore, in both the North and South, state governments were involved in the nation's railroad and canal systems. After the Civil War all three forms of government: local, state, and federal became involved with railroad construction and reconstruction through loans and land grants. The activity of government becoming involved in the economics of private industry led to government intervention in the field of regulation of business

[6]
activity.

In California, Monterey's sardine canners followed the same path of seeking help through voluntary group associations and, when this action failed, they turned to government intervention, on the canners' terms, to help them survive a particular crisis, but always with the unilateral understanding that the industry would regulate itself once a particular crisis passed. This self-regulation was desirable because only the industry leaders, or so they felt, had the professional background to manage the industry.

One of the key business people in the California sardine industry, Knute Hoveden, was trained at the world's only fisheries college in Bergen, Norway, something even the State's fishery scientists could not claim. The other industry leaders all had practical on-the-job training and considered themselves professional businessmen. As professionals these men were fully within the mold of businessmen in the progressive era.

At the core of the progressive movement were the rising middle-class managers and engineers who sought "to fulfill [their] destiny through bureaucratic means."^[7] That bureaucracy would be the fulfillment of the emerging progressive middle-class is logical considering that by

the advent of the progressive era most of the nation's major industries were already developed and the engineers were left with the chore of transforming the nineteenth century industries into efficient twentieth century producers.

A reliance on efficiency in both business and government led to the development of Frederick Winslow Taylor's philosophy of scientific management. Taylor, an engineer, developed the concepts of scientific management to bring about the highest productivity from workers with the least amount of waste and cost. This, he stated, was

[8] efficiency. His model was based on experiment, measurement, and generalization, which were the concepts of the newly emerging fields of science as taught in the new universities [9] starting in the late nineteenth century. According to Taylor the laws of efficiency that he developed would act like the laws of nature and be [10] above the tamperings of man.

Taylor's revolution in management, which helped to usher out the old family style business of the past while introducing trained professional management to American business, gained a foothold due to the faltering production of American industry at the turn of the twentieth century. Taylor's systematic management would reverse the then current trends of lagging production and

bring about an increase in production without the need to look for extraordinary solutions; rather, a simple reliance on the laws of science would transform America's industrial output. [11] Efficient management was a key for the early success of Monterey's sardine fishery in both the processing of sardines and the catching of enough fish to allow the canneries to run economically.

Taylorism was readily adopted by business, labor, agriculture, and professional bureaucrats in government [12] starting in Theodore Roosevelt's presidency. By Woodrow Wilson's administration government was staffed by professionals who helped to formulate legislation concerning the Federal Reserve and Federal Trade Commission Acts as well as laws as diverse as child labor and scientific agriculture. After writing the new bills the professionals also staffed and counseled the new bureaus created to manage the newly discovered [13] problems.

Again, this phase of progressivism can be found in California. The state government emulated Taylor's ideas of scientific management for the coordination, specialization, and centralization of authority. Trained civil servants were the instruments of a new efficient state government established during Hiram Johnson's

[14]
administration.

The California Fish and Game Commission was already well established by the progressive era and began adding more trained personnel, ichthyologists and other scientists and technicians, to its staff during Johnson's [15] administration. These scientists discovered the life history of the sardine and attempted to use this knowledge to manage the fishery in a scientific manner during the 1920s.

Although scientific management promised and to some degree delivered much to benefit industrialization in the Twentieth century there were several problems inherent in Taylorism. While Taylor promised to lower labor costs for businessmen at least one historian, Gabriel Kolko, has described the concept as a "thoroughly totalitarian [16] philosophy, and merely a rationale for cutting costs," which often meant cutting jobs. And while Taylor wrote that scientific management was equivalent to conservation, Kolko saw the process as one of systematic exploitation of [17] the working class. For another historian, Robert Wiebe, the problem of Taylorism was that there was no effort to look into the morality of what was being accomplished; businessmen and engineers were only concerned with what they could do efficiently to make [18] money.

The general feeling during the progressive era was that trained professionals should manage society. Furthermore, if technology created a problem such as over exploitation of natural resources, then technology could be called into the fight to save the resources. [19] This feeling was all pervasive and the nation's conservation leaders were optimistic in their feeling that science and technology would and could open unlimited vistas for human achievement. Expansion was the byword of the day, rather than retrenchment or limitation. [20]

Part of the problem in understanding the issue of conservation during the progressive era is inherent in the meaning of conservation. The conservationists among the progressives were divided into several groups: preservation versus use, differing attitudes in different sections and regions of the nation, and differences between resource users according to their size and nature of resource utilization. Conservation then was a complex issue. [21]

During the first two decades of the Twentieth century conservation did not mean non-use of a resource, but, rather, the efficient use of a resource. Although conservationists had some doubts about unlimited resources and the possibility of future shortages they remained

opposed to those who would close or withdraw the nation's
resources from commercial development. [22]

Between May 13 and 15, 1908, President Theodore Roosevelt held a Conservation Conference in Washington, D. C. to discuss the future of America's natural resources. Forty-four of the nation's governors were present as well as members of Congress, Cabinet officers, Supreme Court Justices, and conservationists. Those assembled heard addresses on forestry, mineral products, soil wastage, irrigation, and water resources. [23] Charles S. Howe, an attendant, was the President of the Case School of Applied Science and represented the Society for the Promotion of Engineering Education. In an article published in Science later that year he wrote that "...this work of conservation is the work of the engineer." [24] And the President of the American Society of Mechanical Engineers, M. L. Holman, argued for beneficial use of natural resources rather than "uncontrolled greed for gain" [25] after the Washington meeting.

In his first inaugural address California's new progressive governor, Hiram Johnson, argued that:

In some form or other nearly every governmental problem that involves the health, the happiness, or the prosperity of the State has arisen because some private interest has intervened or has sought for its own gain to exploit either the resources or the politics of the state...[26]

In order to stave off private exploitation of the state's natural resources Johnson created the California Conservation Commission and provided the new commission with \$100,000 to hire experts who would study and issue reports concerning conservation issues. The commission was headed by former Governor George Pardee and two other prominent Californians who served with no salary. The Conservation Commission's scientists did, over time, provide the reports necessary to enact future [27] legislation.

As early as 1912 conservationists were adopting the concept that efficiency was part of the Americanization process in all phases of life from industry and business to the greater society. For these conservationists Americanization, scientific management, [28] and conservation were similar concepts. Furthermore, because of their identification of conservation with Americanization, reformers felt that a reliance on college trained experts would eliminate the need to appeal to [29] conscience. The conservation movement appealed to the social responsibility of the professional technician, scientists, and engineer.

Not all conservationists, however, had such faith in the public's or businesses' acceptance of

conservation being on the same level as scientific management or Americanization. Gifford Pinchot, America's foremost forestry and land conservationist, was moralistic in his view of conservation: "The conservation question is a question of right and wrong," he reported. [30]

Perhaps Pinchot was correct as conservationism did not begin as a "broad popular outcry." [31] The public was, at best, not interested and, at worst, opposed to conservation policies. [32] Resource exploitation was the attitude of Americans in all walks of life. "Everyone in the Nineteenth century hoped to make a killing from rising land values and from quickly extracting the cheap, virgin resources of the nation," reported Samuel P. Hays, an American historian. [33]

The conservation movement developed from the disciplines of science and technology. The leaders of the movement were hydrologists, foresters, agronomists, geologists, and anthropologists, among others, who were responsible for directing federal resource policy. They, as trained professionals, were loyal to their professional ideals. [34]

A key element to the conservation movement was the political implication of conservation and how and who should make decisions concerning national resources. There were three basic alternatives to decision making:

partisan politics, compromise between competing groups, or judicial decision. Conservationists felt that experts were the best equipped to make the decisions over resource use, development, and allocation. "The crux of the Gospel of Efficiency," Samuel Hays wrote, "lay in a rational and scientific method of making basic technological decisions through a single central authority." [35] The conservationists believed that technicians, not legislators, should determine the distribution of resources, as they had the scientific training and background to look at the problem objectively. [36] Unfortunately, in the case of the California sardine, the distribution of resources was not done by the experts but through the political process.

The conservation movement grew into three elements: "the technical men, the resource users, and the broad reform-minded public." [37] Problems, however, developed within the movement because of this tripartite alliance. Under the philosophy of scientific management the technicians and resource users tended to try and work together, however, problems developed when the technicians and resource users were in conflict over the best use of a resource. [38] The resource users tended to base their use decisions on their immediate needs. They did not see

beyond their own sphere of influence. When resource users could not agree with the technicians over the use of natural resources, the businessmen quickly turned against the concept of scientific management, as resource decisions would be taken out of the users control. Although the businessmen clamored for financial and technical aid from government they did not want technical experts to make resource allocation decisions. [39]

This background fits within the experience of the California sardine industry as fishery biologists tried to manage the sardine fishery by limiting the seasonal catch, while businessmen within the sardine industry resented and resisted any attempt to stifle their economic development.

California's conservationists mirrored the background of the rest of the nation's conservationists. The state's politicians, unfortunately, did not really understand the scientific and technical aspects of conservation, preferring to speak of "good versus evil." [40] This short sided world view was to hinder attempts to regulate the sardine fishery throughout its life span leading to ineffective and inappropriate approaches to the conservation of the sardine.

Many historians have felt that the progressive movement was an attempt to control private corporate

wealth for public ends. Further, they believed that the conservation movement typified this view. This view, however, does not analyze the broader ideology of the conservationists. Historians felt that conservationists were most concerned with the ownership of resources, when the movement was most concerned with use, not ownership. [41]

In California, however, the leading conservationist, John Muir, was an aesthetician and disagreed with Gifford Pinchot and other progressive conservationists' stand that conservation and use were of equal importance. [42] Muir's stand on the beauty of nature and his outspoken belief that nature should be guarded from commercial interests was one of the reasons that he was not invited by President Theodore Roosevelt to the Washington, D. C. Conservation Congress in 1908. [43] California's progressive governor, Hiram Johnson, however, [44] was a pragmatist and believed in conservation for use.

During the progressive era writers were of the opinion that ownership and use were two dissimilar questions. The issues of conservation were within the domain of science and technology while the issue of ownership fell within the political and sociological sphere of society. [45] These issues would become

important in California as sardine processors, who were most affected by decisions regarding conservation and ownership, argued on these two different battlefronts and did not try to merge the two issues.

Most historians have written that progressivism died with the entry of the United States into the First World War and that the 1920s was a reactionary time controlled by conservative Republicans. However, at least one historian dealing with California disagrees with this assessment. In his article on "The Persistence of Progressivism in the 1920's: The Case of California"

Jackson K. Putnam argued that the progressive era ideology did not die in California with the events of 1917.

[46]

Rather, the Great Depression killed the movement.

Putnam also argued that the progressives of the 1920s felt that the decade was the culmination of their efforts during the pre war years.

[47]

In proving his case Putnam cited George Mowry and others to show that in 1920s Californians passed a progressive tax bill, formed the Progressive Voters' League, voted in two progressive governors--William D. Stephens and C. C. Young--while voting in another progressive, William C. Wood, as State Superintendent of Public Instruction, and voted enough progressives into office to control both the assembly and senate from 1923

[48]
until 1930.

As Putnam demonstrated, an era does not end abruptly. The philosophy, the concepts, and the ideology linger on with those who came of age during a strongly defined era. Neither the businessmen nor the fishery scientists seemed to abandon their beliefs regarding the proper management of the sardine fishery. To the end of the fishery, businessmen remained steadfast that the California fishery scientists were taking the wrong approach to the conservation of the sardines and to the research into the disappearance of the fish. For their part, California's scientists were equally adamant from the beginning of the sardine investigations in 1919 through the end of the 1940s, that overfishing would become and did become the culprit in the demise of the sardine fishery.

This case study is partially concerned with the issues of progressivism as these issues affected a particular industry, the California sardine industry in the state's leading sardine fishing port, Monterey. The focus will be on the emergence of scientific management during this time period. The relationship of business and scientific management to the growth of the biological sciences and the resulting conflicts between businessmen

and the fishery biologists who had their own version of scientific management and who were also trying to conserve the sardine fishery are discussed.

The case of the California sardine industry lends support to several concepts concerning the progressive era: Putnam's interpretation as to the longevity of this period of history; the differing views surrounding scientific management, with the ensuing struggles between businessmen and trained scientists over who should manage the resource; and conservation through use.

While California's progressives achieved success in economics, politics, and social welfare, the conservationists within the movement failed to accomplish [49] what they set out to do in the area of conservation. Perhaps no other single case study dramatizes this as much as the California sardine industry. Here the different branches of progressivism clashed over the true meaning of progressivism. Progressive businessmen, who adhered to the scientific management ideology in their day to day actions, fought bitterly with the state's fishery scientists, who also believed in the ideology of scientific management. The battleground was the issue of the management the sardine resource. In the end the scientists found themselves addressing a pragmatic

audience consisting of elected public officials and the resource was managed through the political process.

In an article written for the Atlantic Monthly, Felix Frankfurter, who was later appointed to the United States Supreme Court by President Franklin Delano Roosevelt in 1939, discussed the issue of "Democracy and the Expert." In Frankfurter's assessment, scientists must be part of government, as society was dominated by science. He went on to write that government, however, should not give up its power to experts; rather, the final determination of any issue must be made within the representative process which leads to decisions being made according to values. Science, according to Frankfurter, [50] was lacking in the values of judgment. He felt that values could only be found within the people who elect the government. Organizational skills, technical skills, and scientific methods are but instruments of government, "not [51] ends."

However true this assessment may be, there may exist issues where the political process can not respond to an impending crisis. Representative government, by the very nature of the political process, tends to listen to those who can make the most persuasive case and too often, in the case of the California sardine, the persuasive case

was that of employment and economics.

The sardine fishery holds a lesson of the results of pragmatic management of a natural resource versus a long range view that realizes that although science may not have concrete proof of overfishing, as was the case of the sardine, the assumptions made by scientists after years of observation and testing are worth more than those made by resource users who base their assumptions on economic necessity.

In many ways the events surrounding Monterey's sardine fishery mirrored what was occurring in other areas of both business and conservation during the progressive era. The historical work concerning the issue of conservation during this time period tends to center around the environment and ecology in the west. However, the topics covered, with a few exceptions, are those of the land: forests, land use, and mineral exploitation.
[52]

Historians have completed very little historical research into conservation issues surrounding the nation's fisheries. Anthropologists have looked into fishery problems, but their interests center on the human dimension of groups and they have not focused much on the questions of fishery conservation. While fishery biologists have made important contributions to the field

of conservation their approach lacks an overall dimension that takes into account the concepts surrounding a particular historical time period, such as the progressive era, as being a variant to the question at hand, which is usually a current problem of conservation, rather than an attempt to explain past problems. [53]

The first historian to publish anything dealing with the history of the sardine fishery was Gerald D. Nash who wrote State Government and Economic Development: A History of Administrative Policies in California, 1849-1933. Nash illustrated the state's feeble attempts at regulating the sardine industry within the larger context of the process of California government. [54]

The only other look into the administrative side of sardine management is a new book by Arthur Francis, McEvoy, III, The Fisherman's Problem: Ecology and Law in the California Fisheries, 1850-1980. McEvoy reported on the changes in the economic development, resource management, and environment of California's fisheries. His study dealt with the early efforts to manage the sardine fishery, and other fisheries, through the legislative process. McEvoy's efforts were primarily confined to the legal issues surrounding the management process of the state's industrial fisheries. [55]

In the years since the demise of California's commercial sardine fishery researchers in various disciplines continue to work on the problem of what happened to the sardines. One of the first of these reports was written in 1952 by Albert Campbell, a former waterfront reporter for the Monterey Peninsula Herald, as his masters thesis, "Conservation of the California Sardine." Campbell's eyewitness account drew principally upon his newspaper stories and the research to date in [56] giving a chronology of the sardine fishery.

Nine years later Earl H. Rosenberg drew upon Campbell's work and the research accomplished during the 1950s on the sardine situation as well as on studies of other fisheries of Monterey, for his master's thesis, "A History of the Fishing and Canning Industries in Monterey, California". Rosenberg's chronology of both the market--fresh fish--fishery and the canning fishery is very useful in placing Monterey's sardine fishery within the context of the area's other fisheries. [57]

In addition to the scholarly work on the sardine fishery, several "table top" books have been published, all concentrating on Monterey, in the 1970s and early 1980s such as John and Regina Hicks' Cannery Row: A Pictorial History and Steinbeck's Street: Cannery Row by Maxine Knox and Mary Rodriguez. More recently two books

were published: Cannery Row: The History of Old Ocean View Avenue by Michael Kenneth Hemp and Tom Mangelsdorf's A History of Steinbeck's Cannery Row. These books are either pictorials or dealt with two subjects--Cannery Row and John Steinbeck. Although he wrote two very fine novels about Cannery Row, both Cannery Row and Sweet Thursday, Steinbeck did not play a role in the sardine fishery. Monterey officially changed Ocean View Avenue to Cannery Row in 1958, long after the sardines were
 [58]
 gone.

Along with the state and local studies there exists one world-wide history of sardines, The Pilchard: Biology and Exploitation, by Michael Culley. Culley identified the differences between the various types of commercially exploited pilchards, or sardines, with information of when and how the fish were exploited and
 [59]
 traced common threads of economic mis management.

In addition to the research completed by historians, two books published in the 1980s detail the history of research scientists and their efforts to help manage fishery resources. The first was a collection edited by Michael H. Glantz and J. Dana Thompson entitled, Resource Management and Environmental Uncertainty: Lessons from Coastal Upwelling Fisheries. Included was an article

by John Radovich, a long-time California fishery scientist, on "The Collapse of the California Sardine Fishery: What Have We Learned?" Radovich traced the general history of the commercial sardine fishery and the conditions that led to the formation of the California Cooperative Oceanic Fisheries Investigations (CalCOFI), which was initiated at the behest of the industry to forestall attempts by the state to enact strict conservation measures. Along with Radovich's article, the collection included several articles detailing the Peruvian fisheries and the effects of the weather condition called El Niño on the anchoveta fishery in that country. These articles were useful as the sardines and anchovies occupy the same ecological space. [60]

In 1981 CalCOFI sponsored a symposium entitled "Reminiscences of California Fishery Research and Management." The symposium gathered together several of the most prominent of California's early fishery scientists who related their own contributions and the efforts of their contemporaries in the management and research of California's fisheries. The articles gave a good insight into the history of scientific research from the 1920s to the present. As first hand data the published collection is invaluable to those studying the history of California's fisheries. [61]

Unfortunately the business records of the canning companies were lost over time. From the 1940s through the 1970s no one thought that an archive of the cannery industry records would be worth establishing. However, in the 1980s the sardine industry, particularly as centered at Monterey's Cannery Row, has experienced an awakening of interest. Michael Hemp of the Cannery Row Foundation has spent several years trying, in vain, to gather together the records from the many sardine processors. The Cannery Row Foundation has turned to conducting oral interviews with the few surviving canners, fishermen, and cannery workers to try and fill in this gap.

This study will attempt to fill in a portion of the gaps in the history of Monterey's and California's sardine industry. The sardine fishery holds a lesson of the results of pragmatic management of a natural resource versus a long range view that realizes that although science may not have concrete proof of overfishing, as was the case of the sardine, the assumptions made by scientists after years of observation and testing are worth more than those made by resource users who base their assumptions on economic necessity.

CHAPTER I: ENDNOTES

[1]

The California sardine is a true sardine, unlike the sardines found in Maine and New England which are a young herring, Clupea Harengus. The two species have different habits, biology, and flavor. Norwegian sardines are also not true sardines; they include not only young herring, but bristling, or young sprat, Clupea sprattus. Although these and other small fish were labeled "sardines" for years by canners, in 1916 English courts ruled that Norwegian "sardines" could not be sold under that label. True sardines in Europe are found in England, France, Spain, Portugal, and Italy. The Atlantic sardine is known as Sardina Pilchardus pilchardus while the Mediterranean type is called Sardina pilchardus sardina. Until 1929 scientists grouped all sardines under the generic name Sardina. California sardines, ranging from Alaska to Baja California were known as Sardina Caerulea. Those along the coast of Peru were called Sardina sagax. The sardine found in Japanese waters were labeled Sardina melanostica, those in Australian waters Sardina neopilchardus, and the sardine found off the Cape of Good Hope in South Africa were labeled Sardina ocellata. (William F. Thompson, "The Sardine of California," California Fish and Game, 7:4, 1921, pp. 193-194). In 1929 Carl Leavitt Hubbs successfully demonstrated that the Pacific sardine was different from the European sardine and placed all these in the genus Sardinops. California sardines were then renamed Sardinops caerulea. (Carl Leavitt Hubbs, "The Generic Relationships and Nomenclature of the California Sardine," California Academy of Sciences, 18:11, pp. 261-265). By the late 1960s scientists were again debating the nomenclature of the California sardine and in 1971 Michael Culley reported that the California sardine will very likely be renamed yet again, this time as a sub-species of Sardinops sagax. (Michael Culley, The Pilchard: Biology and Exploitation, New York: Pergamon Press, 1971, p. 145). For the purposes of this paper the term Sardinops caerulea will be adhered to.

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By progressivism I mean more than the governmental power to deal with social, economic, and political problems created by an industrial society that Jackson K. Putnam wrote about in his look into "The Persistence of Progressivism in the 1920's: the Case of California," Pacific Historical Review Vol. 35 (November 1966) p. 395. Progressivism was also concerned with the development of a new business philosophy that included scientific management and the persuasive feeling expressed by David Herbert Donald in his foreward to Robert H. Wiebe's The Search for Order: 1877-1920 when he wrote about the new middle-class professionals who saw governmental process as one of "continuous involvement." Donald felt that the nation's new professionals were full of optimism that they could plant their new, and correct, values on a nation that came out of the Reconstruction period as "a society without a core." (New York: Hill and Wang, 1967) pp. vii-viii.

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- [20] Samuel P. Hays, Conservation and the Gospel of Efficiency (Cambridge: Harvard University Press, 1959), p. 2.
- [21] Otis L. Graham, Jr., An Encore for Reform: The Old Progressives and the New Deal (New York: Oxford University Press, 1967) p. 207.
- [22] Hays, pp. 2-3.
- [23] Charles S. Howe, "The Function of the Engineer in the Conservation of the Natural Resources of the County," Science XXVIII (October 23, 1908) pp. 537-548, reprinted in Pursell, Readings, pp. 266-267.
- [24] Howe, p. 276.
- [25] Haber, p. 14.
- [26] Olin, pp. 34-35. For the full text of Johnson's inaugural address see Franklin Hickborn, Story of the Session of the California Legislature of 1911 (San Francisco: James H. Barry, 1911) pp. i-xvi.
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- [28] Haber, pp. 61-62.
- [29] Ibid., pp. xi-xii.
- [30] Wiebe, pp. 152-153.
- [31] Hays, pp. 1-2.

- [32] Ibid. pp. 1-2.
- [33] Ibid., pp. 263.
- [34] Ibid., pp. 2.
- [35] Ibid., p. 271.
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CHAPTER II

FROM MAINE TO CALIFORNIA:

The Development of Monterey's Sardine Fishery, 1865-1914

Any history of the sardine fishery necessitates a basic understanding of not only the catch and how fishermen obtained the fish, but also of the canning industry and the reduction of the fish into fish meal, oil, or fertilizer. All three factors--fishing, canning, and reduction--are interconnected and interdependent not only in the California fishery, but other commercial fisheries worldwide.

Although sardines can be used as a fresh fish or reduced to produce fertilizer, fish meal, and oil the sardine fishery initially developed into world wide importance due to the canning industry. In 1804 Francois Appert, a French chef, developed a method of preserving food in glass jars. Patented in England in 1810, the method found acceptance by the Underwood Company of Boston between 1820 and 1825. Until this time the only way to preserve fish was by drying, smoking, or salting, but the Underwood Company successfully experimented with

preserving a small amount of Atlantic salmon in glass
[11]
jars.

At the close of the American Civil War George Barnham, an East Coast cannery owner, visited several canneries in France to learn how to pack sardines. Upon his return to the United States, Barnham began experimenting with small Maine herring in Eastport, Massachusetts. He felt that his herring product, packed in oil, could compete with small French canned sardines. Unfortunately, he was unable to pack his product successfully without the herring going rancid as the process Barnham used did not remove enough moisture from the fish before they were packed in olive oil.

Late in 1870, during the Franco-Prussian War, the New York importing firm of Wolff and Reesing began experiencing difficulty in obtaining enough French canned sardines. Hearing of the abundance of Eastport herring, Wolff and Reesing ordered some for experimentation purposes. After deciding that the small herring was equal to the European product, the firm ordered more for canning in New York. By 1875 the firm's management found that it would be cheaper to can the herring in Eastport than in New York and sent Henry Sellman to Eastport to establish a cannery.

In his boardinghouse kitchen Sellman managed to

put up a few hundred cans of medium quality herring. The new product quickly sold under the Eagle Preserved Fish Company label. Soon other canners entered the business and by 1880 nineteen canneries were operating in several towns in Maine--Robbinston, Lubec, Jonesport, Millbridge, Lamoine, and Camden. The value of the 1880 "sardine" pack (as they were labeled) was \$800,000 in various grades, including "Russian" sardines, anchovies, and sardines packed in oil, mustard, spices, and tomato sauce. Six years later the area's herring fishery supported forty-
[2]
five canneries.

The process of canning fish left up to one-third of the fish weight as waste. Initially the canners had a tremendous problem in getting rid of the fish offal. However, they soon learned that they could reap a profit on the smelly waste product in the form of fertilizer and fish oil.

For centuries farmers used fresh fish as a
[3]
fertilizer. Menhaden were used by East Coast Indians to fertilize their maize crop into the early nineteenth century. The process was used by farmers in the Scandinavian countries and Iceland until 1899.

In addition to fertilizer, Yankees used fish oil to manufacture outdoor paints in the late eighteenth

century. Workers placed fish, usually menhaden, in hogsheads (large wooden barrels, with a sixty-three gallon capacity), then filled the barrels with water. The putrefying action along with frequent stirring allowed the oil to float to the surface so workers could skim it off. The remaining mass was purchased by farmers for fertilizer. The term "fertilizer plant" was still used to describe reduction plants years after fertilizer products became a minor product.

Over the years the process of removing oil was modernized; by 1830 the canners used a boiling method and in the 1850s a steam process brought out more oil. By 1850 the extraction of oil developed into a separate industry independent of the canning industry. The residual products were used for both fertilizer and stockfood. Between 1850 and 1865 fifteen reduction plants were built and operating on the East Coast, primarily in Maine. The oil was used for curing leather, as a fuel oil in safety lamps for coal miners, and in cordage manufacturing. In 1875 Europeans imported menhaden oil to manufacture cheap soaps and for use as a sheep tick repellent.

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With the establishment of successful canning and reduction industries the East Coast fishermen soon found that they needed to develop more efficient methods of

catching fish. The herring fishery in Maine had long depended upon weirs, a system of sticks set into a river bottom to form a fence that diverted fish close to shore where they were either driven into a trap or simply scooped onto the bank by pole nets. While this method was sufficient for the fresh fish and early cannery fishery, the fishermen soon adopted other methods. The same was true in the menhaden reduction fishery.

The single most important net to be developed since ancient times was the purse seine. This net required a large crew to encircle the school of fish with the net using rowboats. Then the fishermen pulled a line on the bottom of the net and the bottom of the net come together like a draw purse, trapping the fish. Once the fish were trapped the fishermen either brailed (the term used by fishermen to describe the process of using a large pole net to move the fish into a waiting boat), or they could pull the entire net into the boat by hand.

Three Rhode Island fishermen developed the first purse seine in 1826. Although requiring fourteen men to set and haul in the net, the new net showed promise as the crew could bring home larger catches than were possible with older methods; however the fisherman, conservative by nature, did not adopt the purse seine until 1850, when

fishermen began using the net for shad, menhaden, and mackerel. Over the next decade more and more fishermen began using purse seines, but only close to the shore in shallow water. In 1862 fishermen discovered that mackerel could be caught in deep water with a purse seine and the net gained wider acceptance.

In April, 1878, Captain Knut Mardurson, a Gloucester fisherman, sailed from Maine on the schooner Notice for Norway. He took a crew of twelve to search for mackerel outside Norway's territorial waters. To make the catch, Mardurson took along a purse seine. Although this venture failed, the Norwegian government took notice and, leery of competition, distributed purse seines among Norwegian fishermen.

The new net quickly spread throughout Europe due to the ability of the purse seine to land large catches. In the English West Country fishermen used purse seines for pilchards, the English term for sardines. The net became the most efficient gear in the Spanish sardine fishery and in Portugal the cercos americanos caught the bulk of the winter sardines and in the summer, horse mackerel, Caranx trachurus. Only in France were the new nets not used, because of a law prohibiting the introduction of improved gear. In the Pacific, the Japanese quickly adopted the purse seine for their

mackerel, tuna, and sardine fisheries. [5]

When California's early fish canners set out to develop the state's fisheries they had the advantage of knowing about the fishing, canning, and reduction technology developed in Europe and on the East Coast of the United States. In the case of the sardine, however, as William F. Thompson, of the California Bureau of Commercial Fisheries (later the Department of Fish and Game), pointed out, California's sardine was a different fish than either the Maine or Norwegian herring and sprat. Further, California's labor conditions were significantly different than those in France or the East Coast. [6]

Still, the state's early canners found that they merely had to fit the existing technology to the conditions of California's fisheries as the California sardine was substantially similar in size, texture, and appearance as the fish canned in the East Coast or European canneries.

California's first fish cannery opened in 1864, packing salmon on the banks of the Sacramento River at the state capital. In 1889 the Golden Gate Packing Company built California's first sardine cannery in San Francisco's North Beach. During the company's three years of operation, workers put up 20,000 cases of sardines in quarter-pound cans, 7,000 cases in one-pound cans, and

7,000 cases in two-pound cans. (Forty-eight cans per case of one-pound cans was the industry standard. The other size cans varied per case accordingly.) Because of the uncertainty of the catch and the dark appearance of the canned product, consumers would not purchase the canned fish and Golden Gate sold out their cannery and business to an East San Pedro firm, the Southern California Fish Company.

In December, 1893, the new firm, under the management of A. P. Halfhill, started canning a small amount of sardines in San Pedro. Two seasons later, in 1895, another cannery began operations in San Pedro but a fire destroyed the plant the following year. The Southern California Fish Company continued to pack sardines caught by San Pedro's fishermen. The canned fish met a ready market in Chicago, Boston, New York, and other Eastern markets where they received the same price as European brands.

Due to the high price for canned tuna in 1906, the Southern California Fish Company started packing tuna. Three years later tuna was the only product the San Pedro firm canned. With a ready market and high prices on the East Coast, tuna remained the mainstay of the Southern California canning industry until 1916.

Over the years several new plants came into

operation in the southern part of the state: Lower California Fisheries Company, Pacific Tuna Canning Company, and Premier Packing Company, all in San Diego; Halfhill Tuna Packing Company, South Coast Canning Company, and Los Angeles Tuna Canning Company operating in Long Beach; and Van Camp Sea Food Company and White Star Tuna Packing Company together with Southern California Fish Company in San Pedro. [7]

By 1895 San Francisco fishermen caught almost as many sardines as the San Pedro fishermen. The fishermen sold the catch to fresh-bait fishermen and to fresh fish markets. While there were other canners in the San Francisco Bay area, they were too preoccupied with the lucrative salmon fishery to divert funds and time to sardines. [8]

In Monterey, however, things were different as the fishermen relied almost exclusively on the Monterey Bay salmon fishery. The Central Coast port was located on the southern edge of the salmon run and by the turn of the twentieth century the fisherman began experiencing shortages of salmon. H. B. Robbins [9] built a fish packing plant on pilings next to the Pacific Steamship Company Wharf, now Fishermen's Wharf, in 1900. Robbins, an established entrepreneur, operated a salmon cannery in

Blaine, Washington and the Twin Brothers Mush Company in San Francisco. The Monterey facility, measuring about forty feet by forty feet, canned smoked herring and sardines in spices.

The uncertainty of the catch, a problem that plagued the industry for some time, was the undoing of Robbins' Monterey enterprise. According to E. B. Gross, an early Monterey canner, Robbins, or Robinson as he is sometimes mentioned, hired fishermen to fish in rowboats off the pier. However, the fishermen landed so many fish that the cannery workers literally could not stand at their stations and process the fish. Because of the large catch Robbins' owed more money to the fishermen than he could make by his cannery's slow processing methods and was forced out of business when he could not meet his debts.

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In the meantime, another entrepreneur, Frank E. Booth, visited Monterey in 1902, and decided to start up a cannery there. Booth and his father owned the Sacramento Packers Association in Black Diamond, now known as Pittsburg, where they were engaged in canning salmon.

Booth, like George Barnham before him, decided to visit the established cannery operations in France during 1903. After seeing several canning establishments Booth decided that the labor intensive methods used in

France, where cannery workers did all of the canning work by hand, were unsuitable for California. In Monterey, labor was simply too expensive for a hand labor operation. Booth felt that mass production utilizing modern technology was the only feasible way to compete with the cheaper foreign brands of canned fish.

After returning to Monterey, Booth opened a small cannery near the present-day Fishermen's Wharf under the management of J. H. Madison. The plant put up 3,000 cases of salmon and sardines during the first year, paying out \$12,000 for cannery labor and about the same to fishermen. [11] Monterey's canning industry started developing into the largest employer in the city.

The year 1903 turned out to be very eventful for Booth. Soon after opening his new plant a fire razed the building. Local market fishermen, who did not like the newcomer Booth, his sardines, or the smell from his cannery, were initially blamed for the fire. Fires, however, were common in the fish canneries as the fish oil soaked the dry wooden buildings and even a small fire soon developed into a roaring inferno. Not dissuaded, Booth bought out Robbins' cannery, located at the foot of Alvarado Street, and operated there until 1940. Now located in a regular canning facility, Booth hired up to

seventy workers during the sardine season, which ran from August 15th to December 15th. That year, 1904, Booth's cannery processed most of the 225 tons of sardines landed in Monterey. Booth paid \$22.80 per ton for the sardines unloaded at his cannery. In addition to cannery operations, fishermen utilized a few tons of sardines for bait.

While Booth intended to modernize his operations, a shortage of capital forced him to run the entire operation with hand labor in the French tradition. During the first three years of operation cannery workers scooped the fish from the boats, as the cannery did not have a power winch. The workers then cut the heads and other body parts off, using the French method of hand-flaking, before placing the sardines in the sun to dry. Workers put the dry fish in wire baskets and pushed them through troughs of boiling oil. After-hand packing the sardines in oval cans, the workers finally hand soldered lids on the cans before placing them in cookers.

Despite the labor intensive methods the new plant was a success, averaging four tons of sardines daily during the sardine run. The daily run of up to 166 cases of forty-eight one-pound cans per case represented a dramatic improvement over the 100 can daily capacity at
[12]
the old lumberyard plant.

In the United States people were used to purchasing only French canned sardines. In order to sell his product on the existing market Booth labeled his canned sardines "mackerel," feeling that mackerel would have a better chance of being accepted. Seven or eight years later the United States Pure Food Commission ruled that he would have to label his cans "sardines." Next to the new plant Booth opened a saloon, perhaps to ease tensions with the fishermen not engaged in sardine fishing. The establishment featured smoked sardines as well as beer. Due to this connection the product became known as "soused mackerel."^[13]

Although Booth was by now established in Monterey as a sardine canner, the work was still very labor-intensive and remained so until Knut Hovden came to work as the plant's manager in 1905. Hovden was born on January 3, 1880, in the shipping port of Bergen, Norway. As a young man he attended the National Fisheries College in his home town. After two years Hovden graduated as a fisheries engineer and technician. For the next five years he lived in Liverpool, London, and in several Continental seaports while working for a steamship company as the supercargo. Chronic throat problems, caused by tuberculosis, forced him to return home where he engaged

in fisheries work for six months before deciding to emigrate to the United States in 1904.

Upon his arrival in the United States Hovden visited several commercial fishing concerns. In Chicago he met with Frank Booth's uncle, Alfred Booth, whom he met while still working for the steamship company. Hovden's next stop was on the Columbia River, where he started his own salmon smokehouse business in Kalama, Washington, on the banks of the Columbia River. Before going into business Hovden worked for a short time as a superintendent for the Sanborn-Cutting Company and was engaged in horse-seineing for salmon. The horse-seineing method is an ancient fishing method developed in Europe consisting of placing a drag net with cork floats along the top out in the water, then using a horse at either end of the net to pull the catch onto the beach.

In November, 1904, while visiting San Francisco, Hovden received a telegram from Alfred Booth in Chicago urging him to move to New York and handle the firm's haddock business. While still in San Francisco Hovden met Frank E. Booth, who promptly offered him a job. Hovden decided to stay in the West but did not immediately accept the Monterey position. Still affected by tuberculosis, he journeyed to Arizona, seeking help for his condition. After a short time his illness improved enough to allow

his return to San Francisco. In San Francisco Hovden worked briefly for the American Can Company. Late in May 1905, Frank Booth again offered Hovden the Monterey position; this time he accepted. [14]

Hovden's education at the National Fisheries College in Bergen, Norway, was instrumental in the development of California's sardine canning industry. When Knut Hovden arrived in Monterey most of the cannery work was performed by hand labor, resulting in a high labor cost of between \$2.25 to \$2.50 per case of packed sardines. Hovden looked for ways to modernize the operation. In 1910 Booth put up money raised from his Black Diamond earnings and Hovden introduced two soldering machines to fix lids on full cans. These two machines increased the plant's output to seventy cans a minute. Further, the machines required only two operators rather than the twelve men who operated the six old machines that produced only sixty cans a minute. Now the plant could handle fifty tons of sardines a day.

Next, Hovden turned his attention to improving the frying method by installing a chain driven conveyer to move the fish through vats of oil mechanically maintained at the proper cooking temperature. Monterey's chief cannery joined the technological assembly line revolution.

The following year, 1911, Hovden worked on developing a mechanical dryer to replace the old method of open air drying. To handle excess catch, known as catch overage, which occurred when the fishermen brought in more fish than the cannery could handle, Hovden installed purse-bottomed brails to lift the catch from the boats. In addition, he installed five holding ponds, or hoppers, each capable of holding ten to twenty tons of sardines. While these improvements were costly to Booth's operation, production rose from about 100 to 1,500 cases daily. In 1912 Hovden introduced the mechanical can cooker and from 1913 to 1918 he experimented with mechanical fish cutters. [15]

Hovden, always the innovator, perfected the mechanical fish cutter in 1918. He also designed a fish suction system that allowed the fishing boats to anchor 300 to 400 yards out in the bay, away from the dangers of the shore. The boats unloaded their catch into floating storage hoppers. When the cannery was ready, workers turned on the suction machinery that pumped water and fish out of the hoppers and into the cannery. With these and other improvements Hovden's Portola brand quickly became the industry's leader. [16]

In 1906 other entrepreneurs began entering Monterey's new fish industry; Harry Malpas and O. Noda

built the Monterey Canning and Fishing Company, also known as the Monterey Packing Company. Their small twenty-five by sixty foot building was the first to be built on Ocean View Avenue, later known as Cannery Row, in New Monterey. Although abalone was the cannery's main product, sardines were also canned by hand.

Two years later James H. Madison, Booth's former superintendent, Benjamin Senderman, and Joseph R. Nichols, with the help of several financial backers, incorporated the Pacific Fish Company with \$100,000 capital. The new enterprise bought out the Monterey Packing company and added several buildings and machines to the older
[17]
operation in 1908.

In 1910 Booth's plant put up 33,000 cases of sardines worth \$225,000 while employing 200 men during the sardine season. The Pacific Fish Company, whose major concentration was still abalone, packed about 4,400 cases, under the Del Monte label, valued at \$30,000. This cannery hired as many as 150 men during the sardine
[18]
season.

By 1913 the two canneries took in three million pounds of sardines a year and produced 73,686 cases of canned sardines. Three years later Knut Hovden decided to open his own plant, Hovden Food Products Corporation,

packing under the red Portola label. Hovden located his cannery on two acres at the far end of Ocean View Avenue. This cannery operated until 1973 and was the last still [19] operating on what by then was known as Cannery Row.

Before the First World War the bulk of the sardine catch went into cans for human consumption. As the industry grew, so did the need to find new markets. Cannerymen found that while Americans were willing to buy limited quantities of French sardines, the home-packed product stayed on grocers' shelves, even though the product was of equal or better quality. The public, however, perceived the foreign canned fish product to be of a better quality than the domestic sardines.

In 1902, Captain Robert Dollar, a major shipper in San Francisco, made a trip to the Far East. In addition to sightseeing, Dollar brought with him several cases of sardines. His objective was to introduce the California product in Japan, China, and the Philippines. Dollar went into native bazaars where, with the help of interpreters, he sold the California product to local shopkeepers. Turning his remaining four cases over to the manager of a Manila import firm, Dollar returned home. Over the following months a few orders came in from China and Japan, which pleased him. Finally, an order of 144 cases came in from Manila for shipment to Singapore.

Canners quickly found that the most enthusiastic buyers of canned sardines were abroad. Monterey's one-pound oval cans were soon found in the Philippines and throughout the Orient, as well as in Cuba, and in Southern and Northern Europe. Captain Dollar's efforts not only rewarded him but the entire industry as well.

From that time on, the orders in the Orient grew to such an extent that by 1925, the export business of California sardines consisted of over eighty per cent of the pack, representing over eleven million dollars annually. Portola, Del Monte, El Capitan, and many other brands became known in the markets of Singapore; Pontianak, Borneo; Batavia, Java; Rangoon, Burma; Colombo, Ceylon; Calcutta, India; and many other cities, towns, and villages. In the Orient canned sardines were sold one-by-one in the marketplace. Merchants placed each fish on a wet palm leaf with a carefully measured amount of the
[20]
canned tomato sauce.

Monterey's sardines began winning acceptance in other forums as well. In 1915 Hovden's sardines won a gold medal at the Panama-Pacific Exposition in San Francisco. Eleven years later, at the Philadelphia Exposition, another gold medal attested to the product's continued quality. The real prize came at the 1929 Paris

International Exposition, where in competition with the long established French sardine industry, Hovden's Portola [21] brand sardines won yet another gold medal.

Waste from the early fish packing plants became a real problem for the sardine packers. In the early days of commercial fishing along the California coast, the trimmings and fish offal were simply dumped into the waters below the processing plants. However, Monterey's Chinese fishermen, who were the area's first commercial fishermen, utilized most of what they caught. The Chinese started using fish waste in the 1870s for fertilizer. Shrimp shucks were used quite successfully by Chinese gardeners in San Francisco and soon Anglo-Americans were using the waste by-product.

In the 1880s wheat was California's chief agricultural product. Over the years as farmers continued to grow only one crop the soil became depleted and wheat farmers in the Point Arena area started using the Chinese fish fertilizer. The mixture increased the wheat crops from thirty to forty percent. Although the waste product seemed to work miracles, the high price of \$8 to \$12 per ton discouraged many would-be users. Undaunted, the Chinese merchants simply shipped the sun dried product in 300 to 400 pound bales to China, where the fertilizer [22] found a ready market.

Twenty years later, at the turn of the century, the Excello Grease Company of San Francisco began collecting fish scraps and offal from fresh fish markets. The company shipped the fish waste to Hawaii where the Hawaiian Fertilizer company mixed whale meat with the San Francisco product to produce a commercial fertilizer and sold the fertilizer to Hawaiian farmers.

By 1900, California's orchardists realized the need for fertilizer and actively sought out new sources. Soon commercial firms entered the fish fertilizer business. The Miller and Lux Company's slaughter house in San Francisco mixed dry meat offal with dried fish scrap and marketed the resulting fertilizer. In 1914, on McNear's Point on San Pablo Bay, Max N. Schaefer built a plant for \$15,000 to handle salmon and buck shad offal from the G. W. Humme cannery at Benicia. In addition to fish offal and scraps, Schaefer's plant used shark and skate in the round, whole fish, to produce fertilizer.

Around the turn of the century H. B. Robbins' Monterey fish plant converted sardine and herring waste, as well as whale and shark carcasses, into oil and fertilizer. [23] Robbins had to convince skeptical city officials that his reduction operation would not produce obnoxious odors, a problem that persisted throughout the

history of the sardine fishery in Monterey. Once Robbins cleared his plans with the city, he began working on his combined fish-packing house and reduction plant. Farmers in the Salinas and Pajaro valleys bought Robbins' fertilizer to use on their sugar beet farms. In addition, Robbins had a plant at Blaine on Puget Sound that contracted with Claus Spreckels, the sugar magnate, to furnish fertilizer to his Hawaiian Island sugar plantations.

[24]

Although Robbins' plant utilized fish waste and offal for fertilizer and oil the other fish packing and canning facilities at Monterey took a different approach to the waste problem--they hired men to haul their waste to sea and dump it. This process created friction between the processors and civil authorities. City officials were afraid that the waste would endanger the health of citizens, should the fish offal wash up on shore--a frequent occurrence on the beach at the Del Monte Hotel. A. D. Shepard, the General Manager of the Pacific Improvement Company, which was the real estate improvement section of the Southern Pacific Rail Road, became concerned that the pollution of the hotel's beach would hurt business and in 1907 requested that the canneries not dump their waste at sea. This and the City Health Department's concerns, in addition to the hauling costs of

\$3.00 a ton, caused F. E. Booth to look into the
[25]
problem.

In 1910, only one enterprise in Monterey, made fertilizer and fish oil, Robbins having been out of business since 1903. This was the Monterey Fish Canning Company, located on Ocean View Avenue opposite Prescott Avenue on McAbee Beach. The plant was owned by three Chinese entrepreneurs, Charley Chin Yip, Jeung Yurn Tai, and Lee Chong. The Chinese seemed to solve the fish offal problem and Monterey's canners gave the Monterey Fish Canning Company all their fish waste for free. The canners were spared the trouble and expense of dumping their waste and Monterey had a reduction plant. The Chinese developed what was to become the most important portion of California's sardine industry as well as what was to become the eventual downfall of the fishery--
[26]
reduction.

Reducing to meal and oil is the cheapest way to process fish. Rather than having a lot of cannery workers handling the fish from the fresh state through finished cans, the product is moved by conveyor belt to an oil press, then to the cooker to make the dry meal. The oil is pumped into railroad tank cars and the finished meal is transported by a suction pipe into sacks. The entire process, from the unloading of the boats to the

loading of the tank cars and gunny sacks takes only a fraction of the workers required to can fish.

Although Monterey's canners were enthusiastic about the Chinese fish reduction plant, Monterey's citizens complained to the City's Board of Trustees about the odor problem caused by the plant. The Board referred the problem to the Health Board, the first of many such complaints voiced by both citizens and the press about the odor problem at waterfront reduction plants.

The following year, 1911, Booth, after seeing that the Chinese were able to make a profit in their reduction plant, began experimenting with reduction. In 1912 the company installed equipment and the next year they operated the first floating reduction plant, or floater, in California, anchored next to the cannery. The floater was a converted lime-kiln barge, the Newark. Both lime and fish waste were dried in a similar manner, in large drums rotating over a flame. The next year, in 1913, the company moved the floater up to the Pittsburg plant to operate for one more season. After Monterey's canners decided to enter the reduction business the Monterey Fish Canning Company found that they were cut out of fish offal and went out of business.

Booth and other canners experimented with reduction machinery in an effort to come up with the most

efficient means of reduction. In 1915 Booth designed and installed, at the Pittsburg plant, a type of spiral cooker that remained the mainstay of the reduction industry into the 1950s. The cooker consisted of a large perforated drum that rotated over a fire. Workers placed the fish offal into the drum cooker which dried out the product. These and other innovations were quickly copied by other canners up and down the coast. [27] Unfortunately for Monterey's citizens the odor problem persisted, much to everyone's dismay, and remained the cause of many complaints to City officials.

While Booth, Hovden, and others were able to make ready use of the technological advances during the early phase of Monterey's sardine fishery the fish processors were still dependent upon the "luck of the fishermen." Although the canners, like most businessmen shortly before the First World War, actively developed technological innovations, their counterparts, the fishermen, were slow to adapt to change.

When Knut Hovden arrived in Monterey in 1905, the fishing fleet consisted of a motley collection: 3 gasoline-powered boats, 175 lateen rigged sailboats, and a few old whaling rowboats. Some days the fishermen would catch only a few tons, yet on another day they could swamp

the canneries. While canners modernized their plants, the fishing fleet had hardly changed since the introduction of lateen rigged boats, a very old Mediterranean development.

Albert Campbell, the waterfront reporter for the Monterey Peninsula Herald, interviewed several old-time fishermen in the late 1930s and wrote about the development of fishing in Monterey. From his informants Campbell learned that early fishermen used the chinchola, a type of beach seine developed in the Mediterranean. The men set out the net using a row boat. Then the crew hauled in the net, hopefully with fish, by hand onto the beach. This type of fishing is very limited but provided several tons of sardines to the canneries when needed. Another method was the use of gill nets. Fishermen strung out the nets where they thought fish would pass and, if lucky, the fish would become entangled in the mesh. This method proved to be very unsatisfactory as the fish were usually brought in slightly damaged and could not be used for fancy packing.

In addition to the chinchola and gill nets, the purse seine was introduced to the Monterey fishery in 1903. Purse seines were first used on the West Coast by Chinese salmon fishermen on Puget Sound in 1886. Sardine fishermen fishing for San Francisco's Golden Gate Packing Company used the net in California in 1890. The purse

seine allowed the fishermen more flexibility as once a lookout spotted a school of fish from the crow's nest of a boat the fishermen could encircle the fish and trap them with the pursing action of the net. The new net quickly won acceptance by fishermen all along the coast.

Due to the size of the possible catch using a purse seine, row boats were replaced by gasoline powered boats built especially for purse seining. In 1893 the first purse seine boat, the Alpha, built in San Pedro, began to ply Southern California waters for the Southern Fish Company. Two other boats entered the Southern California fishery in 1895 and 1896, but fished for only a few years.

Purse seines became the mainstay of Monterey's sardine fishery between 1903 and 1905. The fishermen liked the large tonnage the net allowed them to land and the newly developing canneries found, in the net, a reliable means of keeping well supplied with fish. Fishermen set out to fish in the early morning or evening hours and occasionally at night when the luminescence could pinpoint a school of sardines. Fishermen working for Booth's cannery used a Sacramento River seine boat, a light craft featuring a double end and capable of carrying both the net and catch. The net was 12 fathoms deep and

200 feet long, consisting of one-inch mesh. The heavy net required ten men to pull it in. Although a purse seine was supposed to be able to trap the fish, the net worked so slowly that fish could easily dive under the mesh when the fishermen used the net in deep water. [28] In 1905, F. E. Booth's head fisherman, Pietro ("Pete") Ferrante, convinced his boss that a Mediterranean net would solve many of the problems inherent to the purse seine.

Ferrante, a Sicilian, was born in 1867. At the age of nineteen he boarded a cattle boat destined for America in order to escape the poverty of Southern Europe. Working in the fishing industry, Ferrante managed to save enough money to buy his own fishing boat. After his boat burned Ferrante moved to Monterey in 1904, becoming Booth's head fisherman.

While working with the difficulties of the heavy purse seine, Ferrante remembered a net he used as a boy in Sicily, the lampara. The word lampara came from Lampo, or lightning, and was just what Monterey's sardine fishermen needed. In 1905, Booth sent to Tangier for such a net. When the net arrived, Ferrante took his crew and the new net onto the bay. Unfortunately, the cording was old and the new net tore when the men tried to capture a load of sardines. Undaunted, Ferrante and his crew constructed another net, using the original as a pattern. This second

net performed just as Ferrante predicted. Although a success, old-time fishermen bitterly opposed the introduction and use of the lampara net.

After the fishermen put pressure on state legislators, a bill was introduced in 1913 to outlaw the net. The fishermen told their Sacramento representatives that the Lampara would indiscriminately scoop up small as well as large fish which would lead to a scarcity of sardines. The legislature asked the Fish and Game Commission to investigate the net and the Commissioners, in turn, asked Norman Bishop Scofield, the state's leading fisheries scientist, to conduct an inquiry. Scofield reported that 1) only the gill net fresh-market fishermen were in opposition; 2) the rationale they presented to legislators was faulty; and 3) the gill net fishermen could not economically compete with the lampara for sardines. The real problem was that the gill net fishermen did not want to spend the money to purchase the new net, yet without the lampara these fishermen could not bring in the tonnages that the canners required and the canners were cutting back on contracts with the gill net fishermen. The matter died in committee after Scofield concluded that the affair was "an economic contest rather than one which has to do with the conservation of the

[29]
fisheries."

In 1904 Monterey sardine fishermen caught 200,000 pounds of sardines for Booth's cannery, using the purse seine and gill nets. Booth paid the fishermen \$5,130 for the season's haul. After the introduction of the lampara net fishermen landed over four million pounds of sardines worth about \$27,000. Three-quarters of the catch came from the new nets while fishermen caught the remaining catch with a beach seine. By 1920, the fishermen caught 3,000,000 pounds of sardines for Booth's plant using only lampara nets. Until 1913, fishermen used the purse seine during the day as they spotted the schools by watching where the fish were jumping. At night the crews switched to the new lampara nets. A man stationed in the rigging could locate the sardines by the luminescence or phosphorescent glow given off on a moonless night. The lampara remained in the California fishery, totally replacing the purse seine by 1913. This was partially due to the latter's expensive upkeep, but, more importantly, nine men with a lampara could do the work of twelve with a purse seine.

[30]

The lampara nets were between 150 and 200 fathoms long and fifteen to twenty fathoms deep and had total capacities of twenty to thirty tons per catch. Launches carried the nets, while the fishermen loaded the

catch onto barges, which fishermen called a lighters, which were towed behind the launches.

The early lampara boats' limited cruising radii forced the crews to fish close to their home ports. This limitation, however, was not detrimental in the Monterey sardine fishery as there was an abundance of fish within Monterey Bay for the twenty to thirty ton capacity lighters to hold. Even so, until the canners fully developed their plants' capacities, they were forced to impose a nightly catch limit of ten to twelve tons as the cannery workers were unable to process full loads from all the different crews. [31] Although the canners had the technology to expand production lines their markets were limited in the years before the outbreak of war in 1914.

The catch limitation did not affect the earning power of the fishermen who worked for wages, not for shares. Had the fishermen worked for shares their earning power would have been limited by the catch quotas, however, as they worked for wages they made the same amount of money no matter how much, or little, they brought into port. During this early phase of sardine fishing the canneries owned both the boats and gear, while the fishermen worked on a contract basis with an individual canner.

Developments in motorized fishing craft toward the end of the nineteenth century and the beginning of the twentieth century affected the Monterey sardine fleet. The first steam trawler in California began to fish waters around San Francisco in 1885. By 1893 gasoline engines began replacing sails and from 1909 to 1915 most fishing boats either converted or were built with gasoline engines. New five-ton boats powered with fifteen to twenty-five horsepower gasoline engines cost up to \$2,500. But the benefits outweighed the cost. Fishermen no longer were at the mercy of the ever-changing wind. They began making one day trips out to what were formerly remote fishing areas. Diesel-powered engines, introduced in the 1920s, did not have the same revolutionary impact on the fisheries, but they did make the boats safer, since gasoline-powered craft occasionally blew up. [32]

During this time, Pietro Ferrante encouraged more and more of his countrymen to come to Monterey. He wrote to friends and relatives in Pittsburg and the Sacramento River fishery as well as in Sicily, urging them to come to Monterey. The canneries always needed good fishermen. Before the First World War, Ferrante managed to save enough money to build a two-story home on Van Buren Street, overlooking Booth's cannery. He also took a trip home to Isola delle Femmine ("Island of Women") to

marry. The Ferrantes boarded many of their countrymen
[33]
until they too could buy a home of their own. Due to
his activities in helping his fellow countrymen enter the
Monterey fishery and his achievements in developing
fishing techniques, Pietro Ferrante was regarded as the
patriarch of Monterey's Italian fishing community.

In addition to fishing careers, Monterey's
canneries offered jobs in their plants. Cannery workers
were paid by piecework, allowing experienced workers to
earn at least \$5.00 a day. One old-time Chinese fish
cleaner earned up to \$11.50 a day while other cannery
workers earned from \$7 to \$8 per day. Depending upon the
size of the catches, Booth's 150 cannery workers averaged
\$16 a week during the five month season in 1909.

In 1909 Monterey's sardine fishermen made
\$15,000 for the season's catch from Booth's plant, while
salmon fishermen took in \$45,000 for their seasonal
efforts. Booth's plant, which was the biggest, paid an
additional \$36,000 to cannery workers during the salmon
and sardine season. The economic impact on the city had
an effect on Monterey's officials, who were reluctant to
do much about the constant complaints from non-industry
citizens about the persistent odor problems around the
canneries.

By this time Booth's cannery had a daily capacity of twenty-four tons of fish. The workers managed to can about 22,000 cases of sardines, in the one-pound oval cans, forty-eight cans to the case, in 1909. In 1915 Monterey's fishermen landed 2,000 tons of sardines and the cannery workers packed 75,000 cases of sardines. Monterey's fishing fleet boasted 400 fishermen by 1916 in both the canning and fresh market fisheries.

The following year Monterey canners, who were members of the National Canner's Association, established an inspection service to insure the quality of their product. [34] In advocating inspection of canned sardines the canners were imitating the actions of American meat packers who entered the export business in the last half of the nineteenth century. The meat packers found that their business was hindered due to irresponsible packers who shipped bad canned meat to Europe. After European nations banned meat from the United States in 1879, American exporters realized that something had to be done. In 1884 the United States Department of Agriculture established the Bureau of Animal Industry to prevent diseased beef from being exported. Under pressure from major meat packers Congress passed a law in 1891 to insure the inspection of exported meat products and in 1906, after strong lobbying by the packers, Congress passed

another bill that authorized \$3 million annually for
[35]
government inspections.

By 1917 both the canneries and fishing methods were modernized and the canners realized the potential for even larger seasons, if they could find the outlets.

In 1915, Frank Booth told a reporter that ninety
[36]
percent of his business went to Germany. Indeed in most parts of the world one could find the oval cans containing Monterey sardines. While the sardine business was, by 1915, a growing industry, world events, already in motion, would shortly intrude on this small California town of 6,000 people with such an impact that both the town and its main industry would never again be the same.

CHAPTER II: ENDNOTES

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CHAPTER III

WINNING THE BATTLE AT HOME:

The First World War and the Development of Monterey's Sardine Industry, 1915-1919

By 1915 all the major ingredients of what would shortly become a giant industry were in place. In Northern California the sardine cannery owners and operators completed the technological developments in cannery operations that remained almost unchanged until the demise of the industry. The tuna canneries of Southern California lay idle during the winter months when the tuna moved into southern waters and would welcome the additional revenue from packing sardines. [1] Fishermen were ready with gear and boats that were quite capable of sustaining an increase in fishing effort. The market for West Coast sardines, however, was limited due to American consumer buying habits prejudiced in favor of imported French sardines and the limitations of European and Asian markets to absorb more canned sardines than were already being supplied by European and American canners. All that was needed for the sardine industry to

expand was the right occurrence, either at home or abroad.

The event that actually pushed the sardine fishery into the limelight of American and world fisheries was the outbreak of the European war in August 1914. One would hardly associate a war in Europe with the formation of a world-wide important fishery in the isolated and relatively unknown fishing port of Monterey, but the war quickly changed the character of the West Coast's sardine fishery. The transition from a small industry into a giant occurred almost instantaneously.

Like the Great War itself, the Monterey sardine fishery grew from a series of events that were, at first, centered in Europe. As, one by one, the European powers marched their sons off to the trenches, food became a critical commodity. So vital was the need for new food sources that even neutral countries played a role in the battle over sustenance.

France quickly moved to halt the export of sardines and other foodstuffs in order to feed the army. Soon American consumers found their grocers' shelves bare of French and then Russian sardines. Furthermore, in 1915, Norwegian canners in Stavanger found that they could command higher prices for canned sardines in Europe than in the United States. The following year, 1916, became known as the "golden year" because of the high prices the

combatants were willing to pay for the Norwegian canned product. These events fostered the development of many new canneries in the Norwegian fishing ports during 1916.

Although the Norwegian canneries took in even greater orders for their product over the next two years, 1917 and 1918, their shipments actually fell off due to the scarcity of materials--tin plate, olive oil, and fuel oil. In addition, labor unrest and the influenza epidemic cut into the workforce. Finally, in a desperate attempt to get the Norwegian product to its army, Germany shipped tin plate to Norwegian canneries to enable them to make cans and operate their plants. In the meantime, however, the Allied blockade took full effect and Norwegian canners found that they were unable to get the tins of sardines back across the North Sea to Germany. By 1918, the new [2] Norwegian canneries began to close, one after another.

At the beginning of European hostilities, Frank E. Booth reported that his cannery shipped ninety percent of its canned sardines to Germany. Unlike Norwegian canners, who suffered from the British blockade, Booth was able to shift his sales to the home market filling the gap left by French, Russian, and Norwegian sardines being utilized by the combatants. Soon other canners in Monterey and Southern California joined Booth in the

expanding sardine business. In 1915, one new cannery began packing sardines; the following year the eleven Southern California tuna canneries entered the sardine industry and an additional three new plants came into [3] operation.

Monterey's waterfront teemed with activity in 1916. Several canneries started processing sardines for the first time. These operators made their contributions to the existing canning and fresh fish industry in Monterey. One of the new facilities was the E. B. Gross Cannery.

E. B. Gross came to Monterey as a penniless San Juan Bautista farmboy and worked in the new fish canning industry. By 1916 Gross had saved enough money to open his own cannery, which remained in business until 1940.

That same year, 1916, Frank Booth's plant expanded operations spending \$9,000 for construction of a new dock and a salmon splitting house, as well as for additional canning machinery and equipment. The Pacific Fish Company, under Benjamin Senderman's leadership, installed new machinery and made several changes costing the firm \$4,000. The owners of the San Francisco International Fish Company built a \$3,000 building to handle fish on the city wharf. A. Napoli, a wholesale dealer, spent \$1,000 for a collecting and shipping house,

also on the city's wharf. Joseph Rodriguez spent \$1,000 to build a sardine packing plant in New Monterey, where Hovden's and the Pacific Fish Company were located.

Rodriguez planned to produce a new product, pickled and pressed sardines, packed and shipped in thirty-five pound barrels, which were also made in the plant. In addition, Bito Bruno's plans for a fish packing house on the city wharf were complete. The new plant, estimated at \$1,500, would allow Bruno to move out of the Western Fish Company's facilities where he was then operating. [4]

The following year, in 1917, Monterey's Chinese community interested Chinese capitalists in Oakland to join them in the establishment of the Bayside Canning Company. When the 1918-1919 season opened twenty-six new canneries sprang into action. [5]

Responding to the wartime opportunities, California's canneries put up 150 million pounds of sardines in 1918. The fishermen and canners came under the control of government price fixing during the war years. The price per case of sardines actually went down to \$7.25 for one pound ovals packed in tomato sauce. However, the increased production more than made up for the losses.

The United States Food Administration

authorities also fixed the price paid to fishermen at \$15 per ton of delivered sardines that were over seven and one-half inches. This was the only food product that did not increase in cost during the war years. [6]

In order to remain in business the new canneries required increased annual catches which Monterey's fishermen were eager to fill. During the 1917-1918 sardine season Monterey's fishermen landed 23,005 tons of sardines worth \$345,075. In 1917 Monterey's sardine canners put up 331,065 cases of one pound oval cans (or the equivalent) each case packed with forty-eight cans. The value of the pack to the canneries was about \$2,483,000. The following season, 1918-1919, the fishermen landed 36,100 tons of sardines worth about \$541,500. The 1918 catch produced 593,315 cases of canned sardines valued at approximately \$4,450,000. The catch jumped to 43,090 during the 1919-1920 season with the fishermen receiving \$538,625 for their efforts as their price per ton decreased from \$15 to \$12.50. The cannery workers packed 798,566 cases of sardines worth \$5,989,245, a record case pack that lasted until the 1925-1926 season. [7]

After increasing numbers of "swelled" cans began to appear, indicating spoiled contents, government inspectors began insuring that Monterey's sardines met

quality standards. The inspections were a success and the
[8]
numbers of bad cans declined.

In a bid for new markets for sardines the California State Council of Defense's Committee on Zoological Investigations urged that sardines be utilized by consumers as a fresh fish, as well as canned. As fresh fish, sardines sold for only five cents a pound in the San
[9]
Francisco markets.

California's sardine canners began trading with the Allies--Great Britain, France, and Italy--in addition to opening new accounts in the United States. When the United States finally entered the war on April 4, 1917, citizens were asked to cut back on their consumption of beef and substitute fish which further bolstered the growing industry.

From January through February 1917, the United States began experiencing food shortages. Prices of staples--grains, breads, meats, oil, sugar, and milk--rose weekly. The situation was so bad that urban housewives
[10]
led food riots in February 1917.

With the passage of the Lever Food Control Bill of 1917, Herbert Hoover, the Director of the new Food
[11]
Administration, declared meatless and breadless days. Americans were urged to "win the battle at home" through

newspaper advertisements and editorials as well as through posters pasted up throughout the land. In the California Fish and Game Commission's journal, California Fish and Game, picked up the theme stressing the patriotic duty of each citizen to comply with Hoover's decree by eating fish rather than red meats. [12]

As early as 1916 canners began working with the United States Bureau of Fisheries and canning grayfish, or dogfish, for human consumption for the first time. In the past these fish were not used at all by the American public. This project was initiated by the Bureau of Fisheries with an appropriation of \$25,000 to develop new food fishes. American consumers quickly bought up the canned grayfish and by January 1917 several Pacific Coast sardine canners became involved in the project. In addition to grayfish, the appropriation helped develop new markets for skates, rays, whiting, black cod, grindle, goose fish, Alaska herring, and other previously unused species. [13]

On August 10, 1917, a Presidential proclamation mandated licensing for all food packers, effective on November 1, 1917. [14] The government wanted to insure that food packers would adhere to wartime restrictions. In response to this edict California's Food Administrator, Ralph Merritt, issued a proclamation on November 1, 1917,

requiring all wholesale fish distributors, brokers, and commission men to obtain licenses from the agency. To further control food production in California the Food Administrator's office relayed a message from Hoover's office stating that all commercial fishermen must be licensed by the agency by February 10, 1918. [15]

In another effort to control and stimulate the fish catch, the Food Administration announced the removal of local fishing restrictions that tended to limit the types and amounts of fish that could be caught or that limited the places fishermen could fish. Furthermore, the federal government was removing local restrictions that prevented "free and full development of seafood production." In addition to local laws, state laws could also be rescinded during the war. [16]

The Food Commission reported that these actions were needed because some states prevented non-residents and aliens from fishing in their waters. Further, the federal agency attacked closed seasons and restrictions on purse seines. These measures, the agency reported, "should largely increase the supply of seafood by spring of 1918."

In an attempt to placate state officials, who were concerned with the conservation of resources, the

Food Commission tempered the proclamation by inserting a closing paragraph stating that the Food Administration would protect the fish supply for the future and prevent the extinction or reduction of the nation's valuable species of food fishes. Nonetheless, the report caused a certain alarm in various California state fishery agencies that were fearful of any lessening of fishing restrictions.

To further explain their position in California, officials from the United States Food Commission and the United States Bureau of Fisheries met with the California Fish and Game Commission on March 2, 1918. After a presentation from W. C. Crandall, of the Scripps Institute, on the conditions in California's fisheries, the California Food Administrator's staff declared that California's laws did not prevent or hinder the development of the state's fisheries. Subsequent reports indicated that only minor instances of local restriction were singled out for change by the Food Administration in
[17]
California.

During the war both industry and farmers created a tremendous demand for reduced fish oil, fertilizer, and meal resulting in a Congressional study on fertilizer and a study by the United States Department of Agriculture on fish oil by-products. As a result of the demand and

attention the price of sardine meal soared to \$60 a ton
[18]
while the reduced oil sold for \$1.10 a gallon.

At the beginning of the European conflict Booth's reduction plant was the only such plant operating in Monterey. After the first year of the war Max N. Schaefer, the San Pablo Bay reduction operator, located another reduction plant in Monterey. Schaefer obtained his fish scrap from the new canneries that started up during the war bonanza.

In 1917 the first continuous reduction operation in California came into operation at Booth's Monterey plant. The following year six other Monterey canners decided that they could not afford to pass up this golden opportunity and added reduction facilities to their
[19]
plants.

While the war years brought on an unprecedented expansion of Monterey's and California's sardine fishery, with the end of hostilities on November 11, 1918, Monterey's canners could only wait for the expected collapse of their businesses. With peace at hand they would soon be facing renewed competition from European canners. To add to the canners' woes, jobbers and other speculators began storing millions of cases of sardines in the last year of the war expecting to reap a tremendous

profit if the war continued.

The post-war depression of 1920-1921 and the hoarding of wartime sardines combined to depress the canned fish market. Soon canners found the markets in the United States and overseas glutted with the speculative
[20]
sardines.

In an attempt to ward off the expected post-war collapse in the canned sardine trade, California canners increased a practice that ultimately led to disaster for the fishery--reduction. In 1919 canners claimed that most of the sardine catch was of inferior quality and unsuitable for canning purposes; in reality, the cannery operators were trying to engage in the only lucrative aspect of the sardine fishery that was available, the
[21]
reduction of the catch to oil and meal. E. B. Gross, one of Monterey's early canners recalled:

We threw away more than we saved. When the war was finished, we thought we were all through. Then we learned the lucrative reduction game. In order to get material for meal and oil, we needed the waste material, so we brought in all the fish we could and sold the canned goods for \$2.16 a case.

...the low price acquainted the world with the best and cheapest food put up in a can or any other way.[22]

With a ready market for reduction products canners soon found that the greatest profits in sardines were not in canning as the price per case fell from \$7.50 during the

war years to \$5.89 in 1921 and down to \$3.98 in 1924.
Packers began reducing more and more of the catch. [23]

In 1916 Monterey's canners and reduction plants produced 249 tons of the state's total of 535 tons of sardine meal while producing 25,563 gallons of sardine oil, which was all but 500 gallons of California's total production of sardine oil. By 1919 Monterey's reduction business rose to 3,812 tons of a state total of 11,153 tons of meal while Monterey's sardine oil production rose to 341,173 gallons of the state's total production of 514,262 gallons of oil. However, by 1925 the Monterey sardine processors produced 7,105 tons of the state's total of 22,936 tons of sardine meal and 1,246,561 gallons of a total of 3,150,041 gallons sardine oil. [24]

During this same time period while the production of canned sardines rose the figures clearly indicate that reduction played an increasingly important part in the industry. In 1916 Monterey produced 97,100 cases of one pound oval cans out of the state's total of 106,745 cases. Three years later Monterey's canners packed 798,566 cases of sardines out of 946,069 cases packed in California. Finally, in 1925 Monterey's canners packed 737,743 cases of the state's total of 1,687,780 cases of sardines. [25]

By the 1925-1926 sardine season canned sardines brought the Monterey packers \$4,404,000 while the reduced meal and oil added \$1,110,000. The reduction profits were paying for almost all of \$1,490,000 in wages paid to both fishermen and cannery workers [26] leaving the canners with good profits even after they paid their other operating expenses.

Although studies in the United States and Europe demonstrated as early as 1875 that fish meal was valuable as a stock feed, prejudice and custom prevented the use of fish meal for feed until the war years. With the resulting high demands put on corn, barley, wheat, and other ingredients used in stock feed, farmers began to reconsider the use of fish meal.

During the war California's Petaluma poultrymen turned to salmon meal, but the Alaskan product's oil content was much too high resulting in a fishy flavored fryer. The process utilized by both Frank Booth and Max N. Schaefer eliminated the oil problem in sardines. The oil was utilized in various industrial processes such as paint, glue, and lubricating oil.

The war years found farmers feeding the fish meal to cattle, swine, and chickens. In southern California, orchardists used the meal for fertilizer in their orange groves. [27] Sardine canners found that they

could utilize the offal, spoilage, and catch-overage that they once dumped into the sea.

In response to the increasing numbers of sardines being reduced by the packers the Fish and Game Commissioners asked the the California Legislature to intervene in order to conserve sardines for human consumption. The Commissioners were worried that the fish would be overfished and not commercially available. In 1915 and again in 1919 the legislature passed bills giving the Commissioners the authority to set catch limits on sardines and salmon. However, both Governor Hiram Johnson in 1915 and Governor William D. Stephens in 1919 vetoed [28] the bills.

Governor Stephens did, however, sign the 1917 State Fish Exchange Act, which was the first to be successful of many such attempts to curb the runaway sardine fishery. The act was brought about as a result of several factors: Fresh-fish fishermen selling food fish to reduction plants which could potentially cut down on the availability of fresh fish for consumers, the uncertainty of the fresh-fish catch, a war-time desire to utilize fresh fish rather than red meat, and finally to stabilize fresh-fish prices which were adversely effected by the prices offered to fishermen by reduction operators.

Although the act was challenged and appealed in Paladini vs Superior Court, (178 California 3690), the State Supreme Court upheld the constitutionality of the law. [29]

Part of the act declared that the state, acting for all the people, had the "ownership and title to all fish found in the waters under the jurisdiction of the state." By establishing ownership of the state's fish, the state declared that it could regulate the taking of fish within California's waters which extended three miles from shore. [30]

Using the same approach as the 1917 law, the legislature passed the California Fish Conservation Act, also known as the Sardine Reduction Act, in 1919. During the debates over the measure the Legislative Committee on Fisheries decided at first to outlaw the use of any edible fish in reduction plants, but the committee was persuaded, by canners, that some overfishing was unavoidable, that canning machinery did break down, and that some fish were unfit for human use. The committee finally decided to leave the matter of reduction in the hands of the Fish and Game Commission. [31]

With the passage of the 1919 Fish Conservation Act the Fish and Game Commissioners began to realize that they were trying to serve two distinct groups that were often at odds over the use and conservation of the state's

fishery resources. One group--industry--felt that the Commissioners should continue to represent and help them overcome what was becoming, by 1920, a depressed industry. The other group--conservationists, who were made up of sports fishermen and fishery scientists, both in and out of government service--were concerned with the future of the sardine as a viable source of food for game fish and as a viable commercial fishery. They felt that any action taken by the Fish and Game Commission should [32] foster conservation.

Under the new law the Fish and Game Commission could report the following year that fishing solely for reduction purposes had ended and that over-catch and waste [33] was reduced. Even with more reliance on legally permitted reduction after the war the number of fish canneries and packing plants in California fell from fifty-seven in 1919 to forty-two by 1921 and finally to thirty-four by 1923. Not all of the canneries that went out of business were shut down, however. Some were bought out by other processors who continued operating them.

The shutdowns coupled with increased labor unrest was caused, in part, when Harris Weinstock, the State Market Director, set the price of fish too low which, according to the fishermen, caused further layoffs and the

number of cannery workers to fall by fifty-five percent
[34]
from 1919 to 1921. The situation in Monterey appeared
grim.

CHAPTER III: ENDNOTES

- [1] William F. Thompson, "Historical Review of California Sardine Industry," California Fish and Game, 7:4 (1921):196.
- [2] Ibid., pp. 198-199.
- [3] Ibid., p. 203.
- [4] Ibid; Monterey Peninsula Herald, February 18, 1952; California Fish and Game, 2:3 (1916):154.
- [5] Thompson, p. 203; Monterey Peninsula Herald, February 18, 1952; California Fish and Game, 2:3, p. 154; Sandy Lydon, Chinese Gold: The Chinese in the Monterey Bay Region, (Capitola, California: Capitola Book Company, 1985), p. 386-387.
- [6] Twenty-Seventh Biennial Report of the Fish and Game Commission, 1920-1922, (1923):63; Monterey Peninsula Herald, Ritch Lovejoy interview with E. B. Gross, 28 February 1952; Thompson, p. 204; Annual Report of the United States Food Administration, (1917):147-150.
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- [8] Wilfrid Sadler, "The Bacteriology of Swelled Canned Sardines," American Journal of Public Health 8 (1918):216-220 in Arthur Francis McEvoy III, "Economy, Law, and Ecology in the California Fisheries to 1925" (Ph.D. dissertation, University of California, San Diego, 1979), p. 369; Thompson, p. 203.

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- [14] Reports of the United States Food Administration and the United States Fuel Administration, 1917, 65th Congress, 2nd Session, House Resolution, Document 7837, pp. 22-23.
- [15] California Fish and Game, 4:2 (1918):94-95.
- [16] Ibid.; Annual Report of the United States Food Administration for the Year 1918, p. 34.
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- [18] Albert H. Ahlstrom and John Radovich, "Management

of the Pacific Sardine," A Century of Fisheries in North America, ed. Norman G. Benson, Special Publication number 7 (Washington, D. C.: American Fisheries Society, 1970), p. 186; McEvoy, pp. 370-371; Thompson, p. 195-206; 1921 California Statutes 459; N. B. Scofield, "Commercial Fishery Notes," California Fish and Game, 7:3 (1921):174; "Report of the Department of Commercial Fisheries," Twenty-Eighth Biennial Report of the Fish and Game Commission, 1922-1924, pp. 48-49; B. D. Marx Greene, "An Historical review of the Legal Aspects of the Use of Food Fish for Reduction Purposes," California Fish and Game, 13:1 (1927):2.

[19]

Greene, p. 2.

[20]

Monterey Peninsula Herald, Lovejoy, 28 February 1952; Twenty-Seventh Biennial Report, p. 63.

[21]

Ahlstrom and Radovich, p. 186; McEvoy, p. 369; Thompson p. 195-206.

[22]

Monterey Peninsula Herald, Lovejoy, 28 February 1952.

[23]

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[24]

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[25]

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[26]

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[27]

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[28]

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[29]

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[34]

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CHAPTER IV

THE GROWTH OF THE GIANT:

Technological and Fishing Ground Expansion, 1920-1929

As a result of war expansion many extractive industries, such as mining, lumber, and agriculture found [1] that they were over-extended during the early 1920s.

In the California sardine industry the worsening economic conditions of 1922, due to oversupply, caused the price of fish to decline and boat captains, or the canners who owned boats, laid off fishermen. In 1919 Monterey boasted forty-five lampara crews consisting of approximately 400 sardine fishermen. At any one time during the early 1920s, however, due to the post-war depression within the sardine fishery, only three to twenty-nine sardine crews actually fished for the seven canneries in operation.

By 1924 many of Monterey's sardine fishermen left for the Alaskan salmon fishery, or were forced into other occupations. The result of the uncertainty of the bearly 1920s meant that when the economic conditions in [2] the sardine packing plants improved, in the mid 1920s, the packers kept encouraging more boats to fish, when the

capacity of only a few would suffice the needs of the canneries. The packers claimed that by having many boats fishing, with limits on their individual catches, the canneries could operate more efficiently as the sardine loads were spread throughout the various shifts of the packing plants. The fishermen, however, facing low prices and imposed limits, often overfished in the hopes of selling the excess for reduction purposes. Further, when experienced fishermen returned to the sardine fishery they placed additional economic pressure on the fishing
[3]
fleet.

With the passage of lenient reduction laws in the 1920s the packers began allowing the sardine crews to leave port without a quota. As the boats began arriving back in Monterey during the 1925-1926 sardine season with loads of fifty to sixty tons, more and more fishermen began to take up the lucrative business of sardine fishing for the reduction industry as they began receiving \$10 per ton of sardines that season and \$11 per ton the following
[4]
four seasons.

The lampara boats, or launches, towed lighters, or barges, to carry the catch. The lampara boats carried the lampara net and the rowboat necessary to set the net. The crew consisted of eight fishermen plus the captain, who either owned the boat and equipment or worked for a

cannery. In either case the captain directed the work. Each member of the crew received one share while the captain received three to five shares for himself, the boat, and the net. [5]

During First World War, Pete Dragnich, a San Pedro fisherman, reintroduced the purse seine net in California waters. The net was improved over the older purse seines and proved to be more effective than the lampara net.

By the early 1920s market fishermen and their organizations opposed the use of the new improved purse seines and attempted to have legislation passed to abolish the seine or at least to restrict the use of the net. The fishermen were worried that by using the net the sardine fishermen would catch too many small sardines that were used as food fish and this would result in a decline in the larger fish.

At the request of the State Fisheries Laboratory, Dr. Tage Skogsberg conducted a study of the purse seine, during the 1922 legislative session. Dr. Skogsberg's report to the legislature upheld the use of the controversial net. [6]

A few years later, in 1925, another San Pedro fisherman using an old small mesh purse seine went fishing

for sardines. He was so successful that by mid-November 1925, twenty-five purse seines were in operation in San Pedro. The outlook for purse seines in the sardine fishery was such that William L. Scofield, a research scientist for the California Department of Commercial Fisheries, writing in California Fish and Game, proposed that the net should be used in Monterey by the Italian [7] lampara fishermen.

Several years were to pass, however, before purse seines became popular in Monterey Bay. In the Fall of 1926 a purse seine boat from San Pedro began delivering sardines for Hovden's cannery. The purse seines were 1,500 feet long and 250 feet deep while the lampara nets were 900 feet long and 300 feet deep.

The local lampara fishermen, rather than adopting the new purse seine gear, were reluctant to switch, for two stated reasons: 1) They were delivering all the sardines the canneries could handle using their old methods, and 2) A switch to purse seines would not only require the extra expense of new nets, about \$10,000 each, and the economic loss of the older lampara nets, but the purse seines required the use of special boats valued between \$79,000 and \$100,000. The total lost in new and old nets and boats for the Monterey fleet would amount to more than the fishermen felt they could recoup in the

foreseeable future. After a threatened strike by the lampara fishermen the Monterey canners canceled the purse [8] seiner's contract.

In March 1929, Monterey's sardine fleet boasted fifty-six lampara crews, two purse seine crews, and one Japanese net, or shizuoka--which was similar to the [9] lampara net. This would be the last season dominated by the lampara crews, as a scarcity of sardines in the waters adjacent to Monterey Bay brought in purse seine crews from San Pedro with their longer cruising radius and quicker purse seines. The lampara crews faced two disadvantages in attempting to compete: 1) Their shorter cruising radius, and 2) The small size of the lampara launches which required the towing of a lighter, to store the catch. This combined to make extended trips into rough weather both impractical and dangerous.

The new purse seine boats were much larger and more economic to use as they carried the catch in their holds. Further, being bigger, up to seventy feet long and weighing eighty tons, they were more seaworthy and could travel as far north as Point Reyes, 115 statute miles from [10] Monterey.

Another disadvantage for the lampara boats was their reliance on gasoline power. Being older than the

purse seine boats, only a few of the lamparas were equipped with the modern diesel engine. Diesel oil was not only safer, as the fuel oil would not blow up like gasoline, but even the larger purse seiners could cruise further from their home ports with the newer engines. Although the cost of a launch with a gasoline engine was \$7,000 to \$8,500 and while a launch with a forty horsepower diesel engine ran \$12,000, diesel was still attractive, especially when combined with the efficiency
[11]
of a purse seine.

However, the entry of diesel was slow as fishermen were reluctant to invest capital into a boat simply for the sake of improvement. In 1927 a diesel engine was installed in a Monterey lampara launch and in the 1927-1928 season two more diesels were added to the Monterey fleet. During the following season four more diesels were added, making a total of seven diesels by March of 1929. In addition to the lampara launches, two San Pedro diesel-powered purse seine boats fished out of Monterey during the 1926 season. Knute Hovden hired the two boats which operated for Hovden's cannery until the
[12]
end of the 1928-1929 season.

The seventy-foot-long purse seine boats were much larger than the lampara launches and carried the catch in their holds. These new boats could carry up to

140 tons of sardines and by 1938 they could carry 200 tons of sardines and had a cruising radius of hundreds of miles. The boats had a value of between \$70,000 and \$100,000. In 1929 the Marie-Joan became the first purse seiner to use Monterey as a home port; others soon followed especially after the 1933-1934 season. By September 1, 1939, sixteen more purse seiners delivered sardines to Monterey's packers and by December this number [13] increased to twenty-eight.

Monterey's fishermen did not appreciate the intrusion of San Pedro fishermen into their home waters and their union, the Monterey Fishermen's Protective Union, formed in 1920 to try and keep the prices paid to fishermen at a living wage, [14] threatened to strike any plant that accepted deliveries from the new boats. The lampara fishermen felt that Monterey's sardines would be depleted by the purse seiner's tremendous capacities. They also realized that they could not economically compete with the new boats and their new nets and were reluctant to abandon their lampara launches and lighters to purchase the more expensive purse seine boats and nets. However, at the start of the second month of the 1929-1930 season the fishermen's union was no longer able to keep the new boats and gear out, as the demand for fish was

more than the older crews were able to deliver.

The purse seines were so successful that the lampara owners were forced to adopt another new net for their boats--the ring net. Throughout the season, each time the fishing was interrupted by the full moon (the luminescence of the sardine schools cannot be seen under a full moon), more and more of the lampara crews adopted the ring net. The task was not simple, as a winch and boom had to be added to the launches to help purse the net and unload the catch. The cost of the new ring net, however, was only \$1,500 to \$2,000 rather than the \$10,000 cost of a purse seine. In addition the winch and boom ran the launch owner another \$500 to \$600. The new net was 750 to 990 feet long and 150 to 192 feet deep. The net weighed 600 pounds dry and another 450 pounds of lead was used to stabilize the net in the water. The new net also utilized about 2,000 corks along the top to keep it floating properly.

Fishermen found the ring net much easier to operate than the lampara net and required fewer crewmen, as part of the work was done by machinery. While the ring nets could make two or three hauls to the purse seiner's one haul, the older launches still faced the problem of a limited cruising radius out of port and this helped the newer purse seiners gain a stronghold on the sardine

[16]
fishery.

In addition to worrying about outside competition, Monterey's sardine fishermen were constantly battling with the packers over catch quotas and the value of the catch. In 1920 the captains and crews along Monterey's waterfront organized together and formed the Fishermen's Union. After a strike in 1923, the canners and reduction men agreed to order and purchase the sardine catch directly from the union hall rather than from individual boats. Canners felt this would stabilize the fishery, while fishermen felt the move would increase their bargaining power. Under the agreement the union then paid both fishermen and captains. This arrangement, combining both captain and crew in the same union, lasted only two years. In 1925, after a short strike against the boat captains for increased shares, the crews joined the American Federation of Labor (AFL) while the captains [17] joined the Boat Owners' Association.

Although the sardine fishermen seemed like a unified group they were actually rather varied in their ethnic backgrounds. During the 1920s about eighty-six percent of the fishermen in Monterey were Italian or Sicilian, ten percent were Japanese, and three percent were of Spanish descent. The remaining one percent were

of Austrian, Danish, French, or Portuguese descent.

During the years before and just after the First World War, most of the fishermen were not citizens, nor had they begun the steps necessary to become citizens. This was not an unusual occurrence, as most of the fishermen did not speak or understand English. However, starting in 1924, after the tightening of immigration laws by the federal government, there was a gradual movement among fishermen to take English courses. By the end of the decade many sons of immigrant fishermen, educated in Monterey's public schools, entered the sardine
[19]
fishery.

The technological advances in fishing gear and boats were matched by the numbers of plants put into operation and in the addition of reduction facilities along Monterey's canning district. However, the decade of the twenties began slowly with only seven plants in operation handling 24,955 tons of sardines during the 1920-1921 season and dropping to a low of 16,285 tons the following season. By the 1924-1925 season ten facilities, eight canneries and two reduction plants, processed 67,325
[20]
tons of sardines. During the years between 1919 and 1922, even Santa Cruz, across the bay, boasted a sardine cannery, but with decreased catches brought in by the plant's four fishing crews this cannery was forced to

close. After this sardines were landed at Santa Cruz for
[21]
bait purposes only.

By the 1924 sardine season, Monterey's ten operating plants had invested \$1,500,000 in buildings and equipment. A large portion of this expenditure came as a result of Knut Hovden rebuilding his plant, burnt to the ground by an arsonist in 1922. [22] An ex-convict was captured and was the only person convicted for the fire, although Hovden maintained that an unnamed competitor had hired the arsonist. [23] The frequent fires along Ocean View Avenue were both dangerous and destructive. The wood frame buildings and vast quantities of flammable sardine oil needed little encouragement by arsonist or faulty wiring to turn the structures into infernos.

During the 1923-1924 sardine season the owners of the Carmel Canning Company, Jose Nichols and Benjamin Senderman, built a new cannery that almost doubled their floor space and included a reduction plant. That same season Knut Hovden bought out the Great Western Cannery [24] and renamed the facility K. Hovden Plant Number Two. Although not very original, this name was indicative of Hovden's success and helps to explain why Hovden was known as the "King of Cannery Row."

In addition to the capital improvements in

buildings and equipment, Monterey's sardine plants employed 1,900 cannery workers during the mid-twenties as well as about twenty-five fishing crews. Each week of the sardine season the canneries boosted the economy of Monterey by \$80,000 paid out in wages. A further \$500,000 worth of expenditures and costs were paid by the canneries [25] during each month of the season.

Although the cannery and reduction operators occasionally received complaints from city officials and the general public about the offensive odors the plants emitted, the operators realized that the city would not really do much to force the plants to clean up the emission. The canneries were, after all, responsible for [26] forty percent of Monterey's working force.

Over ninety-eight percent of the 1924 annual sardine catch was delivered to the sardine canneries. The rest were used for bait by market fishermen. Of the amount actually canned, only a small fraction saw California tables. A larger percentage was sold in the rest of the United States. Although, vast quantities of the canned product went to consumers in Mexico, Cuba, Central and South America, Hawaii, and Southern Europe. [27] Most, however, were sold in the Orient. The cost per case was one of the main attractions for the canned sardines. In 1921 sardines sold for \$5.89 per case at the

cannery; by 1924 the price dropped to \$3.98. This stimulated the market in the Orient where the product was sold by the piece from open cans. [28]

In the mid-1920s, Frank Booth, the dean of the packers, noted that the reason for the cheap price was that the sardine packers were engaged in the reduction business, and canning had become "a by-product affair." Canned sardines, reported Booth, were sold below cost as there was "a fair profit in fish oil or meal and fertilizer." This additional revenue offset the canning loss enabling some of the processing plants "to merely exist." [29] Booth's claim that some of the plants merely existed seems a bit overstated, as five new plants began operations by the 1929 season. [30]

The economic situation for Monterey's packers became tenuous during the 1927-1928 sardine season. Cannerymen sold canned sardines in the United States at a loss. Rather than risk bankruptcy the cannerymen decided to join forces and cooperate in setting prices in the lucrative overseas market.

B. D. Marx Green, who spent most of the 1920s regulating the industry as the Bureau of Commercial Fisheries' attorney resigned his position on March 1, 1928, to become the secretary-manager of the newly formed

California Sardine Export Association.

The new organization's members were canners interested in price fixing. Although the organization could not engage in domestic trade under the Webb-Pomerene Act of 1918, the law suspended the prevailing Sherman antitrust law allowing the sardine packers' an export monopoly and allowed them to compete against foreign canners. [31]

The dependency on foreign markets became so strong, during this period, that conservationists felt that one of the best ways to deal with the potential overfishing pressures placed upon the sardine reduction fishery was to develop a viable domestic market for the canned product. They felt that if the profit in sardines consumed in the United States was high enough, the packers would cut back on the reduction end of their business. [32]

In addition to their concerns of unruly competition, the sardine canners began realizing that the quality of fish they canned and sold, both at home and abroad, was poor. The reputation of California canned sardines suffered as canners, eager to reap the profits of reduction, packed the the required amount of sardines during the summer months when the fish were soft, enabling the packers to continue their lucrative reduction business. In 1926 the value of California's canned

sardines was \$4,404,000 while the value of the reduced meal and oil was \$1,110,000. The reduction business almost paid for the cost of the sardines and the wages paid to the cannery workers which was approximately \$1,490,000.^[33] This reliance on summer sardines for the reduction business forced canners to pack sardines with a mushy texture and consumers once again began purchasing sardines from European exporters.

In an effort to improve the quality of canned sardines, which threatened to damage the reputation of the California product, Monterey's sardine canners, together with tuna canners and sardine canners in Southern California, formed the Sardine Canners Association of California. In 1929 the association asked the Division of Fish and Game to impose a closed season on sardines during the summer months to prevent the packing of soft fish.^[34] The Division responded by establishing a sardine season from November 1 to March 31 in the southern area and August 1 through February 15 in the northern area^[35] including Monterey.

At the close of the 1920s the sardine fishery expanded in many directions. The canners and reduction operators grew from seven plants in 1920 to fifteen plants by the close of the decade. Three of the plants were

straight reduction operations while the remaining twelve
[36]
included reduction facilities and canning lines.

Monterey's fishermen landed 69,011 tons of sardines during
the 1925-1926 season. By the 1929-1930 season the
canneries and reduction plants took in 159,434 tons of
[37]
sardines.

CHAPTER IV: ENDNOTES

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[36]

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CHAPTER V

CONTROLLING THE GIANT:

Investigation, Regulation, and Litigation of the Monterey Sardine Industry, 1919-1929.

In California, the First World War era fostered the first serious attempt to enact management of the commercial fisheries based on scientific research. This was brought on by the development of industrial fishing methods with motorized boats and efficient processing plants. Scientists engaged in California's fishery research brought to the newly developing programs a background of several decades of governmental involvement in basic research and the utilization of the findings in the regulatory process. [1]

California's commercial fishing industry developed in the San Francisco Bay by 1849. [2] In addition to the usual market fish, such as sole, fishermen were taking salmon and by the early 1860s they were catching cod for local consumption. [3]

Fishermen were able to supply the market place in San Francisco but were hampered from expansion by the

lack of suitable preservation technology and efficient transportation. However, by the 1880s, as the sixth [4] highest state in terms of value for fishery products, the state's fishing industry provided employment for 5,469 [5] men and had a total investment of \$2,543,000. This expansion was due to the development of a railroad network within the state, more effective sea transportation, [6] effective preservation technology, and a population that increased from 92,597 in 1850 to 800,000 by 1880. The resulting intensive commercial fishing led to signs of [7] depletion among the market and canned fisheries.

On April 2, 1870, Governor Henry H. Haight signed into law a bill providing for the establishment of a State Board of Fish Commissioners. Under the act the new board received an appropriation of \$5,000 annually from the state's treasury to import new game and commercial fish, to preserve the state's native food [8] fishes, to collect and disseminate data concerning fish culture, and to show the usefulness of other varieties of fish. The new Commission also had the powers to regulate fishing seasons and curb pollution. To help the Commissioners with the planning process the act authorized [9] the members to direct scientific research.

California became one of the nation's first states to enact legislation creating a state agency to

deal with depletion [10] of a natural resource. The following year the United States Congress created the United States Commission of Fish and Fisheries to help expand and regulate the nation's commercial fisheries. [11]

The first commissioners were B. B. Redding, S. R. Throckmorton, and J. D. Farwell. Redding, the former Secretary of State under Governor Leland Stanford, served [12] for more than ten years.

In their Third Biennial Report, issued in 1875, the Commissioners advised the legislature of the need for a standing committee in the legislature to deal with matters relating to the fish and fisheries of California. [13] Although the Commission had power to regulate, the Commissioners could not make new laws and felt that a standing committee could work with them to enact needed legislation. In 1887 the Commissioners worked with the legislature on a bill that created the first fishing licenses. The revenue would be used for [14] scientific research of the state's fishes. In 1909 the legislature passed a bill taxing commercial fishermen for the first time and the following year the Fish and Game Commission collected \$22,000 in license fees. [15]

The Fish Commission was years ahead of other state agencies in using trained technicians and scientists

to gather and analyze data. In 1895 the Commissioners argued for the inclusion of their scientists in the state's civil service system, [16] the Commissioners were probably trying to give the men benefits and a recognized pay scale.

In 1900 the Fish and Game Commission was not only one of the oldest public agencies but was undoubtedly the best respected agency in state government. The Fish Commission took on the added responsibility of wild game in 1878. Over the first three decades of existence the commission played an important role in fish and wildlife legislation, regulation, and management. [17]

From 1900 on the state's commercial fisheries became second in economic importance, after oil, of California's natural resources, [18] and the Fish and Game Commission became more active in championing legislation regulating fisheries that were in danger of depletion. The Commissioners also worked on economic and logistical problems facing the fish industry. [19]

At this time California became the second largest commercial fishing state in the nation, and in some years emerged as the leading state. This was due to the introduction of improved refrigerator railroad cars, scientific fishing methods, and technologically advanced canning and processing methods. As the state's per capita

income rose after the turn of the century, allowing more people to purchase California's food, the state's commercial fishermen and fish processors were ready to expand.
[20]

By 1914 the Commission was concerned that commercial fishing was becoming too big and too important for the Commissioners to regulate without help. The first issue of the Commissioners' new publication, California Fish and Game, announced the setting up a new department, the Department of Commercial Fisheries, under the direction of the State Board of Fish Commissioners. The article reported that Norman Bishop Scofield was to head the new department, assisted by H. B. Nidever.
[21]

Scofield, or N. B. as he was called, is known as "the father of commercial fisheries investigation in California."
[22] Scofield, a Midwesterner, was born in 1869 and earned a bachelor's degree in biology before coming to California and enrolling at Stanford University. At Stanford, Scofield studied the San Francisco Bay under Dr. Charles Henry Gilbert, the researcher who determined that salmon return to spawn in their hatching streams, as well as under Dr. David Starr Jordan, America's leading ichthyologist and Stanford's president.

After graduating with Stanford's first class,

with a Master's Degree in 1895, Scofield worked for the Department of Fish and Game from 1897 until 1899 when he went to the East Coast for nine years. Returning in the Fall of 1908 Scofield joined the Department of Fish and Game and worked there until he retired in 1939 as the head of the department. His contributions were so valuable that in December 1935 the Department of Fish and Game named their new research vessel the N. B. Scofield. (This was the first Fish and Game boat named for anything but a fish.)

The Fish and Game Commissioners created the Department of Commercial Fisheries with the specific thought that the salmon, tuna, and young sardine fisheries must be looked after by trained scientists. In 1919 the legislature established the Bureau of Commercial Fishery to aid tuna fishermen. The new bureau's responsibility was to help the tuna industry, and some other commercial fisheries, plan its operations by controlling supply and prices and stimulating demand. The Bureau's agents gathered data on the fishery, investigated over-fishing, did biological research, and presented their findings for the use of both the fishing industry and fishery scientists. True to the ideals of the new century the Commissioners felt that science professionals should manage the state's fisheries within the business

concepts and beliefs developed during the Progressive Era.

The Commissioners reported that the new department would gather statistics and data on the different commercially-caught fish. The Department would also report on various methods of fishing, handling, and marketing of commercial fish. Further, the Commissioners charged the new department with compiling data on fish that were not yet utilized, but which could become [26] commercially important.

The scientists were periodically to report on "the utilization of waste fish and fish offal for fertilizer, fish oil, glue and chicken feed" to the Commissioners. Their research would look into "the habits, migrations and spawning times of the different varieties of fish." The Commissioners reasoned that this research would enable them to protect the commercial fisheries by either "restricting the fishing or by establishing closed seasons." By having the proper information, the Commissioners would not only be able to promote legislation that would foster the intelligent utilization of the state's fishery resources, but the Commission would also be in a position to advise against legislation that would inhibit the utilization of the [27] state's commercial fishery resources.

In 1918 Scofield reported that California was forced to remove from the commercial market Sacramento perch and sturgeon, due to overfishing by commercial fishermen. He also reported that the state suffered from the depletion of salmon, shad, striped bass, tom cod, California halibut, crab, shrimp, and abalone. Scofield also announced that investigations into the life history of the sardine were underway by the Department of
[28]
Commercial Fisheries.

Findings from the sardine investigation were first used by the United States Food Administration, starting in 1918. The reports assisted Food Administration officials with various wartime food programs and in the implementation of conservation measures. Basically the Fish and Game Commission furnished the federal authorities statistical records on the price paid to fishermen, with whom the fishermen were under contract, and the average yearly catch of each boat
[29]
in the fisheries of California.

That same year the Fish and Game Commissioners

warned:

It is a period of danger. Already there have been numerous attempts by commercial interests to shelve protective laws, and if food conditions become still more serious, it will be increasingly difficult to prevent serious inroads being made on our fish and game. [30]

The dangers of overfishing became more apparent and sardine investigations continued well into the 1950s.

In 1915 Scofield hired William (Will) Francis Thompson, a young fishery scientist, to head the sardine investigations for the California Department of Commercial Fisheries. Earlier in 1915, while working for the Canadian Government's fishery program, Thompson made his first significant contributions to fishery research with the first comprehensive study of the North Pacific halibut fishery in British Columbia. Thompson was the first researcher to conduct a study including economic factors as a crucial element in a fishery's development. The young scientist realized that, like natural data, economic pressures on a fishery must be factored into any prediction of the viability of the fishery. [31]

The director of Stanford's Hopkins Marine Station, Dr. Walter Kendrik Fisher, made space available to Thompson and his assistant, Oscar Elton Sette, at the Pacific Grove research institute. In Southern California, another state biologist, Elmer Higgins, conducted research

in offices provided by the Neilsen and Kittle Canning
[32]
Company at San Pedro.

Thompson hired William Lancelot "Lance"
Scofield, N. B. Scofield's nephew, to study sardines and
other fisheries in Monterey Bay. Lance Scofield became
the first person to discover sardine eggs in their natural
environment. After Thompson left Monterey he stated that
the Southern California fishing grounds would develop into
the most important fishery in California. Due to this
belief Thompson was instrumental in getting the California
State Fisheries Laboratory built at Terminal Island in
Long Beach. The facility was completed in November
[33]
1921.

Thompson introduced California's scientists to
the importance of looking at the economics as well as the
biological aspects of commercial fishing through the
catch-per-unit-effort measure, an economic index that
stressed the importance of looking for natural
fluctuations by taking into account all aspects of the
fishery. This index measured the amount of fishing hours
the fishermen needed to land the annual catch as compared
to previous seasons' catch-per-unit-of-effort. Thompson
argued that the number of fishing boats operating in an
area would have a direct effect of the population of the
[34]
fish in question.

situation which is concerned with the perpetuation of the fisheries, to be able to recognize depletion, to know how to prevent it, and how best to promote the fisheries.[37]

According to Thompson, scientists must discover if there was a greater effort expended each year in gathering the same amount of fish by commercial fishermen. This was the key step in the problem of depletion. Once the "unit of effort" needed to land the catch exceeded the amount of previous years, scientists could then determine, through the biological study of the fishery, whether the decrease of catch was natural or due to overfishing. For Thompson the reliance on science would not only solve the problem of overfishing, but, through yearly catch forecasting, scientists would be able to predict the magnitude of the catch as well as the success of each year's spawning. Further, Thompson speculated that by studying the complete life cycle scientists would be able to determine if the fish were migratory and if overfishing in one geographic area could affect the entire fishery. [38] This was the same approach he developed while studying Canadian commercial fisheries.

California scientists were the pioneers in the field of sardine research. Scientists with the Fishery Research Board of Canada began studies in the late 1920s and in 1937 scientists in the states of Oregon and

Washington also began sardine research.

In another article, also written in 1919, Thompson presented the argument that in schooling fish, such as the sardine, which are caught in nets, depletion may not be recognized until well underway. Thompson further pointed out that even if intensity of labor studies did not reveal depletion, this might be due to the factor that small schools could be found as readily as large ones and large schools could yield close to one-half of their population to fishermen using modern techniques. If this were the case, researchers would have an extremely difficult time recognizing depletion of the stock until it was too late to enact measures of conservation. Thompson concluded that "... , it should not be assumed that the resources of the sea are inexhaustible..." [40]

Oscar E. Sette reported in 1920 that the depletion of sardines in Monterey Bay was a real possibility. He wrote that researchers had to substantiate facts on age, rate of growth, migration, and spawning of sardines. However, Sette pointed out that the researchers already had clues to the answers concerning conservation of the sardine resource. [41]

Two years later, in 1921, Thompson predicted that in addition to overfishing, natural fluctuations could very likely cause future decreases in the sardine

catch. He further stated that before scientists could accurately predict the yearly sardine catch more scientific evidence must be obtained about the natural fluctuation phenomena. [42]

The problems that the sardine industry could expect from natural fluctuations were detailed by Elmer Higgins in 1923. Higgins warned that "a year of abundant spawning may be followed by a period of several years duration in which but few sardines survive the dangers and hardships of infancy." To make the point even clearer Higgins outlined similar occurrences in the French sardine fishery, the Norwegian herring fishery, and the European cod fisheries. In addition Higgins reported that the sardine investigators were able to determine the age of sardines by size. In so doing the scientists established the fact of dominant (super-abundant) size/age groups within the California sardine fishery. With this information and further research Higgins felt that the fishery scientists would be able to predict:

...the character of future runs as to the relative abundance of the different sized or age-classes, and in general, the parts of the season which each size-group will appear in the fishing district. [43]

For the fishery scientists, then, answers as to abundance and fluctuation of the sardine catch required a little

more research time.

During the World War I period through the early 1920s, the rapid expansion of fisheries investigations in California allowed the Department of Fish and Game to hire students, as well as permanent help. Students hired on with the Department for summer work, which was an asset to their classroom activities. At the Department these young researchers learned, first-hand, the techniques of collecting data from the various fisheries. By 1922, however, with the post-war depression, California could no longer run a large program and students as well as permanent staff left the state to work for the federal government. Norman Bishop Scofield, then head of the Department, pointed out that California was a training ground for future federal researchers and managed to work out an agreement in the early 1920s for the federal government's fishery programs to pay part of the salaries [44] for a few state researchers.

One of those who came to work before the Great Depression was Frances Nedever Clark. Clark, a graduate in biology from Stanford, was initially hired as a secretary and librarian. Although she had little formal training in librarianship, Clark started the Department of Fish and Game's library before leaving to continue her studies at the University of Michigan. At Michigan, Clark

earned her Doctorate before returning to the Department of Fish and Game in 1926 as a full member of the research staff. Clark rose to the position of Director of the Marine Division of the Department of Fish and Game before retiring in 1957. In the late 1920s, research again picked up and in addition to college students full time staff members were hired. [45] The new staff personnel were to make significant contributions in sardine research.

Sardine investigations were not limited to scientists in California. In 1924 the North Pacific Fisheries Treaty with Japan was signed and William Frances Thompson quit his California sardine investigations to head the fisheries investigations between the United States and Japan in Seattle, Washington. Lance Scofield took over Thompson's position as director of sardine research for California. [46]

Two years later the United States and Mexico formed the short-lived International Fishing Commission. N. B. Scofield, who was instrumental in the formation of the Commission, became its director; however, the investigations were not successful and ended in 1929. [47] That year the Canadian Biological Board and the Provincial Fisheries Department in British Columbia began

investigating sardines. Canadian fishermen caught large sardines in British Columbian waters and Canadian scientists were trying to determine the migration patterns of sardines to see if the Canadian-caught sardines were part of the California sardine groups. [48] To further this research the Canadian Government and the provincial government of British Columbia hired John Hart to undertake the sardine investigations. Hart talked with and corresponded with the experts in California in a successful effort to integrate the Canadian and California findings. [49]

Events in the fishery, however, were infringing on the time that the scientist needed to complete their investigations. In the early days, before the First World War, sardine fishermen simply rowed their boats out beyond the end of Monterey's wharf, threw their nets into the bay waters and pulled in the harvest. By the 1921-1922 season, seventy-four percent of the catch was still caught within five miles of the canneries, [50] although the fishermen used more modern techniques. [51] Most of the catch was made within the sheltered cove of Monterey, a stone's throw from the canneries in fifteen fathoms of water. The farthest the fishermen ventured was two miles out on the bay in forty fathoms of water. [52]

Over the remaining years of the decade the

fishermen gradually went further out from Monterey until they were fishing off Santa Cruz and Capitola, twenty to twenty-five miles across the bay. During a short time in the 1924-1925 season the sardine boats were forced to travel north to Pigeon Point, fifty miles north of Monterey, in search of sardine schools. [53] A few captains decided to go as far as Half Moon Bay, another twenty miles past Pigeon Point. [54] William L. Scofield reported that the fishermen were beginning to think that the great catches of the past put too great a drain on the local sardine supply. [55]

Throughout the 1920s the fishing effort at Monterey continued to grow with more efficient methods, more boats, and bigger lighters to keep pace with the larger limits imposed by the canneries and reduction plants which made approximately one million dollars annually from the reduction operations. The increased demands could not be met in local waters. Instead fishermen gradually expanded their fishing areas further and further from Monterey. At the same time the periods in which no sardines were available in the waters off of Monterey gradually lengthened. "All of which indicated depletion," wrote N. B. Scofield at the close of the decade. [56] Indeed by the 1928-1929 sardine season more

skippers were traveling up the coast to Half Moon Bay. By 1930 most of the sardine fishing areas between San Francisco and San Diego were explored by fishermen in search of a catch. [58]

The question of depletion became a topic of concern for fishermen, cannery operators, and scientists during the mid-1920s. By 1925 exports of canned sardines exceeded those of canned salmon. Cannery operators began to talk about limiting the sardine pack through longer closed seasons. By 1929 the sardine scientists working for the state realized that something drastic was affecting the supply of sardines in California's waters. [59]

In a survey of "Fishing Localities at Monterey from November, 1919, to March, 1929," Milton J. Linder summarized that in order to meet the growing demands by cannery operators, fishermen were forced to expand the fishing areas further north each year. Linder pointed out that the normal period of sardine scarcity in Monterey Bay during the late fall and early winter increased each year. The fishery scientist also reported that although the fishing effort rose each year the quantity of sardines taken in Monterey Bay waters remained fairly constant from the 1923-1924 season until the end of the decade. [60]

The investigators began realizing that the sardine supply seemed to fluctuate according to dominant

year groups. That is, there were occasional seasons, usually three to five years apart, where the spawn succeeded quite well, resulting in a large year-group representing a high percentage of the total supply of sardines. These super-abundant groups, as they were called, posed problems for the scientists who were trying to accurately determine the results of overfishing. [61]

The investigators reported that the fish stock would have to be watched until the first signs of depletion occurred, [62] which would be a sudden radical drop in the yearly catch. At such a time, fishery scientists warned in the late 1920s, the state legislature must place a limit on the entire fishery to insure its survival.

However, rather than following the advice of the fishery scientists the legislature vacillated on the question of conservation regulations. Further, the courts became increasingly involved in the issue over the control of California's sardine resources.

For a short time after the war, the 1919 Reduction Act seemed to keep the canneries from reducing too much of their catch. Although there were instances of catch overage the law provided for the reduction of overage as long as the plant received written permission

from the State Market Director, Harris Weinstock. Although the operators could reduce from ten to twenty percent of their catch, under the 1919 Act, the profits in fish meal and oil together with the depressed post war economy proved to be too tempting.

In 1920 the state's canners began petitioning the State Legislature to allow them to reduce more of the catch. They informed legislators that with higher reduction allowances they could afford to sell canned sardines at a much lower price overseas and remain competitive with foreign canners.

In the meantime, cannery owners in southern California decided to test the 1919 law in the courts. A Los Angeles Superior Court took exception to Section Five of the 1919 Reduction Act and determined that the Fish and Game Commission did not have the power to regulate the use of fish in reduction plants.

With this ruling, curtailing the Fish and Game Commission's authority, State Senator Joseph A. Rominger, a Republican from Los Angeles, introduced Senate Bill 576 in 1921. This bill amended Section Five of the 1919 act by allowing for reduction if the reduction operator could show that there were no other markets for the catch and that the supply of sardines was not depleted. In addition the new law did not allow independent reduction plants.

Further, in no event could the overage exceed twenty-five percent of the monthly amount of fish canned for human consumption. [63]

The passage of the new bill spelled trouble for the sardine fishery. Up to the passage of the bill the processors reduced only ten to twenty percent of the catch, a natural amount considering spoilage, unavoidable catch overage, trimmings, and offal, but the new bill allowed for up to twenty-five percent of the catch to be reduced. This meant that perfectly good sardines would now be reduced in order to help the canners' economic woes. In commenting on the new bill N. B. Scofield wrote that he and other fishery scientists feared that the sardine was already overfished and the new law would deplete the remaining supply. [64]

Not content with the liberal conditions of the new law, the Stafford Packing Company of San Pedro challenged the authority of the Fish and Game Commission by reducing 88.06 percent of their January catch. The Commissioners asked their attorney, B. D. Marx Greene, to bring the matter to trial as soon as possible. This time the Los Angeles Superior Court held for the Commission and the amended Reduction Act. However, Stafford Packing Company appealed the Superior Court's decision which was

reversed by the Second District Court of Appeal, but on June 5, 1924, the California Supreme Court overturned the reversal and let the Superior Court's decision stand. [65]

More than just a victory for the Fish and Game Commission, the Supreme Court laid down guidelines that are still in effect: 1) The Court held that irreparable injury to the fishery was threatened by the company's reduction policy; 2) The Court held that the people of the state own and have rights to fish in state waters and that the State, acting for the people, has the right to control not only the taking but the disposition of fishery resources; 3) The Court held that the acts of the Stafford Packing Company constituted a public nuisance and an invasion of the property rights held by the people of the state; 4) Finally, the Court stated:

if this defendant may thus violate the law with impunity, every other packer may do likewise and would naturally be tempted to do so. Appellant asks us to take judicial notice of the fact that the supply of fish in the Pacific Ocean is inexhaustible. If we are authorized to take judicial cognizance upon this subject, we should have to conclude that experience has proven that the available supply of food fish in the ocean in waters readily accessible to the packing plants of the state may be seriously depleted, if not practically exhausted, within a period of a few years by unrestricted fishing. [66]

In upholding the constitutionality of all aspects of the amended Sardine Reduction Act the Court agreed with the state's fishery scientists that overfishing was a danger

to the sardine fishery.

While the courts clarified and defined the limits that the state could impose upon a canner, the owners of the Monterey Fish Products Company, operating a reduction plant, felt that the law violated their constitutional rights to engage in business. In 1923, in an effort to force the issue, the company sent out boats solely for the purpose of catching sardines for reduction. The Fish and Game Commissioners sent investigators to the plant, but Max Schaefer, the manager, refused the investigators admittance to the office or to his records as provided by the Reduction Act. [67]

The Fish and Game Commission's investigators then attempted to have the Monterey District Attorney's office secure a warrant and prosecute Schaefer. The investigators, however, were told that they could not expect cooperation from Monterey authorities. The Commission then authorized Greene's office to bring the matter before the Monterey County Superior Court, but the Court held for the defendant. With local channels thus effectively blocked, Greene turned once again to the State Supreme Court, which agreed to an early hearing and decision on the matter.

The high court recognized the defendant's claim

of discrimination, as reduction plants were not provided for under the 1921 Reduction Act, but the Court held that:

there is no reason for allowing to the operator of a reduction plant, who is not packing fish for human consumption, any margin or leeway whatsoever, because he is forbidden to take any fish fit for human consumption for use in his reduction plant.[68]

The Court further stated that the act did not forbid the operators of reduction plants the right to conduct business using fish "not fit for human consumption or of fish offal." The Court reiterated the earlier finding that the title to the fish within the waters of the state were vested in the State of California and held in trust for the people. The legislature, therefore, was perfectly within its legal rights to dictate how the fish of the state were to be disposed. [69] With this ruling there was no doubt that the amended Sardine Reduction Act was constitutional and binding on all parties.

In 1923, under pressure from the canners the state legislature passed Senate Bill 696 allowing processors to reduce an unlimited amount of sardine oil during the four months that the sardines retained the greatest amount of oil providing that the oil was used for human consumption. The resulting meal, however, could be used for any purpose. [70]

The following year, 1924, the Department of

Commercial Fisheries asked the Fish and Game Commission to request that the legislature amend a portion of the reduction act. The Department wanted to have the hearing portion eliminated to ease its workload. In addition, the Department also wanted the legislature to fix a definite amount of sardines that could be reduced rather than the current twenty-five percent of the total catch. [71]

The Department of Commercial Fisheries realized that by allowing twenty-five percent of the monthly catch to be reduced, the canners were simply canning more sardines than the marketplace really needed. The result was that canned sardines were sold at a loss to enable the canners to continue making profits from the reduced oil and meal. To combat the economic motive for increased catches, the fishery scientists felt that by stipulating a definite amount of sardines that could be reduced, the legislature would be forced to place a ceiling on the entire yearly catch, a measure that the fishery scientists desperately wanted for conservation purposes. [72]

This idea of a ceiling on the catch would resurface for the next two decades. Scientists working for the Department were becoming increasingly uneasy about the size of the sardine catch. In the Twenty-eighth Biennial Report of the Fish and Game Commission published in 1925, Will F. Thompson announced the findings to date

of the sardine investigations carried out by the State Fisheries Laboratory. The most newsworthy event occurred in San Pedro where Elmer Higgins was successfully able to predict the 1923-1924 season's catch using data collected [73] from the beginnings of the investigations in 1919.

While scientists were making some headway they were also learning that they might not be able to detect overfishing until the overfishing progressed too far to be reversed. In concluding his article Thompson warned that the failure of the sardine fishery might be disastrous to other fish stocks that relied on the sardine as a source of food. Thompson wanted the practice of using sardines for fertilizer halted and a more conservative approach to managing the sardine fishery undertaken by those entrusted [74] with implementing the state's public policy.

In response to the Department of Commercial Fisheries 1924 request that the legislature rewrite the Reduction Act, Senator A. Berlingame Johnson, a Republican from Los Angeles, introduced Senate Bill 250 during the 1925 legislative session.

While prohibiting some independent reduction plants--those engaged solely in making fertilizer and stock feed--the bill allowed canning operations an overage of twenty-five per cent. This overage amount would be

determined at hearings held by the Fish and Game Commission based on each packing plant's capacity. The new law also permitted reduction, by independent reduction plants, if the resulting oil and meal was used for human consumption. The penalty section required a three month [75] plant closure for failure to comply with the new law.

For the fishery scientists, who originally asked that a new law be drafted, the result was disastrous. While the new bill did abolish some reduction operations, those manufacturing fertilizer and feed, the act did not set a definite total weight of sardines that could be caught and processed by canning or reduction. Further, the law retained the hearing section, a time-consuming process that was rarely satisfactory to either the canners or the Department of Fish and Game personnel. The fishery scientists felt that the new bill was a failure in yet another area as the wording of the bill left out the conservation aspect inherent in the older laws. In the past, reduction legislation stipulated that the canners and reduction operators had to prove during hearings that there were no other markets for the overage and that the reduction overage would not deplete the species; however, [76] the new law did not carry such a provision.

From the passage of the 1925 Reduction Act until the demise of the sardine fishery in the late 1940s, both

the packers and the Fish and Game Commission, during the required annual hearings, concentrated on the efficient and economical operation of the canning facilities. Questions concerning the conservation of the sardine were no longer part of California's reduction law. [77]

With the passage of the 1925 Reduction Act, the Fish and Game Commission adopted General Order Number One stating that:

for each ton of sardines received by a packer during a calendar month he shall produce fifteen (15) cases of one pound ovals (48 cans to the case) or the equivalent if other size cans are used. [78]

This order was based on the theory that if all of the fish received by a packer were canned each ton would provide for twenty cases of one pound oval cans. Each case being the industry standard of forty-eight cans per case. In requiring only fifteen cases per ton of raw fish received the Commission allowed the packers to reduce twenty-five percent of the catch. This did not include, however, the fish waste that was normally reduced.

Not content with the new law, the Monterey Fish Products Company began using good sardines for reduction purposes only. The Fish and Game Commission's lawyers asked for and received a permanent injunction against Max Schaefer's plant. The court also ordered the plant to

close for the three month penalty period as provided for
[79]
in the new law.

While the power of the Commission and the new law seemed secure as far as straight reduction for non-human consumption was concerned, the Commission was quickly challenged on another front. Van Camp Sea Food Company, of San Pedro, questioned the power of the Commission to hold hearings to determine the plant's capacity. The Los Angeles Appellate Court held that the Commission could not hold the mandated hearings as the Commission could not act in a judicial fashion under the California Constitution. Hearings of this nature were
[80]
restricted to courts of law.

Coming quickly on the heels of this decision was another challenge to the new law. The Commission held that the twenty-five percent catch overage applied to each ton of sardines that the canners actually canned, which was to be considered the plant's capacity. The packers contended that the capacity of each plant should be determined by the number of can-closing machines installed at each plant, whether they were used in the processing of each ton or not. To force the issue the canners bought more can-closing machines and installed them on processing
[81]
lines they never intended to operate.

Los Angeles Superior Court Judge Albert Lee

Stephens ruled that the packers were indeed entitled to an allowance for reduction based on the number of can-closing machines. Further, Stephens ruled that the commission was without judicial power and therefore could not hold hearings to determine the capacity of the sardine [82] plants.

This attack on the new law continued in Northern California in September 1926 when the Bayside Fish Flour Company of Monterey decided to apply the rulings of the Los Angeles Appellate Court regarding hearings and of Judge Stephens regarding can-closing machines and capacities for the plants. Bayside charged that under these two rulings the Fish and Game Commission had no judicial powers and therefore could not hold hearings necessary to issue a permit for edible oil products.

B. D. Marx Greene asked for an injunction against Bayside, on behalf of the Commission, in the Monterey Superior Court. Greene contended that since the Commission could no longer hold hearings, according to the rulings of the Appellate Court and Judge Stephens, the permits that the Commission issued in 1925 were issued illegally. Therefore Bayside could not legally operate under a permit granted in 1925. Without a permit, as specified under law, Bayside could not legally reduce fish

to meal and oil. Further, the Commission's legal staff reported to the Superior Court that the Commission, under the law, could not issue a new permit without holding the hearings which two courts already decreed improper.

The ruling, by Judge Treat, of Salinas, further complicated the issue because he held that the Commission did have the judicial functions as set down by the 1925 Sardine Reduction Act and could legally hold hearings and issue permits. At this point the Commissioners and their legal counsel decided that no matter which approach they took the Commission would be in violation of either the rulings in Los Angeles or in Monterey County. The best action, then, was to take no action and await the
[83]
response.

The response was quick. In December 1926, Globe Cotton Mills of Los Angeles, a manufacturer of sardine oil, filed a petition in the State Supreme Court for a writ of mandate against the Fish and Game Commission to compel it to hold hearings and grant reduction permits. The Supreme Court ruled in favor of Globe, holding that while the Commission could not hold powers which were exclusive to the judicial branch of state government, the holding of hearings and granting of permits was strictly within the Commission's administrative or regulatory powers and did not conflict with judicially held powers.

This ruling, while technically a defeat for the Commission, actually amounted to a victory as the Commission was once more empowered to issue permits and hold the time-consuming hearings. [84]

Most of the Southern California packers refused to comply with the Commission's reaffirmed powers, citing Judge Stephens' ruling as the correct interpretation of Constitutional law. The Commission responded by bringing an injunction against Van Camp Sea Food Company. The matter was brought to trial in Judge Stephens' court. On November 14, 1927, Stephens overturned his former decision and, citing the Supreme Court's decision in the Bayside case, ruled for the Commission.

Rather than allowing the packers to reduce twenty-five percent of their theoretical capacity, based on the number of can closing machines, the Fish and Game Commission now compelled the canners to reduce only twenty-five percent of the amount canned as specified by the 1925 law. The packers again had to pack fifteen cases of one-pound ovals per ton of sardines. [85]

Even with the Supreme Court's ruling, the Fish and Game Commission continued to defend the state's sardine resources against the onslaught of the reduction interests. During the 1928-1929 season the reduction

operators, after unsuccessfully trying to convince the Commission to allow them to put up only twelve cases of sardines per ton, decided once again to test the law by packing the twelve cases per ton. The Commission immediately started abatement proceedings. After a change in venue, requested by Judge H. G. Jorgensen of Monterey County, the case was heard by Judge J. R. Welch of Santa Clara County. Although Judge Welch ruled in favor of the Commission, the matter received yet another legal challenge, this time in Southern California.

In a case brought before Judge Clair Tappann in the Los Angeles County Superior Court, canners from San Pedro successfully argued that the Commission could not define the percentage of fish to be packed and, further, that the Commission's definition of fish offal was invalid.

As a result of the two contradictory decisions the canners and the Fish and Game Commission approached the legislature asking that the law be amended. The canners introduced a bill allowing for a forty percent reduction figure, while the Commission urged for practically no overage. Finally the Murphy-Youngman bill, allowing for 32.5 percent reduction, passed both houses. In addition, the new bill, with the approval of both the Commission and the packers, reduced the sardine season.

The new season limits of August 1 to February 15 theoretically cut the total catch by twenty percent, but during the 1929-1930 season over-production and carryover [86] from the previous season was again the rule.

The new Murphy-Youngman bill was yet another step toward unlimited reduction, as the legislature not only increased the amount of sardines that could be reduced per ton received by the packers, but failed once again to place a limit on the seasonal catch. In an interview E. B. Gross, a Monterey canner, recalled that under the new law the canners need pack only 13.5 cases of sardines, thus allowing the packers to use 33.25 percent of the catch, plus scrap and offal, in the reduction [87] plants.

During the 1920s in an effort aimed at easing the canners' reliance on the reduction fishery the United States Bureau of Fisheries developed improvements in the sardine canning process to provide the canners with a higher profit margin. However, with the lack of state regulation the reduction business continued unabated. Furthermore, while the packing plant operators were quick to take advantage of the state's increasingly liberal reduction laws they decided against adopting the new canning methods, citing increased costs with limited

[88]

financial returns.

Rather than impose limitations, California's legislature continually relaxed the minimal restrictions on the taking of sardines for reduction purposes. However, even with the lenient reduction laws in place during the late 1920s, violations continued to occur. In December 1929, the Fish and Game Commission lawyers went to court to obtain injunctions and closed three Monterey reduction facilities for reduction violations. The three operators were quite upset when later that month the Fish and Game Commission was forced to allow the Globe Grain and Milling Company, processors of edible oil and meal, to open its doors for the first time as they fell under the provisions of the 1925 law allowing reduction for human consumption.

[89]

All through the 1920s the sardine catch rose steadily. In the 1920-1921 season the state's catch was 40,930 tons, reflecting the post war recession and the wartime speculative canned sardine stockpile. By the 1925-1926 fishing season the catch rose to 137,690 tons, which was 35,170 tons less than the previous season, a direct reflection of the 1925 Sardine Reduction Act. The following year, however, saw the California sardine catch rise above that of the much older Maine sardine fishery, and by 1928 California accounted for almost three quarters

of the entire nation's sardine landings. In the 1929-1930 season the catch, under the new liberal reduction limits, jumped to 324,240 tons, an increase of 69,890 tons over [90] the 1928-1929 season.

The sardine situation was such that by 1929, ninety percent of the state's total fishery landings went to the canneries. Of this, sardines led the cannery fish [91] by a wide margin.

Time and time again, throughout the 1920s the canning industry approached the legislature for more and more lenient reduction regulations and time and time again the legislature gave in to the canners' cry of economic hardship. Although Norman Scofield, the Director of Fish and Game, was respected and had influence in Sacramento he [92] could not fight the canning interests. Finally, in 1925, the reduction interests managed to totally exclude matters of ecology and conservation from future consideration with regard to the reduction of sardines.

Public policy decisions made by the California legislature made it clear that the chief concern of the politicians was for the expansion of the sardine industry. However, at the same time both the Department of Fish and Game scientists and the Fish and Game Commissioners were becoming increasingly alarmed over the prospects of

depletion in the sardine fishery. Finally in 1929, scientists with the Department of Fish and Game warned of impending overfishing and urged an annual limit of 200,000 to 300,000 tons. The Fish and Game Commission responded to the warnings and enacted a policy beginning with the 1929-1930 sardine season to limit the catch to 200,000
[93]
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CHAPTER V: ENDNOTES

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from Sardine Offal," California Fish and Game, 7:4 (1921):207-208; McEvoy, "Economy, Law, and Ecology in the California Fisheries to 1925," (Ph.D. Dissertation, University of California, San Diego, 1979) pp. 382-383.

[90]

"The Commercial Fish Catch of California for the Year 1935," Fish Bulletin 49 (1937):10, 14 table 1; Harry R. Beard, "Preparation of Fish for Canning as Sardines," United States Bureau of Fisheries, Report (1927):73-80.

[91]

McEvoy, pp. 382-383.

[92]

Croker, "An Iconoclast's View...", p. 31.

[93]

Ahlstrom and Radovich, "Management of the Pacific Sardine," p. 191.

CHAPTER VI

MONTEREY'S GOLDEN YEARS:

The Reduction Fishery, 1930-1945

Several factors combined to forestall the efforts of the Fish and Game Commission to limit the annual landings of sardines during the 1930s. First, the Commissioners had to face the fact that they could not control the offshore floating canneries, or floaters, as they were known. These operations were located outside California's three mile offshore boundary limit and, thus, were not legally under the jurisdiction of the state government's attempts to limit the yearly catch. Second, due to political pressure from landbased operators, the Commission felt forced to allow these plants to engage in the ever increasing reduction business, a business that quickly became the mainstay of the entire sardine industry. Finally, after the threat of offshore reduction plants was finally out of the picture, the Second World War kept the catch limits high as the United States initially tried to supply the Allies Forces with food, then became directly involved in the war after December 7,

1941.

The real reason for the expansion of the sardine industry was, unquestionably, the profits derived from the sale of sardine oil and meal. In 1938 William L. Scofield wrote "Sardine Oil and Our Troubled Waters" for California Fish and Game. The fishery scientist reported that fifty percent of all sardines caught were reduced. This was brought on by changes in the sardine law and special liberal reduction permits allowing for only thirteen and one-half cases of canned sardines per ton of fresh sardines. In reality the canners were easily able to can twenty cases of sardines per ton of fresh sardines, however, under ever-increasing pressure, due to higher profits in oil the case requirements were dropped to eighteen, then fifteen, then finally thirteen and one-half cases per ton. In addition to the liberalized laws granting canners permission to reduce good whole fish, the processors were already reducing the residual fish scrap [1] from the cleaning process and any damaged fish landed.

Scofield reported that the profit in oil was the cause of the problems in regulating the sardine catch. Very little of the reduced oil was used for human consumption. Most went into industrial uses in paint, soap, linoleum, felt-base paper, and oil cloth. The reduced oil was also used to tan leather, make artificial

leather, in the quenching of steel, and in insecticide sprays, candles, rubber substitutes, printer's ink, textiles, and vitamins. Hydrogenated sardine oil was used as a lard substitute, in margarine, lubricating grease, and buffing compounds. In 1934 fifty-one percent of sardine oil went into the manufacture of hand soap and laundry soap; ten and one-half percent into linoleum and oil cloth; thirty percent in leather manufacturing, fruit sprays, and animal feeds; only eight and one-half percent went into edible products, mostly shortenings and [2] margarine.

Most of the costs in producing sardine oil was recovered in the sale of fish meal--the natural by-product of sardine oil. During the 1936-1937 season the Monterey canneries earned \$3,358,573 of their \$7,058,573 income from the sale of reduced meal and oil. The costs in wages to fishermen and cannery workers were only \$3,003,290. Of course, there were other operating expenses including factory maintenance but clearly the reduction business did meet a large segment of the canners' expense.

In their continuing efforts to gain liberal reduction permits and case requirements California's packers found farmers willing to aid them in the legislature. The farmers favored unrestricted reduction

so they could buy cheap poultry and stock feed, as well as inexpensive fertilizer. However, the packers made more feed and fertilizer than California's farmers could use and the excess was sold to out of state and overseas farmers, mainly in Japan. The support given to reduction interests ended up helping California farmers' competitors.

The low costs in producing sardine oil allowed this product to be competitive with cottonseed oil and lard. By the late 1930s, not only was sardine meal a minor, yet profitable, operation for the state's canneries and reduction plants--earning Monterey's canners \$889,660 during the 1938-1939 season--but even the canning operations, at a seasonal value of \$2,584,094, were almost a side line to the extraction of sardine oil which brought in \$1,330,622 for the season. [3] Although the canned pack brought in more money than the sardine oil the costs to reduce sardines into oil and meal were much less than the costs of the canning operation.

While the 1925 Sardine Reduction Act allowed sardines to be reduced for edible products, those reduction operators who were engaged in making inedible products, such as fish meal or fertilizer, decided upon a plan to circumnavigate the law by outfitting an old concrete vessel, the Peralta, as a reduction plant. The

Peralta was one of five cement ships built to save steel during the war by the United States Government's concrete fleet experiment between 1918 and 1919. The Peralta's sister ship, the Palo Alto, now permanently moored at Seacliff State Park in Aptos, Santa Cruz County, cost two million dollars, was 420 feet long, and weighed 3,696 net tons. More than 4,800 barrels of Davenport cement (from Davenport, Santa Cruz County) went into the ship, causing [4] some to believe that the ship would sink.

The Peralta's owners, Ocean Industries, Inc., moved the floater into Monterey Bay, slightly more than three miles from shore, but inside the headlands of the bay. The operators engaged two Los Angeles purse seiners and began reduction operations.

Upon this turn of events, the California Fish and Game Commission had the purse seine captains arrested and their purse seines seized. The captains were cited for violations of the Fish Exchange Act, which prohibited the capture and sale of food fish for non-edible production without the written authorization of the state market director. The Superior Court of Santa Cruz County granted the Fish and Game Commission a temporary restraining order against the purse seiners.

Seeking \$9,000 for the seizure of the nets and

other damages of \$1,000 per day the fishermen filed suit against the Fish and Game Commission in the Southern Division of the United States District Court, Northern District of California, Third Division, at San Francisco. They claimed that because the Peralta was operating in the high seas it was not liable to control by the state.

The hearing came up quickly and on November 13, 1926, Federal Judge A. F. St. Sure set judicial precedent by ruling that Monterey Bay was within the State of California. This was one of the few times that a court decided on the territorial jurisdiction of a bay over six
[5]
miles wide.

During the time that litigation on the Peralta case was pending, Stanley Hiller, Inc., outfitted the Lake Miraflores for reduction. This boat was 4,500 tons, had its own power, and was able to cruise outside the three mile limit. Feeling threatened by the Peralta case, the company filed for an injunction against interference by the state in the Superior Court of Alameda County. The action was dismissed prior to a ruling. The Lake Miraflores' owners then put the ship to sea and attempted to get fishermen to fish for them in the Santa Barbara Channel. The fishermen, however, were unwilling to risk the ire of the Fish and Game Commission and soon the Lake Miraflores returned to San Francisco Bay.

After a meeting with Commission officials the owners agreed to install canning equipment and comply with state regulations, but prior to installing the equipment they put to sea and anchored a short distance below San Pedro, inside the bay but four-and-one-half miles from shore. This placed them inside the headlands as defined by the Monterey Bay case. When the crew took some fish and made some fertilizer the Commission filed for an injunction in Alameda County asking for a three month abatement as penalty against the Stanley Hiller Corporation. The Alameda Court, however, ruled that the body of water in which the Lake Miraflores was anchored did not constitute a bay and therefore found for the defendants. Even with this favorable ruling the operation took in only 3,806 tons of sardines for the 1929-1930 season. [6] This was far below the capacity of the floater, but legal problems faced by the Stanley Hiller Corporation caused an early curtailment of operations until they received the favorable ruling by the Alameda Court.

In November, 1930, the Lake Miraflores moved up the coast and began taking sardines for reduction off the San Mateo County coastline. While operating outside the three mile limit the ship took advantage of California's

harbors for protection from storms, for repairs, and for landing its products. The fishermen working for the floater also continued to use the state's harbors. While this operation ran only four months, until early March 1931, the Lake Miraflores took in an estimated 31,522 tons of sardines. This effort and the Peralta's operations were only the beginning of increased floater activity off [7] California waters.

On August 1, 1931, the Lake Miraflores again commenced reduction operations off the San Mateo coastline. Before ceasing operations in February 1932, the ship took in 21,000 tons of sardines. In their Thirty-Second Biennial Report published in 1933 the Fish and Game Commissioners reported that though their hands were legally tied, because the floater anchored outside of their jurisdiction, the offshore operation took what the Commissioners considered to be California fish. Further, the Commissioners reported, under federal laws and the rulings of customs courts, the offshore operation did not have to pay an import duty on fish meal or oil unless the [8] floater operated under a foreign flag.

During the Summer of 1932 a group of twelve to fifteen purse seine boat owners entered into an agreement with the California Sea Products Company to take over its whaling ship the Lansing. The purse seiners refitted the

ship with modern oil presses and cookers with a capacity of 900 tons of sardines daily. The group, ready to operate on October 1, 1932, hoped to take in 50,000 tons of sardines during the 1932-1933 sardine season. [9]

While the season did not meet the expectations of the Lansing's owners, the Fish and Game Commission estimated that the Lake Miraflores' and the Lansing's combined sardine landings were 58,272 tons--27,090 tons for the Lake Miraflores and 31,182 tons for the Lansing. [10]

The following season the two ships were joined by the old motorless concrete ship Peralta along with the Santa Inez. The Peralta was again refitted with the latest in reduction machinery, as was the Santa Inez. However, financial difficulties caused the two ship's combined sardine landings to be 34,229 tons for the 1933-1934 season. During this same period the Lake Miraflores took an estimated 27,612 tons while the Lansing's estimated catch was 46,832 tons. The Fish and Game Commission's Biennial Report forecasted a larger take for the floaters during the 1934-1935 sardine season with the expected price increase of sardine meal and oil. The catches were made within the three mile limit, but landed, on the floaters, just outside the three mile limit, so in

addition to the loss of control over California's sardines the state was losing an estimated \$75,000 in taxes that the floaters did not have to pay in the 1937-1938 [11] season.

While the floater issue was one of the major concerns of the California Fish and Game Commissioners during the 1930s, most people in the sardine industry, as well as the rest of the country were facing a more pragmatic problem-- the depression. Although "Black Tuesday," October 29, 1929, is the point from which most people begin the depression era, a recession actually began during the summer of 1929. With inventories at exceptionally high levels factories and corporations began laying-off their work force. This triggered a recession as the purchasing [12] power of workers dropped.

When the nation's economy did not recover during the winter of 1929-1930 the canners in Monterey and other West Coast ports began to question their position favoring a 200,000 ton catch limit on sardines, as sardine oil still brought in some income and as the offshore floaters respected no catch limit while they reduced all their landings to oil, meal, and fertilizer. To stave off a limit of 200,000 tons, under the new economic circumstances brought on by the depression, the processors charged that the state fishery biologists did not know how

to interpret the data they found in researching the fishery. The processors brought pressure on the United States Bureau of Fish and Wildlife to conduct an investigation of the sardine. [13]

The worsening economic crisis in the early 1930s coupled with farmers agitating for low cost fertilizer and the high price for sardine oil resulted in the Division of Fish and Game, under the authority of the Fish and Game Commission, granting liberal permits to use sardines, fit for food purposes, for reduction into meal and oil. This public policy decision was made "in order to assist the fishing industry as a whole and make for more employment among the fishermen and cannery workers." [14]

While the processors did benefit from the liberalized permit situation, not all of the sardine canners wanted the continuation of the high production of oil. A few operators realized the potential problems of massive catches and actively supported the Division of Fish and Game in efforts to cut back on oil production. They felt that the industry would be seriously threatened with severe sardine shortages if it did not get back into the canning business. By 1932 canners were willing to accept the Division's recommendation of a 250,000 ton sardine limit, although a 300,000 ton limit was also

discussed. This limit was to be allocated to canners on their canning capacity and past performances.

There were three major problems with the limitation proposal: First, the cutbacks were slated to go into effect during the depths of the depression at a time when thousands of California workers were on relief; second, the floaters were outside of the state's jurisdiction and could not be forced to adhere to a catch limitation; finally, the legislature could not, and would not, enact such a law while the floaters were still threatening not only the canners and hundreds of fishermen, but the nearly 10,000 cannery jobs.

Instead of a quota the State Legislature and Division of Fish and Game decided to try and help the shore plants compete with the floaters. They issued permits for additional amounts of sardines for reduction purposes. While this was politically a good move as "[t]his caused a local island of prosperity in the sea of depression and fishermen left the relief rolls for sardine fishing", the new permits continued to overtax the supply of sardines. By 1933 the laws restricting the amount of tonnage used for fish meal and oil was removed, resulting in more pressure to increase reduction operations. [15]

When the 1934-1935 sardine season arrived, with the expected increase in sardine oil prices, the Division

of Fish and Game issued permits in excess of the 5,000 tons for each plant that the Commission of Fish and Game recommended. "Under the circumstances [the depression and competition from floaters] it seemed proper to issue liberal permits, even if it resulted in a serious strain on the sardine supply." The sardine landings for most of the shore plants, during the season, equaled 12,000 tons each, or 480,746 total tons of sardines for the state. This resulted in 16,800,000 gallons of oil and 77,600 tons of meal for the shore plants while the floaters took in 133,123 tons of sardines reducing 5,358,000 gallons of oil and 22,400 tons of meal. The floaters' ranks increased when the Santa Inez joined the Lake Miraflores and Lansing. [16]

While the liberal permits did maintain jobs for fishermen and cannery workers and did give relief to canners the situation led to increased expansion in an already overextended industry. More fishermen and more boats entered the fishery. By the 1936-1937 season Monterey's fishing fleet included 93 boats and about 700 men, many from outside California.

As canners concentrated on reduction, the canning pack decreased from 1,513,688 cases during the 1935-1936 season to 1,288,205 cases the following season

which resulted in a demand for canned sardines at the end of the season. In addition, new plants were built for the 1935-1936 season. In Monterey Bay a new plant opened at Moss Landing to take advantage of the liberalized permits, causing the catch to increase from 180,090 tons during the [17] 1935-1936 season to 206,229 tons the following season.

The 1935-1936 sardine season resulted in an overall decline in California of fifteen percent in the total catch over the previous year, down to 407,166 tons. The total number of permits increased due to the new plants, although the tonnage granted was much less than the previous season. However, the floaters increased their landings to 254,000 tons of sardines resulting in 7,826,000 gallons of oil, almost 2.5 million gallons more than in the 1934-1935 season. The sardine meal tonnage increased to 27,900 tons, approximately a five-thousand-ton increase.

Part of this increase was due to yet another ship, the Brookdale, joining the growing floater fleet. The shore plants reduced 13,200,000 gallons of oil, 5,480,000 fewer gallons than in the previous season. Their meal tonnage was 59,900 tons, or 17,700 tons less than the past season. Fortunately, the demand for canned sardines remained as strong as during the spring of 1935 and most of the three million cases of canned sardines

were sold within the United States. This was an encouraging development, for in the past, eighty percent of the pack was sold to foreign countries. With this turn of events canners again began to consider the effect of [18] excessive reduction on the supply of sardines.

In 1936 the shore-based sardine processors and conservation groups, comprising sport fishermen, who were worried that a decline in sardines would seriously reduce the number of bigger game fish that fed on sardines, and fishery scientists, who were worried about the commercial future of the sardine, attempted to pass a federal law prohibiting the delivery of sardines on the high seas, or giving the state jurisdiction to control delivery at sea. Floater interests postponed the action by asking for a special study on sardines by the United States Bureau of Fisheries claiming that the State Fishery Laboratory findings regarding sardine depletion were in error. While the state legislatures of Washington and Oregon agreed to a federal study, California's legislature did not, citing the vast amount of work already completed by state [19] biologists.

However, any attempt to actually utilize the findings of the research that might suggest a need to limit the catch size was met with opposition by industry

leaders. The sardine processors simply found scientists who believed that the depletion, by overfishing, of a pelagic species was impossible. The result, a debate among scientists, stalled any meaningful use of data gathered by California scientists, as the industry managed to institute a federal-state research program in California. The sardine industry wanted the federal agency to participate, as the federal biologists were involved in conducting research only, while the state biologists were not only conducting research but also [20] involved with managing the fishery.

In order to placate the injured feelings of the state's sardine researchers, the United States Fish and Wildlife Service, Bureau of Fisheries sent Oscar Elton Sette, formerly with the California program, to the West Coast in hopes that his friendship with California researchers could bridge the gap between the two differing [21] groups. Sette, however, encountered opposition to his proposed work. In countering the opposition he found in California, Sette stated that the bulk of the sardines were within the state's waters. Sette worked out of Stanford University in Palo Alto and managed to secure a [22] cooperative plan with state investigators in 1932.

Sette finally managed to enact a cooperative investigation of the sardine catch per-unit-of-effort in

California waters by the United States Fish and Wildlife Service and the California Division of Fish and Game with the cooperation of the Hopkins Marine Station from 1932 to 1942. In addition, the investigators received clerical help from Works Progress Administration (WPA) employees. A report on the investigation's findings was co-authored by Ralph P. Silliman of the Fish and Wildlife Service and Frances N. Clark of the Division of Fish and Game. [23]

While California's shore plants continued to expand in numbers, reaching seventy by 1938, the offshore operations started a decline during the 1936-1937 season as the floaters took only an estimated 90,030 tons of sardines. Afraid that the increasingly liberal catch limits would lead to depletion of the sardines, the editor of the Monterey Peninsula Herald wrote an editorial asking "that the State and Federal government do not wait until the theory of depletion is a PROVED FACT." The editor also charged that the floaters were only interested in immediate speculative profits, while the shore plants, being investment oriented, were interested in regulation and control of the natural resource. The editor charged that the legislature had listened to the "greedy and predatory elements that insist the legislature and its advisors are incompetent to regulate honestly and

[24]

scientifically."

Fortunately, after the next year, 1938, several factors combined to end floater operations. Workers on the reduction ships worked up to twenty-four hours a day when landings came in and the American Federation of Labor Fishermen's Union, established in 1934, agitated for a eight hour work day and higher wages. Furthermore, a dismal catch of 43,889 tons of sardines, placed the floaters at an economic disadvantage in competing with shore plants. In addition, a state initiative, pushed by California's fish canners and supported by the state's press, passed in November 1938, prohibiting the delivery into California of fish meal and oil processed outside of California waters. This law, lower fish oil prices, and increased operating costs combined to put an end to the floating reduction ship operations at the end of 1938. However, after all the effort expended to control the floaters, they were not a major problem for California's sardine industry, according to Dr. Frances N. Clark, the state's sardine expert from the 1930s through the

[25]

1940s.

The early depression adversely affected almost all businesses in California including the sardine fishery. The total value of California fishery products dropped more than in most parts of the nation resulting in

a lower gross income for California's fisherman than the gross income for fishermen in other states. Fishermen put off as much maintenance and outlay for vessels and gear as they could, thus affecting the shipyards. California's canneries and reduction plants were forced to reduce their operating days. Businesses that relied on the canneries were correspondingly affected as the canneries purchased fewer supplies and canning equipment and shipments were also curtailed. [26]

In addition to the general worldwide depression, several other factors contributed to the hard times for Monterey's sardine fishermen. Norway, France, Russia, and Japan levied high tariffs on United States canned sardines and the packers were forced to accept unfavorable rates of exchange for goods sold overseas. Furthermore, Monterey's canners and reduction plant owners faced stiff competition in the Orient and Europe from Japanese and Russian sardines, fish meal, and fish oil. The latter factor compounded an already bleak situation in Monterey as the canneries had a surplus of pre-depression sardine products on hand, amounting to half a million cases of the canned product, and kept their orders low by reducing the price paid to fisherman from \$11 per ton to \$8. The fishermen attempted a strike on August 15, 1930, to force the price

up, but due to the surplus they were unsuccessful. The sardine catch actually declined for the first time in several years during the early years of the [27] depression.

At the opening of the 1931-1932 season on August 1, 1931, Monterey's warehouses were empty. Although the fishermen agreed to a price of \$8 a ton they did not experience any relief as the markets were still poor. The packers price for oil fell to 12 cents a gallon. A number of packers did not open and several others operated for [28] only part of the season. In addition, Monterey's sardine fishermen landed only 69,823 tons of sardines during the 1931-1932 season. This meant that they earned only \$550,584 for the season as compared to \$1,743,774 [29] earned during the last good season, 1929-1930.

The sardine season ended on February 15, 1932, with twenty-five percent fewer fish caught than the previous poor season. To help combat their financial plight Monterey's fishermen asked for an emergency permit of 5,000 extra tons of sardines for reduction purposes. Their petition was backed by the mayors and chambers of commerce of Monterey and Pacific Grove, who pointed out that otherwise the fishermen would be out of work and risked losing their boats. Sympathetic with the fishermen's dilemma, the Division of Fish and Game granted

an emergency measure of 3,000 tons, but due to poor
[30]
weather the fishermen brought in only 510 tons.

At the beginning of the 1932-1933 season the packers faced the same problems that they had faced in the beginning of the depression. They hoped that the domestic market would absorb more of the canned product, to offset the depressed foreign situation. Despite the general depression, however, the American public did not develop a taste for canned sardines. With a carry-over of 200,000 cases and low prices the packers were unable to recover
[31]
their costs of production. The market for sardine oil and meal was a quarter of what it was before the depression. However, reduction remained the only way to
[32]
make any money in the industry as reduction was the cheapest way to process the catch.

Several packers indicated that they would not open during the 1932-1933 season. Fishermen and cannery workers, who had already suffered through two poor seasons, faced financial ruin. After a series of meetings with the fishermen and packers, the Fish and Game Commission decided to allow season permits to each plant of 7,500 tons of sardines for reduction purposes. Even with the liberal reduction permits, some plants did not open and several that did open used only a portion of

their permit allotment.

To enable the canneries operate at all during the 1932-1933 season, the packers forced the fishermen to accept a price of \$4 per ton of sardines. While neither the packers nor the fishermen made a net profit they did manage to weather the crisis. Because of the extra reduction permits the canners actually packed very little of the catch and by the end of the season there was a new demand for canned sardines as the warehoused supply dwindled. Even with all the problems caused by the depression, California was the leading producer in fish, mollusk, and crustacean tonnage landed, ranking third behind Massachusetts and Alaska in total value. During this time fish delivered to canneries averaged eighty-five percent of the total catch. Sardines were by far the biggest fishery in the state, although they trailed [33] albacore in value.

For the sardine fishermen the lowest point of the depression came during the 1932-1933 season, when they were paid only \$4.00 to \$4.25 per ton of delivered sardines. Monterey's entire fleet received only slightly [34] more than \$360,000 for the season's haul.

When the 1933-1934 season opened, the packers were receiving a profit on oil and meal for the first time in several years. The canned product, however, did not

rise above the costs of production. The Fish and Game Commission again issued reduction permits, but cut the amount down to 6,000 tons for each plant. The Commissioners stated that they were acting to enable the canners to put up a larger pack which would give more employment to the cannery workers and relieve the situation among the fishermen. Further, the Commission members felt that it would be unfair to limit the reduction amount for the shore plants when the floaters, who also received their fish from the California fishermen, were not subject to catch limitations.

Although the canners offered \$6 a ton for sardines the fishermen soon went out on strike for more. After a month the packers and fishermen negotiated with Timothy Reardon, the State Director of Industrial Relations, and settled on a price of \$7 a ton and the season was prosperous for both the fishermen and the canners. All the plants operated and most took in their full allotment for reduction purposes. In addition, because of a better than expected market they canned more sardines than in past seasons. The 1933-1934 season ended with a catch of 313,842 tons of sardines landed by the shore plants and another 77,000 tons taken by the floating
[35]
reduction plants. In Monterey the catch was 151,937

tons worth \$1,063,559 to the fishing crews.

Other than the first few years of the depression California's packers and fishermen did not feel the effects of the nation's poor economy the way many other businesses did. From the 1933-1934 season on, the canneries were taking in ever-increasing amounts of sardines for reduction and canning. During the first half of the 1930s (1931 through 1935), fishermen landed almost four billion pounds of fish, mollusks and crustaceans in California. Ninety percent of this amount was landed at canneries, and sardines accounted for more than double all other species of fish, mollusks and crustaceans
[37]
combined.

With the economic turnaround in the sardine fishery during the mid-1930s fishermen began returning to their trade. By the 1933-1934 season a total of eighty-four boats fished in Monterey. Sixty-one were purse seine boats of which fifty-three fished full time. During this same season only fifteen launch-and-lighters fished compared to twenty-three during the previous season. Several of the launch-and-lighter captains chartered seventeen purse seine boats from Washington and Southern California to see how effective the rigs really were. One boat's captain still used the old lampara net during the beginning of the season but after landing a small load

[38]

this captain also adopted the ring net.

By the 1936-1937 sardine season ninety-three different boats fished in the Monterey area; of these, seventy-five were permanent residents. Fifty-one were purse seiners. Twelve of the temporary boats were purse seiners, making a total of sixty-three purse seine boats fishing for sardines. Only thirty of the full time and temporary boats fished for sardines with the older lampara launches and lighters in the Monterey area during the season. [39]

This in marked contrast to the sixty-two lampara boats fishing out of Monterey in the previous seven years. The old launch-and-lighter lampara combinations with the new ring nets were clearly going out of favor.

One reason that the older lampara boats became antiquated was their lack of cruising radius and the increased need to travel beyond the launch's range. By the mid-to-late 1930s Monterey's sardine fishermen were fishing the same grounds as San Francisco's fishermen. Monterey's sardine fleet cruised 115 miles north to Point Reyes and 70 miles south to Piedras Blancas. The extension of the fishing grounds south of Monterey came between January 15 and 19, 1934, when sardines were scarce north of Monterey and fishermen fished between Point Sur

and Pfeiffer's Point, 28 miles south of the port. During January of the 1938-1939 season Monterey's purse seiners were forced to extend this range down to Piedras Blancas when the sardine school they were fishing from moved from the Farallone Islands, west of the Golden Gate, south to Half Moon Bay, and finally south of Point Sur. As the fishermen could not locate another school in their old fishing grounds they were forced to travel still further south for sardines.

Monterey's fishermen were reluctant to travel south because of the Central Coast's rugged coastline with only two lighthouses in 80 miles, lack of a safe anchorage in the event of a storm, and treacherous currents that interfered with the laying out and hauling in of nets. In addition, landmarks for navigation purposes were scarce and returning north with a full load was difficult as the sea current runs south along the coast. [40] This, of course, was before the advent of radar and sonar, which is a tremendous safety feature to modern fishermen.

Another aspect of sardine fishing, combined with the reasons stated above, added to the fishermen's reluctance in traveling south--sardine fishing was done on dark nights when the moon was not shining. The boats traveled with their lights out while the crewmen looked for a luminescence in the water. The luminescence was

caused by the sardines and once spotted the fishermen would circle the school of fish with their nets. At this point the trapped fish would thrash about in the water [41] making quite a spectacle.

The greatest sardine catch, on the Pacific Coast, occurred in the 1936-1937 season when fishermen landed 789,000 tons of fish, or about 4,740,000,000 individual fish. This was an increase of 160,000 tons over the previous season. Fishermen in Monterey caught 206,116 tons of sardines during the 1936-1937 season representing a 22,000 ton gain over the preceding season. In addition the Monterey sardine fishermen received \$589,386 more than during the 1935-1936 season. The increased catch also helped cannery workers' wages rise from \$917,000 to \$941,000. This increase should have been at least \$60,000 larger, but three hundred cannery jobs were lost due to the Del Mar Cannery Fire in November [42] 1936.

This situation did not last long, however, as the following season Monterey's sardine fishermen often came back to port empty. The 1937-1938 catch in Monterey [43] resulted in a catch of only 104,464 tons.

Over next three seasons before United States entered the Second World War, Monterey's sardine fleet

averaged 191,333 tons per season. Along with the rise of Monterey's sardine catch in the late 1930s and early 1940s came a rise in the amount of money paid to fishermen per ton of sardines landed, which reflected a rise in the prices that the canners received for their products. From a low of between \$4 and \$4.25 paid to fishermen in 1932 the earnings rose to a high of \$13 paid during the 1937-1938 season. By 1940 the price paid to fishermen had sunk to \$10.50 a ton but the following year the price jumped to \$17 a ton for sardines landed at the canneries. [45]

The number of sardine boats in California also rose during the late 1930s. From a low of 149 boats in the first depression year, 1930, the number rose to a peak of 379 sardine boats during the 1937-1938 season, as the wages climbed. The boats were not newly constructed sardine boats but, rather, captains and crews trying to cash in on high wages. Over the next three years the number of boats engaged in sardine fishing dropped, as the wages sank, to 321 boats in 1940. In Monterey there were 93 boats fishing for sardines during the 1936-1937 season [46] this number dropped to 60 boats two seasons later.

By the time the United States officially entered the Second World War, the San Francisco Sardine Association reported that 50 percent of the weight of sardines delivered to California sardine processors went

to human food, 28.5 percent of the weight went into fish oil, 21 percent went to fish meal, while 0.5 percent went into fertilizer. [47] The conservation of the sardine by methods proposed by the Fish and Game Department's scientists were clearly not in vogue. However, the onset of the war and increased involvement by the United States during 1941, first in supplying the European Allies with food, then by direct involvement, brought about a change in the use of sardines as the canned product became increasingly sought after as a food source by the Allied [48] forces.

In April 1941, with war raging in Europe and Asia, the state legislature enacted a new licensing law requiring additional registration and identification, in the form of fingerprints and two photographs, from fishermen and boat owners. The new identity cards had to be renewed every five years by all fishermen, alien or citizen. In addition, fishermen were "under the close surveillance of at least five federal agencies." Agents patrolled both the ocean and waterfront, making checks on fishermen returning from offshore waters. After December 7, 1941, the federal government revoked the licenses of all non-citizen Italian as well as all Japanese fishermen; very few of these fishermen, however, were engaged in the

sardine fishery. But their absence did affect the state's
 tuna fishery. [49] (During the following year, 1942, the
 United States forced all the Japanese living on the West
 Coast into concentration camps.)

The war had a profound effect on the California
 fishery. Free movement in and out of fishing ports was
 curtailed by military authorities; many of the newest
 fishing boats were taken over for national defense, the
 number of boats engaged in sardine fishing sank to a low
 of 206 by 1943; scouting for fish was cut back due to
 enemy submarine activity; and some fishing grounds in
 sensitive areas were closed altogether. In addition,
 experienced fishermen were drafted. All this resulted in
 a reduced sardine catch of 484,874 tons in 1942 which was
 approximately 150,000 tons less than the previous year.
 However, the average annual catch of sardines in the state
 actually increased by 29,000 tons from 1941 to 1944 due to
 increased fishing effort and higher wages paid to
 fishermen. Monterey took part of the general increase as
 the catch went from 165,145 tons during the 1940-1941
 season to 249,717 tons the following season. [50]

For the fishermen left in Monterey the food
 situation caused by the war resulted in increased profits.
 By the end of the war, during the 1944-1945 season, the
 price paid to fishermen was at a forty-year high of

[51]
 \$22. As more men returned from active duty in the Armed Forces and as the government began releasing boats from wartime service in 1944 and 1945, the number of sardine boats in California increased to 225, while in Monterey the fishermen used 84 boats. [52]

The Second World War introduced three problems for fishery management: 1) The demand for food caused an intensification of fishing; 2) California's population soared from 6,900,000 people in 1940 to 10,500,000 by 1950, which affected all public services and led to water pollution and shortages as well as the destruction of aquatic habitat; and 3) Fishery biologists went off to war, placing a temporary hold on needed research. However, the war years also provided those biologists who left California with different perspectives. In talking with fishery experts from other nations California's wartime fishery scientists developed a world wide view of fisheries. The biologists also changed their thinking about research. They became convinced that a multiple-species approach to research was important. The whole picture of what was happening in the ocean was their new focus. [53]

From the 1930s through the war years radical changes occurred to California's sardine fishery. There

was a constant improvement in the methods fishermen used to find and catch fish. In order to compete with other fishermen and fully utilize fishing grounds that were increasingly far from home ports, fishermen increased the size of their boats. In addition, the fishermen bought larger nets. The purse seine and ring net replaced the lampara net, diesel replaced gasoline, mechanical labor-saving devices were introduced, radio telephones allowed fishermen to communicate with each other at sea. [54] All this activity suggested that once the war was over California's sardine fishery might expand, as it did after the First World War. This, however, was not to be. The second half of the 1940s saw a marked change in Monterey's and California's sardine fishery.

CHAPTER VI: ENDNOTES

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CHAPTER VII

A PROGRESSIVE LEGACY:

Scientific Management in the Corporate Age

From the 1920s through the 1940s as the California sardine fishery grew into the largest fishery in the state, [1] various state and federal agencies conducted research into the effects that this large scale industrial fishing effort had on the sardine population. Over the ensuing years various agencies, both public and private, joined in with their own investigations of the sardine. In the late 1920s the Fishery Research Board of Canada started research in Vancouver, British Columbia. The United States Bureau of Commercial Fisheries as well as the states of Oregon and Washington began investigations in 1937. The following year all four agencies, plus the California Department of Fish and Game sent scientists to the first of a continuing series of annual conferences. Finally in 1949, with the demise of the sardine fishery imminent, the California Marine Research Commission--including the California Department

of Fish and Game, the United States Bureau of Commercial Fisheries, Scripps Institute of Oceanography, the California Academy of Science, and later Stanford's Hopkins Marine Station--formed the California Cooperative Oceanic Fisheries Investigations (CalCOFI). [2]

For over forty years, from the inception of research in 1919 until well after the demise of the fishery, scientists published hundreds of research papers dealing with the life history of the sardine, the fishing grounds, catch methods, and many other related topics. More information was known about the Pacific sardine than about any other single species of fish, [3] yet little of the information gathered by scientists was utilized by public policy decision makers in the management process.

By 1928 fishery scientists discovered signs of overfishing and issued warnings of potential problems. In March 1929, the State Legislature was appraised of the overfishing situation and were asked to restrict the use of sardines to canning. That same year the State Fisheries Laboratory recommended that the State Legislature give the Division of Fish and Game the authority to limit the sardine catch to 200,000 tons in the interest of conservation. Several factors combined to keep this measure from being implemented: the lack of control over the floaters' fishery, the depression, World

War Two, and opposition by the reduction interests as detailed in the previous chapter. On April 16, 1930, the state's fishery scientists issued warnings of impending depletion of the commercial sardine stock to both state officials and the leaders of the sardine industry at hearings held in San Pedro by State Assemblyman William P. Jost's Interim Committee. [4]

In addition to fishery scientists, others began warning of the potential for disaster. On February 26, 1937, the editor of the Monterey Peninsula Herald reminded his readers that the Pacific whale, once caught in the Monterey Bay region, was gone. He also pointed out that the commercial salmon fishery of Monterey and the Sacramento River were overfished. Furthermore, the albacore tuna fishery in Southern California was then depleted, and without federal government programs for restocking the northern salmon, that fishery, in Northwest British Columbia and Alaska, could not survive. He concluded with a warning, "Any interested party can without any stretch of the imagination visualize the depletion of the sardine industry under present [5] conditions."

Fishery scientists were increasingly unhappy with the rate of expansion and the resulting levels of

sardine landings. These factors led to an increased reliance on reduction, which was the industry's primary business. In addition, the state legislature was not making any headway with controlling the floaters. These factors, the scientists felt, were adversely affecting the entire food chain in California's waters. Warnings continued to appear in fishery publications, but suggestions to limit the catch were opposed by industry and the state legislature on grounds that the scientists [6] had not given positive proof of depletion.

In an article, "Sardine Oil and Our Troubled Waters," in California Fish and Game William L. Scofield, California's chief fishery scientist, outlined in 1938 the Division of Fish and Game's concerns for the sardine industry. Scofield's article warned that the sardine fishery was facing a crisis:

Our management of this fishery during the next few years will determine whether this career is to be a skyrocket that will drop back into darkness after a brief burst of glory, or whether it will be made a genuine career that will bring continuous wealth and satisfaction to the people of the State for years into the future.

In addressing the problem of proof of depletion Scofield wondered if those concerned with the fishery could "recognize the crisis and apply common sense ... before it is too late." Scofield went on to state that it was impossible for fishery scientists "to offer proof of

[7]
serious depletion till it had occurred."

The Fish and Game Commission, with the urging of their scientists, continued to petition the legislature for total control of the sardine fishery throughout the 1940s and into the 1950s. Finally, in 1967 the state legislature placed the first comprehensive moratorium on sardine landings; [8] the effort was too little and too late.

Between April 1929, and September 1932, Leland Stanford Junior University Hopkins Marine Station's Hydrobiological Survey and the Bureau of Commercial Fisheries of the California Division of Fish and Game cooperated in a study of the early life history of the California sardine. The intention of the study was to establish a method of accurately predicting the success or failure of each sardine year class two or three years [9] before the group entered the commercial catch.

One of the key questions regarding the life history of the California sardine was the location of its spawning ground. From the inception of sardine investigations scientists looked for the answer. William F. Thompson wrote in laboratory notes in the early 1920s that he and Elmer Higgins took eggs they thought to be sardines. Finally, in June 1929 Eugene C. Scofield, of

the Department of Commercial Fisheries and the son of Norman B. Scofield, with assistance from Stanford's Hopkins Marine Laboratory, discovered eggs and larvae of sardines five miles off Point Vincent in Southern California while working on the Fish and Game patrol boat [10] Bluefin.

Over the next few years further research proved that the majority of California's sardines spawned in Southern California between San Diego and Point Conception up to 100 miles offshore. The total range for sardine spawning extended from Cape San Lucas in Baja California north to San Francisco. However, few fish spawned in the waters off Central California. Further, investigations revealed that large fish from the same year class appeared one month earlier in Monterey than in San Pedro, thus [11] proving that the sardines were a migratory fish.

Next to discovering the spawning grounds of the sardine the discovery that the sardine was a migratory species helped scientists understand more about the life history of the fish. As early as 1918 J. P. Babcock of the British Columbia Fisheries Department wrote that the fish found in Canada were large and fat. The Canadian catch was sold fresh or packed in one-pound and half-pound cans. In 1923 Puget Sound fish packers in responding to written inquiries wrote that the sardines in the catch

were very large and uniform in size. The following year The Pacific Fisherman reported that the sardines in the Puget Sound area were so much larger than those caught in California that the processed fish could not be packed in one-pound oval cans the California way. These reports [12] suggested that the sardine was a migratory fish.

By 1934 researchers understood quite a bit about the spawning habits of the sardine and Dr. Frances N. Clark's article "Maturity of the California Sardine," summarized the findings to date:

- 1) Individual sardines spawn more than once during each spawning season.
- 2) Larger fish spawn more eggs at one time than do smaller fish and ripen more batches of eggs each season.
- 3) A few females mature for the first time at 60 to 170 mm., body length, 50 per cent of the females in the commercial catch mature at 180 to 190 mm., 90 per cent at 200 mm., and all females are mature at 220mm.
- 4) Spawning occurs from February to August and the height of the spawning season is in April and May.
- 5) H2O temperature determines if the sardines will spawn in the Monterey area. If the water is cold they do not.
- 6) Sardines move South during winter months.
- 7) Maturing and spawning cause sardines to lose weight in the spring and summer months. The weight of larger fish is affected more by spawning than the weight of smaller fish.[13]

By 1936 much of the life history of the sardine was understood by fishery researchers.

Pacific Coast fishery scientists were not the

only people interested in further research into the habits of the sardine. In a paid advertisement published in the Monterey Peninsula Herald Knut Hovden wanted studies on the migration of sardines to determine which fish migrated and which did not.

[14]

The research that Hovden called for was already taking place in a cooperative program involving researchers from Canada, Washington, Oregon, and California and had been since the late 1920s. The results of the tagging program, initiated in 1937, was reported on by John F. Janssen in 1938. Janssen's article pointed out that the migrating fish initially go as far north as Central California and each year go further north until by the time they are eight or ten years old they reach British Columbia before turning south again to spawn off southern California.

[15]

A few months before Janssen's article appeared William L. Scofield reported that fishermen caught sardines as far north as southern Alaska, up to 300 miles from shore, and in depths up to 500 fathoms. Scofield also reported that the fish spawned within 100 miles of shore. The spawning season was from February to July peaking in the months of April and May. The sardines were able to spawn as often as two to four times a year for the larger fish and produce from 35,000 to 65,000 eggs each.

The eggs floated at or near the surface where the young utilized minute plants and animals floating at the surface of the ocean. [16]

By 1940 Dr. Clark was able to report that the younger fish remained on the nursery grounds from six months to a year. The young sardines started moving northward by their second summer and each year moved further north in the migration cycle. The oldest fish eventually migrated as far north as British Columbia in the summer. In the fall and winter the fish moved south, along the coast, reaching the spawning grounds by the spring. Clark also pointed out that because the sardines migrated all the fishing regions were drawing from the same sardine population, although from different age groups. [17] In 1938 thirty-five small sardines were found in an albacore stomach thirty miles off the Columbia River mouth proving that young sardines lived in Northern waters. [18]

The Central California sardine fishery flourished in the fall months, right when the sardines were turning south on their migration cycle and, as could be expected, the best fishing in Southern California occurred in the winter months. The spring months were not good for fishing as this was the spawning season in

Southern California waters. The larger fish lost weight due to spawning and the sardines were not concentrated in large schools during the spring. [19]

Investigations revealed the existence of fluctuations in the number of each year-class of sardines and in the size of the fish in the catch. This fluctuation in numbers was self-perpetuating when the year-class reached spawning age, and also showed up in a fluctuating catch. The fluctuations were found to be the result of different dominant year-groups or superabundant groups which appeared every three to four years. The entrance into and passage through the fishery of these superabundant groups was largely responsible for the average size of sardines. [20]

When these fish entered the commercial fishery the result was more than the usual numbers of younger smaller fish in the catch. Further, when these superabundant groups reached maturity there was a corresponding high number of larger fish reported. The effect of superabundant groups meant that scientists could not come to any conclusions or establish a trend of increase or decrease of large fish. Therefore, if the fluctuation of the largest sardines was the only criterion for overfishing, depletion of the sardine stock could advance to serious proportions before the investigators

knew of it.

Another major problem discovered was that the fall fishery was dependent upon younger adult fish from three to four age-groups. This placed a higher strain on young age-groups than the winter fishery which drew from eight to ten year-classes. In addition, the fall fish were smaller than the winter fish resulting in twenty-five per cent more individual fish caught per ton in the fall than in the winter.

As the commercial fishery expanded, with more boats and more effort expended, each superabundant group was exploited to a higher degree than before, with the result being that all the California fall sardine tonnage of the 1930-31 and 1931-32 seasons, three-fourths of 1932-33 season, and two-thirds of 1933-34 season were supplied by one superabundant group. This resulted in 425,000 tons of sardines being taken from one age group. This, in contrast to the previous superabundant group, exploited from the 1925-1926 season to the 1929-1930 season, which supplied only a little more than 200,000 tons of sardines. Because of this heavy exploitation superabundant groups lost their dominance in the fishery long before they should have.

The over-exploitation was not limited to

superabundant groups, however, but to all groups. As each group of young fish ran this "gantlet" of fishing exploitation, the immediate effect was fewer younger and smaller-sized sardines. When the age-class ran its life course the end result would be a scarcity of all sizes. The fishery scientists feared that without a cutback of the fall fishery:

the time is not far distant when each new year-class will be practically destroyed before it has grown to sizes which support the winter fishery. Such conditions may eventually result in inadequate numbers of spawning fish and serious depletion of the sardine population.[21]

Frances Clark pointed out, in 1937, that the life span of a year-class lasted for no more than four or five years, [22] from the 1928-1929 season on.

This bleak view was not tempered the following year, even though Clark pointed out that the decline in numbers of sardines that occurred up to the 1937-1938 season stopped, due to an abundance of young sardines. Clark reported that larger sardines were difficult to find and that the resulting intense reliance on small fish would not allow the smaller fish to reach a larger and more useful size. [23]

The change in the number of older fish also resulted, according to Clark, in a change of the number of spawn, larvae, and young produced. However, the

temperature of the water in the spawning ground, or the abundance of food for young might be a more critical factor in survival and ultimate numbers of sardine eggs. All factors considered, Clark reasoned that because the sardine was a slow-growing species and because they were heavily exploited before reaching maturity, "it is almost inevitable that the amount of spawn produced will be [24] diminished by an intensive fishery."

One of the methods developed to determine the amount of sardines available to the fishery was the fishing effort expended to land the catch or catch-per-unit-of-effort. In the early 1930s fishermen were reporting that they had to go further and further out from port to make their catch. To accomplish this the fishermen used larger boats with larger and more efficient nets. The resulting increase in fishing effort was greater than the corresponding increase in the sardine [25] catch.

Working with this method fishery scientists were able, by the late 1930s, to reach the conclusion that the catch per unit-of-fishing-effort was one of the best ways to measure abundance of sardines in California waters. If the return of catch for a given unit of fishing effort dropped over a period of years, then this would show depletion.

In 1938 William L. Scofield demonstrated the viability of this measurement in an article "Sardine Oil and Our Troubled Waters," published in California Fish and Game. Scofield reported that the greatest yearly landing of sardines was made during the 1936-1937 season. During this season there was an increased fishing effort as sixty-five new sardine boats entered the fishery. Overall these boats did not fare well; however, the following season, 1937-1938, another 60 boats entered the fleet. During this season, with more boats, the total catch was off 22.7 percent of the previous year. "Clearly," according to Scofield, "an indication of decline in the abundance of sardines." [26]

One problem that the fishery scientists had to overcome was that, in general, during the late 1930s the actual sardine tonnage landed was very high. The following chart lists seasons and tons of sardines landed for canners and reduction outlets as well as reduction ships:

Season	Landings in tons	% Difference
1932-1933	271,030	
1933-1934	405,501	+ 49.6
1934-1935	689,077	+ 69.9
1935-1936	716,808	+ 4.0
1936-1937	876,816	+ 22.3
1937-1938	677,025	- 22.7

While this chart basically depicts a healthy fishery, the drop-off of 22.7 percent is not significant for the industry as a whole, given that the 1937-1938 season's landings were within the overall six-season average of 606,042 tons. However, when scientists measured the yield-per-unit-of-effort another picture emerged.

To measure the trends of return-per-unit-of-effort the 1932-1933 season was used as a starting point by fishery scientists. The effort fishermen expended for that year's catch represent 100 percent and the following seasons are a percentage of the 1932-1933 season. Until the 1934-1935 season the return per unit of effort revealed no change. However, that year and for the next three years, the return for effort information collected from the fishermen showed that:

each year's fishing yielded less return than did the previous and in 1937-38 the fishermen were catching, with the same expenditure of effort, less than half as much as they had six seasons before.[27]

In another article the sardine catch-per-unit-of-effort was depicted from a starting point of the 1934-1935 season as follows:

Season	% Sardines per-unit-of-effort
1934-1935	100%
1935-1936	70%
1936-1937	50%
1937-1938	30%

The catch per-unit-of-effort revealed a different picture than the tonnage landing figures, given earlier, would indicate. While the sardine tonnage rose between the 1934-1935 season to the 1936-1937 season the fishermen were having a harder time finding fish as depicted in this chart. [28]

In Monterey the sardine tonnage landed from the 1932-1933 season to the 1937-1938 season shows a general rise with some fluctuation. In addition, the unit-of-effort shows no significant decreases with the exception of the 1937-1938 season as compared to the greater return of the 1936-1937 season. [29] During this season the fishermen started having major problems obtaining sardines.

The San Francisco catch between the 1937-1938 season and the 1941-1942 season showed a decrease in unit of effort tonnage of forty-seven per cent. At the same time the actual numbers of fish landed increased:

Such a finding is in keeping with the now widely-held theories regarding the relationship between fishing intensity and population characteristics such as that first expounded by Baranov (1918) and simply stated by Thompson (1937). [30]

The researchers feared that the fishery was relying too heavily on younger fish and this would eventually lead to an inability for the stock to regenerate itself.

In 1945 an article in California Fish and Game showed that for the ten years following the 1935-1936 sardine season the sardine catch-per-unit-of-effort in California decreased by thirty-four percent. In the same article an explanation of the overall conditions and data regarding the catch-per-unit-of-effort was explained.

Basically the overall sardine picture was complicated by many factors: i.e. the fluctuation of year-classes, the size of sardine schools, the migration route they followed, the depths at which they were found, and the speed with which they moved through a fishing area. These factors, the fishery scientists reasoned, might be influenced by the variations in the ocean currents off the coast and the location and amount of food. Furthermore, stormy weather often forced the fishing fleet to remain in port, thus affecting the yearly catch figures. In addition, negotiations over fish prices and sales practices also helped keep the fleet at home.

Other factors to consider were the increase and decrease of boats just before and during the Second World War years and the increase in efficiency of boats and nets, as well as the use of radios, that occurred during those years.

After considering all these aspects of the sardine fishery, scientists were certain that there was a

decrease in sardine abundance over the numbers of sardines that existed prior to the mid 1930s, when the expansion of the fishery began. [31]

This decrease was found in four areas of research: 1) The return per-unit-of-effort was less than in the past, 2) The length of time that a superabundant group could be traced through the fishery decreased from a period of six to ten years to a period of two or three years, 3) Because the fish did not live as long they did not grow to larger sizes and there was concern that the largest winter fish might disappear from the general sardine population, and 4) The range of the fishery expanded so that by 1939 practically all of California, from Point Arena south to the Mexican border, was exploited. This was in contrast to the early years of the sardine fishery when boats fished within a few miles of port.

The conclusion reached by the scientists in the late 1930s through several studies was that the sardine population had diminished. This was the result of two possibilities:

- 1) The magnitude of the fishery has been so great as to seriously deplete the supply.
- 2) Sardines are subject to long term fluctuations in abundance and the decreasing scarcity over the last six to seven years is merely a manifestation of a natural disappearance of the population and

would have occurred regardless of the amount of fish caught.

The second possibility was favored by those opposed to management of the fishery. The scientists working on the problem had to admit that they could not immediately prove, or disprove, the cause or effects of fluctuations on the fishery until several years elapsed. The scientists favored the first explanation, noting that the California sardine catch doubled every five seasons from 60,000 tons in 1918 to an average of 500,000 tons by 1939. The investigators felt that even with an immense initial population this type of exploitation would lead to disaster.

[32]

The results of tagging sardines also caused a re-evaluation of the number of sardines that were available. This, in turn, led to the conclusion that the sardine fishery was much more intensive than formerly believed. The number of fish in the sardine population, large enough to be utilized for canning and reduction purposes between 1936 and 1944 was nine billion fish, according to the scientists' best estimates. However, during these years the Pacific Coast sardine fishery took approximately fifty per cent of the sardine stock each season--six per cent in the Pacific Northwest, thirty-one percent in Central California, and thirteen per cent in

Southern California. The total number of fish taken in Monterey alone during these seasons numbered about 11.8 billion sardines. This amount takes into account the number of fish that existed prior to 1936 and those that entered the fishery during these years. [33]

The conclusions reached through the tagging program also showed that the maximum age of each generation decreased. Between 1918 and 1928 the sardine life span was ten years. From 1928 to 1933 this decreased to six years. And from 1933 the life span of sardines decreased again to four years. [34]

In 1939, Dr. Frances Clark observed that the decreasing life span might have "grave consequences." She pointed out that older sardines were larger and produced more eggs. In addition, smaller fish could not produce enough eggs "to maintain the sardine population under the present intense fishery." [35]

In the article "Measures of Abundance of Sardines..." Clark demonstrated the changing characteristics of the fall and winter fisheries. Between 1919 and 1924 the fall and winter fishery increased at the same rate, with the winter fishery taking in one and one-half more tons of sardines than did the fall fishery. However, as the fall fishery was made up of smaller fish on the beginning of their migration cycle the net result

was that there were about one and one-half more fish in the fall fishery than those survivors found in the winter fishery.

By the early 1930s the fall fishery took 5.4 times as many fish as it had in earlier seasons and was taking in about 10,000 tons more than the winter fishery, which landed only 3.4 times as many fish as it did at the end of the First World War. In the late 1930s both the fall and winter fishery doubled in tonnage over the landings in the early 1930s. [36]

A little over fifty per cent of the yearly sardine catch was caught during the fall fishery when only younger smaller adults were present. This characteristic would, the fishery scientists felt, produce a further decrease in the number of larger and older sardines and eventually effect the entire sardine stock, as the intense fall fishery would not allow the fish to grow to larger sizes that were better able to reproduce the fishery. [37]

Fear of the disappearance of large sardines was demonstrated during the 1937-1938 season, when large fish were found with difficulty and for only a brief time. This continued a trend that started during the 1933-1934 season when sardine sizes became smaller after increasing in length between the 1924-1925 season and the 1932-1933

season. From the 1938-1939 season through the 1941-1942 season the sardine fishery reached the lowest size average in its history before slowly increasing in length until the 1944-1945 season. However, the sizes never reached the average size found prior to the 1937-1938 season. After the Second World War the average length again [38] decreased to an all time low in the 1948-1949 season.

The length of the sardines corresponded to the age of the sardines in the catch. From the early 1930s and continuing for the next two decades, three-year-old sardines represented almost a third of the catch in numbers. In the mid-1930s forty-eight percent of the catch was composed, in numbers, of sardines four years and older, while only twenty percent of the sardines were two years old. However, during the 1940s the catch-ratio began to change and by the late 1940s and early 1950s two year old sardines made up forty-two percent of the catch [39] numbers.

In further breaking down the catch in terms of numbers and age scientists discovered that a superabundant year-class entered the fishery in 1939. That year-class, reported Clark and Daughterly, "maintained the catch at approximately 500,000 tons until [the] 1944-45 [season]." By the next season this group, which was fished hard for six seasons when they were relatively young, could not

sustain the fishery any longer and the result was the
collapse of 1945-1946. [40]

The concept of conservation was hardly new when the sardine industry was developing. During the nineteenth century the state legislature formed the Fish and Game Commission specifically to conserve the wildlife resources of California. At the turn of the century the California Fish and Game Commission developed into a successful model of progressive era management. Professionals were in charge of the agency and had hired the best scientists to conduct research. Professional managers used the findings of the fishery researchers to suggest legislation to the state legislature, which would then enact laws based on comprehensive knowledge of the various fisheries.

The federal government, however, saw its role quite differently. Federal fishery authorities had a mandate that called for the development of the fishing industry. What regulation they undertook was geared toward the safety of crewmen in subsidized fisheries such as the cod fisheries and whale operations. Congress authorized these subsidies to bolster the merchant marine and to obtain foreign exchange, not to control the
exploitative nature of these industries. [41]

When the federal government authorized research in the nineteenth century, it was not for ecological conservation; rather, federal moneys were spent to further economic exploitation. This was not only how Congress looked at research, but how taxpayers believed their taxes should be spent. The governing principle during the nineteenth century at the federal level was economic expansion, as natural resources were believed to be inexhaustible. [42]

This philosophy, with respect to pelagic fisheries, such as the sardine, was held by federal officials until the 1960s. Web Chapman, the director of fisheries for the United States Department of State, and at one time with the California Academy of Sciences in San Francisco, reported that fisheries could expand indefinitely. Other federal fishery scientists working for the United States Bureau of Commercial Fisheries held that fishing activity could not harm species such as sardines.

In general, the differences between state and federal biologists in their perceptions of the sardine fishery meant that the sardine industry sided with federal biologists, who were looking for natural causes for the declining catches. As the federal researchers and the state researchers were looking for different causes and had different responsibilities, their continual disputes

over the causes for the decline resulted in no regulation of the sardine industry. The state legislature could point out that even the fishery biologists, who were using the same data, could not agree as to the cause of the decline in the sardine catch.

This friction between the federal and state fishery researchers remained until the 1959 World Sardine Conference in Rome. After this conference both groups began recognizing that the sardine fishery needed coordinated research in both the ecological and human dimensions, as the fishery was affected by both
[43]
aspects.

CHAPTER VII: ENDNOTES

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CHAPTER VIII

[1]

LA CRISE SARDINIARE:

Unheeded Warnings, 1945-1950s

The collapse of the California sardine fishery during the late 1940s meant the collapse of the largest fishery in the Western Hemisphere. Twenty-five percent of all fish caught in the United States during the 1930s and 1940s were the Pacific Coast sardines. In California sardines represented seventy-five percent of all fish landings and of this amount Monterey produced from forty-three to thirty-seven percent of the state's total sardine landings. [2]

The end of the Second World War in 1945 did not bring the same type of collapse to the sardine market that the close of the First World War brought in 1918. Speculators were not hoarding sardines in warehouses as they did in 1918. In fact fish buyers were ready to continue paying good money for sardines. This was due to wartime demands for food that resulted in the cannery operators increasing their plants' capacities during the early 1940s. However, to meet their financial commitments, due to wartime expansion, the processors

needed as many fish as could be landed.

In addition, fishermen returning from wartime service were eager to reap the profits that their colleagues made during the war. In Monterey the number of fishermen rose from approximately 700 in the late 1930s to about 1,000 by the mid-1940s. The fishing fleet also experienced an increase as fishing boats were decommissioned from wartime duty. Monterey's fleet also showed an increase after falling from eighty-two fishing boats during the 1940-1941 season to less than seventy-five during the first war-time season. The numbers increased to 119 during the 1943-1944 season then leveled off to about 85 vessels by the end of the war. The large number of boats in the sardine fishery was partially as a result of returning vessels and partly as a result of newly constructed boats entering the fishery. All indications were that the post war fishery would continue [3] the large landings netted over the past dozen years.

The reality of the situation was much different than the expectations. In 1945 the Monterey catch was off by almost 100,000 tons. This was directly reflected in the overall California sardine landings for 1945 which decreased from 574,000 tons to 423,000 tons. In addition to Monterey, the sardine fisheries at San Francisco and Eureka also experienced a decreased catch. The overall

catch was lower than at any point since the 1937-1938
[4]
season.

As the California sardine fishery had experienced other fluctuations in its yearly landings and as the decreased catch affected only the central and northern coasts, little heed was paid to this one season's catch. The following year would bring back the sardines. Unfortunately, the following year's catch resulted in a further decrease.

The sardine fleets of Monterey and San Francisco spent about half of the 1946-1947 season scouting for fish in their usual fishing grounds. Slat Lucindo, a Monterey sardine fisherman, reported that there were some fish in the bay in 1946. However, they were so close to the rocks that he lost a net trying to get at them. Soon part of the fleet started down the coast for Southern California's fishing grounds. While the catch at Monterey reached an unprecedented twenty-four year low of only 36,000 tons Los Angeles recorded a record catch of 196,557 tons in 1946. The harbor at Los Angeles held the largest fishing fleet
[5]
that had ever fished in that area.

Santa Barbara, which was never a sardine port in the past, due to the lack of a cannery, had thirty purse seiners in its harbor on November 6, 1946. Another 170

purse seiners fished along the Southern California
coastline between Santa Barbara and San Pedro. [6]

In the following seasons, 1947-1948 and 1948-1949, the Central California fishing fleet again scouted for sardines in their normal waters, but with no luck. When the season opened in Southern California most of the fleet headed south. Monterey recorded a dismal 18,000 tons caught in its waters. However, the lack of fish was beginning to show up in Southern California in these later seasons. The total California sardine catch for 1947 was only 128,000 tons which was about half the 1946 season which was just over half the 1945 season. Clearly [7] something was wrong.

The situation for Monterey's cannery and cannery workers was as grim as that for the fishermen who were desperately trying to hold on to their sixty-nine vessel fleet valued at \$5,000,000. The canneries employed 3,500 people on a seasonal basis. In addition, the cannery buildings and equipment had a value of between \$12,000,000 and \$15,000,000. With catches that would barely keep one cannery in operation the Central Coast operators offered up to \$100 per ton for sardines, although the prevailing [8] rate was between \$30 to \$60 during the late 1940s.

During the early months of the 1945-1946 season purse seiners from Monterey fishing in the Santa Barbara

area delivered their catch in Monterey. Hovden utilized a war surplus "LST" landing craft, to help deliver the catch from the distant southern fishing grounds. Soon, however, processors began looking elsewhere to deliver their catches. The San Carlos Canning Company, the California Frozen Fish Company, and Hovden's Canneries were the first Monterey canners to begin accepting catch landings at Santa Barbara's pier. On November 19, 1946, water tank trucks from Monterey, Stockton, and Santa Barbara, hired by Monterey's canners, arrived on Stearns Wharf in Santa Barbara to haul the sardines north. Each truck had a capacity of twenty tons and from the beginning caravans carrying 700 to 800 tons were leaving Santa Barbara daily on State Highway 101 for Monterey's desperate canners. While trucking was an alternative it was an expensive alternative. In addition to an average price paid to the fishermen of \$40 per ton, the owner of Stearns Wharf in Santa Barbara, Mr. Benjamin Sanders, received \$1 per ton as a landing and use fee and the City of Santa Barbara placed a tax of fifteen cents a ton on sardines unloaded in its jurisdiction. Furthermore, the canneries paid the trucking companies between \$15 and \$20 a ton to haul the sardines to Monterey. [9] The getting of sardines for Monterey's canners was an expensive proposition.

Monterey's sardine catch could not meet the canners' needs. By 1947 some of Monterey's smaller canneries, unable to compete with the larger concerns that were paying up to \$100 a ton, were forced to close. The following year brought no real relief, although the catch rose slightly. Monterey's landings were still much too low at 48,000 tons. The fleet continued to go further out and remain on the fishing grounds longer. California's sardine fishery was no longer made up of local boats with fishermen delivering to their home ports. The smaller ports, like Santa Barbara, became very important shipping points for distant canneries. [10]

In 1949 fishermen made record catches off Santa Cruz Island, in the Santa Barbara Channel. The fishermen reported seeing sardine schools of 500 to 600 tons. In mid-January there was a sighting of a seven mile long school and one fisherman reported to the Santa Barbara News-Press that: "the fish were so thick, it was like pavement out there." [11]

Every time a report came in of good conditions Monterey's besieged canners had reason for hope, but by 1951 the failure of the sardine fishery was clear. While the state issued eighty-four permits to reduce 150,000 tons of sardines, the packers reduced only 1,022 tons of their allotment. The rest of the small catch went into

canned sardines as the small catches during the late 1940s stimulated a demand for the food product. Only 25,000 tons of sardines were processed in Monterey's plants. Of this meager amount only 878 tons were landed in Monterey; [12] the rest were trucked up the coast. By this time, moreover, the failure was not limited to the Central Coast waters.

Packers in the Los Angeles region, facing stiff competition for local fish from Monterey canners, were forced to truck sardines to their plants from Santa Barbara and Port Hueneme. By 1953 fishermen landed only 2,600 tons of sardines in all of California, this comparing to an average of 500,000 tons during the golden years of the 1930s and early 1940s.

By the 1947-1948 season the effect of the sardine shortage--as the fishermen in Monterey landed only 14,492 tons, the resulting high prices for fresh sardines due to the combined costs of fishermen, and trucking--drove the price for canned sardines up to \$15 per case from a pre-war low of about \$2.50 per case. By the 1949-1950 season, however, when the Monterey sardine catch rose [14] to 131,884 tons the price per case dropped to \$5.20.

In an effort to survive, sardine fishermen began fishing within two miles of the coastline, thus violating

a 1936 law against using nets that close to shore. This law was pushed by sports-fishermen, who were worried that the commercial fishermen were sweeping up all the fish. As a result the Fish and Game Patrol Units caught several fishermen within the boundary in the Santa Barbara and Goleta area and sent them to trial. [15] Most of those directly affected by the sardine drought took other measures to help their condition.

On February 9, 1952, the Monterey Chamber of Commerce, the Monterey Fish Processor's Association, the Monterey Purse Seine Association, the Monterey Small Boat Owners Association, the American Federation of Labor (A. F. L.) Cannery Workers Union, and the A. F. L. Seine and Fishermen's Union sent letters to California's United States Senators William F. Knowland, Richard M. Nixon, and United States Congressman K. Bramblett urging that they assist the organization's efforts in convincing the United States government to purchase 500,000 cases of squid, 500,000 cases of anchovies, packed sardine style, and 500,000 cases of herring. The letter writers argued that the purchases could be used for foreign relief. In defense of their position the organizations reported that after five years of sardine famine they could not raise the capital needed to mount an advertising campaign that would educate and create an American market for these food

fishes. Squid was not utilized by the home market, but the people of the Philippines and Greece used the product in their native cuisine. They further reported that over 5,000 people in Monterey depended on the canneries for employment. [16]

The sardine situation deteriorated even more than anyone expected by the mid-1950s, as only 73,257 tons were caught and these fish were all found below Point Conception. Most of Monterey's canneries received what they could during October 1955, and for the rest of the season the meager deliveries went to southern California canneries. The following year's catch was less than half the 1955-1956 level at 32,648 tons. Only 62 tons were caught above Point Conception and these were landed at Avila and trucked north to the canneries in Central California, including San Francisco. A few other landings from Santa Barbara and Port Hueneme were also trucked north, but the total was hardly enough to keep the canneries operating. [17]

The collapse was not only hard on Monterey's fishermen and canneries, but on the entire economy of the town as well. The sardine fishery's value, as represented by the price paid to fishermen, was about eighty-five percent of the total value for all fish landed in the

port. When the collapse first occurred, in 1945, the result was a loss of \$1,712,514 worth of revenue from the fishermen alone. In 1947 the value of the sardines was only 37.6 percent of the total value of all other fish landed at Monterey. While the landings in 1948 and 1949 increased and the value started approaching the war time figures this increase was shortlived and basically reflected the high amounts the canneries were willing to pay per ton of sardines. In the 1950s the percentage of sardines, as reflected in the total catch for Monterey, dropped even further until they were no longer an economic factor in the overall fishery. [18]

Rather than face an imposed catch limit once the sardine fishery collapsed in 1946, industry leaders advocated and sponsored the California Fishing Product Institute, which had the effect of delaying legislative action. The Institute began studying the entire North Pacific: its physical oceanography, biological oceanography, meteorology, and geophysics. In addition to Dr. Sette, who was hired as the Institute's consultant, Dr. W. M. Chapman of the California Academy of Science also worked for the Institute.

Other researchers were asked to cooperate during a meeting of the Institute held in 1946 at the California Fish and Game Library. The meeting was attended by

Colonel I. M. Isaac, the chairman; Dr. H. Sverdrup of Scripps Institute of Oceanography; Dr. Frances N. Clark and Richard F. Croker from California Fish and Game; Montgomery Phister of Van Camp Seafood Company; and Dave Rubinette, W. M. Morehead, and D. T. Saxbe of the research committee of California Sardine Products.

The group also decided that more research was needed in order to compete with foreign countries. Furthermore, the industry and research people present realized that they needed to find a political and an economic solution to the sardine problem. They decided to ask the legislature to tax sardine landings at fifty cents a ton to help pay for further research into the faltering sardine catches. [19]

In addition to the California Fishing Product Institute, the industry initiated the Pacific Marine Fisheries Commission. This Commission, which was active for thirty years, became world renowned for research it sponsored.

The canning industry started the Pacific Marine Fisheries Commission to discredit the state fishery biologists who felt that controls were needed. The industry members initially forced the participating state agencies to cooperate with the new commission. However,

the Department of Fish and Game biologists felt that the new organization was essentially a slap in their face. Other public and private research organizations willingly joined the Pacific Marine Fisheries Commission: The Federal Fisheries Service, which had no management responsibility; Stanford's Hopkins Marine Station; the California Academy of Science; Scripps Institute of Oceanography; [20] as well as Canada and the states of California, Oregon, and Washington. The commission was [21] chartered by the United States Congress.

The California State Legislature consented California's participation in the Pacific Marine Fisheries Commission and created the Marine Research Committee in 1947, with nine members appointed by the Governor. The president of the Fish and Game Commission, the executive secretary of the Department of Fish and Game, and one employee of Fish and Game served as ex officio members of the Commission with full rights. The other six members consisted of five experienced and active sardine processors.

The legislature authorized a tax of fifty cents per ton of sardines to be placed in the Fish and Game Preservation Fund and dispersed by a majority of the Committee to finance research. By 1953, with the demise of the commercial sardine fishery a fact, the legislature

increased the tax, with industry approval, to one dollar a ton for sardines, Pacific mackerel, jack mackerel, squid, Pacific herring, and anchovies. Over its thirty year existence the Commission took in \$3,350,000, most of which [22] was used as seed money for new projects.

The first meeting of the Marine Research Committee was held at the California Academy of Sciences in San Francisco on April 28, 1948. Julian Burnette, an old-time sardine reductionist, was elected chairman, a position he held until February 1967. Burnette then served as a general member until the last meeting of the Committee on June 29, 1978.

The following month, on May 19, the Committee met at Scripps in La Jolla where Robert C. Miller, the Chairman of the Technical Committee, outlined a program that became the California Cooperative Sardine Research Program. This program's goals were: 1) To research the physical-chemical conditions in the sea; 2) To determine the organic productivity of the sea; 3) To determine the spawning survival and recruitment of sardines; 4) To find the availability of the stock to fishermen, and the behavior of the fish as it affects the catch, abundance, distribution, and migration; 5) To define fishing methods in relation to availability; and 6) To determine the

dynamics of the sardine population and its fishery.

In 1947 the California State Legislature authorized the California Cooperative Sardine Research Program, which became a joint research between the Bureau of Marine Fisheries, the University of California Scripps Institute of Oceanography, the United States Fish and Wildlife Service, and fishery researchers from the states of Oregon and Washington. In June 1953, after the total demise of commercial sardines, the Program was renamed California Cooperative Oceanic Fisheries Investigations [24] (CalCOFI) and began research into other species of commercially used fish.

Although Monterey's canners turned to other fish they were never able to equal the profits made during the heyday of the sardine industry. In 1947 seventeen canneries were working along Monterey's cannery row. A decade later, in 1958, only five canneries were in operation and these were canning squid and other fish on an intermittent basis. By the early 1950s the canners realized that they would have to do something else with their plants. [25]

In 1953 Niel DeV Vaughn opened the first new business on Ocean View Avenue, a fish and steak restaurant. That same year George Leutzinger and Wesley Dodge formed the Cannery Row Properties Company.

Leutzinger, who was also the manager of the Peninsula Packing Company, and Dodge began buying canneries and warehouses along the row in 1953, reconditioning and selling the canning equipment, mostly to overseas canneries in Peru. Sardines are still sold in oval cans from Peruvian canneries that have machinery bought from Monterey's Cannery Row. Leutzinger continued with both the property company and with the Peninsula Packing Company until January 1, 1957, when the cannery closed for the last time. In addition to Leutzinger and Dodge, other Cannery Row Properties stockholders included: Monterey Supervisor Thomas Hudson; a San Francisco entrepreneur, Leo Hart; and the Brayton Wilbur real estate development interests. The group bought fifteen parcels, half of the row, by 1957.

Only five canneries remained in operation by February 26, 1957: Hovden's plant, the Enterprise, San Xavier, Calpak, and Carmel. Earlier that winter, on Thanksgiving Day 1956, the San Carlos Cannery burned. San Carlos was not operating as a cannery at the time but was leased to National Automotive Fibers Company by Cannery Row Properties. Knut Hovden retired in 1951 and the following year went to Mexico and opened up a new plant. Hovden, the real innovator of the sardine industry died in

Guadalajara, Mexico, at the age of eighty-one in March
[26]
1961.

During the previous year the machinery from the Del Vista Cannery was sold to a Peruvian firm. The Del Vista, built in 1946, was the last cannery built on Cannery Row. The plant never really operated as only a few test runs were completed before the sardines
[27]
disappeared.

In 1958 the name of Ocean View Avenue was officially changed to Cannery Row, the name popularized by John Steinbeck's novel Cannery Row. Over the years Cannery Row Properties helped develop the row into a tourist mecca of restaurants, art galleries, boutiques, and fancy bars. Finally in 1985 the old Hovden Cannery was remodeled into the Monterey Bay Aquarium. Most of the new businesses have preserved the old canneries and used them as a basis for development. Steinbeck once told an interviewer, "I've always thought it [Cannery Row] could be the most beautiful place in the world. The coast line would be perfectly lovely once you get the fish scales off of it and put up some pleasant looking places." While this might fit the "new" Cannery Row, Steinbeck also stated that the buildings on the row should not be preserved as a "pseudo or Santa Barbara" development, rather that new buildings be built in place of the old

[28]

unsightly canneries.

The collapse of the California sardine industry came not without warning. Fish and game scientists were warning of a collapse from the beginning of large scale canning and reduction operations at the close of the first world war. The theme of conservation and the realization that without protection wildlife could easily be destroyed was a factor in the creation of the California Fish and Game Commission in the nineteenth century. In the second issue of the Commission's magazine, California Fish and Game, most of one page was devoted to an article explaining the death of the last passenger pigeon in America and the relation that this death had on wildlife protection in general. This theme was carried on in the investigation of the California sardine, which became the most studied fish in the world from 1918 to well after the demise of the fishery.

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CHAPTER VIII: ENDNOTES

[1]

This is an old French fishing expression translated to "the sardine crisis," for the French, as to other fishing peoples, a sardine failure is a disaster to all the people who depend on the fishery for their livelihood. Genevieve Corwin Wheeler, "A Bibliography of the Sardines," California Department of Fish and Game, Fish Bulletin number 36, p. 5. Hereafter noted as Fish Bulletin with the appropriate number.

[2]

Herbert W. Frey, California's Living Marine Resources and Their Utilization (Sacramento: State Printing Office, 1971) p. 51, California Department of Fish and Game, Fish Bulletin 67, p. 7.

[3]

Fish Bulletin 67, p. 7.

[4]

Ibid, p. 8.

[5]

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[6]

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[7]

Pinkas, p. 14.

[8]

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[9]

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- [10] Santa Barbara News-Press, 31 December 1947; Fish Bulletin 89, p. 8; Fish Bulletin 80, p. 15.
- [11] Santa Barbara News-Press 30 December 1949 and 16 January 1950.
- [12] Fish Bulletin 89, pp. 7-8.
- [13] Ibid.
- [14] "The Commercial Fish Catch of California for the Year 1947 With an Historical Review 1916-1947," Fish Bulletin 74 (1949):31.
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- [16] Monterey Peninsula Herald, 9 February 1952.
- [17] F. E. Felin, Robert S. Wolf, Anita E. Daugherty, Daniel J. Miller, "Age and Length Composition of the Pacific Sardine," Fish Bulletin 106, pp. 7, 13.
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- [20] Richard S. Croker, "An Iconoclast's View of California Fisheries Research, 1929-1962," CalCOFI Report, Vol. XXIII (1982):32.
- [21] Ibid, p. 31.
- [22] Radovich, p. 63-64; Croker, p. 31; John L. Baxter,

"The Role of the Marine Research Committee and CalCOFI,"
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[23]

Baxter, pp. 25, 36.

[24]

"Report of the Assembly Interim Committee on Fish
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24; Baxter, p. 37.

[25]

Dudley Towe, "This is Cannery Row," Game and
Gossip, Volume 9, Number 6, 3 March 1958, p. 2.

[26]

Monterey Peninsula Herald 26 February 1957, 29
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[27]

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[28]

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[29]

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CHAPTER IX

PUBLIC POLICY DURING THE SARDINE ERA:

A Legacy of Indecision

In the years since the collapse of the sardine fishery in California many different people and groups who were once a part of the fishery have tried to place the blame for the collapse on someone or something else. [1] Scientists, currents, water temperature, sea lions, oil exploration, and overfishing, all were blamed. [2] The point for which there is no doubt, however, is that the disaster did not happen without warning.

The collapse of a commercial fishery does not mean that the total population is decimated; rather, the population is reduced to a size that makes the commercial utilization of the species unprofitable in terms of return for unit-of-effort. In California and in Monterey this ecological and economical phenomena was known long before the sardine industry's demise.

Spanish mackerel (*Scomberomorus concolor*) were fished commercially in the 1870s. The fish, considered a delicacy, brought very high prices in the San Francisco

markets; however, overfishing led to the Spanish mackerel's disappearance from Monterey's 1880 landings. The fish dwindled to such an extent that the first Spanish mackerel caught in Monterey after their disappearance in the nineteenth century occurred fifty years later on March 30, 1931. [3]

During the 1920s Monterey's salmon fishery ceased to exist as a commercial fishery. This fishery began in the bay during the 1880s and became commercially important during the next decade. In the nineteenth century salmon was sold fresh until 1898 when a mild curing process was used in Monterey. In 1900 Robbins' cannery processed a small portion of the catch.

Commercial fishermen caught from 200 to 400 fish during the salmon runs, which occasionally reached 700 fish landed daily in Monterey. The record daily catch occurred on August 9, 1904, when the Monterey New Era reported 3,000 salmon from the day's efforts. The fishermen waited at the Monterey wharf until ten at night to have their catch weighed at the packing house; one boat landed forty good-sized salmon. The packing house crew worked through the night processing the salmon which averaged sixteen pounds each. The fishermen were paid between two and three cents per pound by the processors.

The all-time season peak for salmon landed at

Monterey and Santa Cruz was in 1916 when five million pounds were landed. However, in the 1920s the catch began to dwindle in numbers and soon the canneries from Monterey north to San Francisco and Sacramento began to switch to other fish. The salmon fishery in San Francisco and Sacramento was hurt by placer mining and farm irrigation and the resulting debris; hydroelectric dams, which cut the salmon off from their breeding streams; and overfishing, as nets were stretched across the Sacramento River to harvest the fish that escaped the San Francisco fishing fleet. In Monterey Bay overfishing was the chief [4] cause for the commercial salmon fishery demise.

In 1879 and 1882 the California Fish and Game Commissioners introduced 435 striped bass from New Jersey into San Francisco Bay waters. As early as 1889 San Francisco commercial fishermen began selling the fish to markets in the city and soon the migrating fish were taken in Monterey Bay. Before the 1930s, 350 to 400 fishermen were engaged in the fishery, which was centered in the Central Coast area. However, due to evidence of depletion and pressure by sports-fishermen, the use of nets by commercial fishermen was outlawed in 1931, and four years later commercial fishing for striped bass was totally [5] prohibited.

One of the most controversial fisheries at the turn of the twentieth century was the abalone fishery (Haliotis rufescens, red abalone; Haliotis fulgens, green abalone; Haliotis corrugata, corrugated or pink abalone; and Haliotis cracherodii, black abalone). Abalone may be the oldest commercial fishery in California as California Indians used the uhllo meat for food and the shells as ornaments and money.

With the arrival of the Chinese in California in the 1850s the abalone, which was largely unused by Anglo-Americans other than for decoration, was quickly recognized as the same delicacy found in China. By 1864 the possibilities of exporting the shelled creature presented new opportunities and laborers gathered, dried, then salted the abalone before shipping them to China. The Chinese made an additional profit by selling the shells to the Anglo-Americans who used aurora shells, as they called them, to decorate signs, as well as making fancy buttons, studs, buckles, and other ornaments for clothing. The value of the shells reached twice that of the meat in 1879. That year 4.1 million pounds of abalone, as they were called in California--a corruption of the Spanish aulon or aulone--were gathered in the intertidal zone by Chinese laborers. In 1887 a federal fishery investigator, Ernest Ingersoll, reported that the

abalone of California was rapidly becoming depleted.

At the turn of the century politicians were under pressure from white citizens to force the Chinese from the abalone beds. Not, however, because they were trying to save the abalone. In February 1899 Assemblyman Frederick P. Feliz, representing Monterey, introduced a bill to protect the abalone from the "wasteful methods employed by the Chinese and Japanese fishermen." With the passage of this law, giving supervisors in coastal counties local control for conservation of fishery products, the supervisors in Monterey and other coastal counties responded to their constituents by making it unlawful to gather abalone except in deep water. As the Chinese were not divers they were effectively eliminated from the fishery. Japanese "sake barrel" divers, who were proficient in underwater fishing, entered the fishery and soon developed hard hat methods using air pumped in a hose to a diving helmet.

Due to pressure from California manufacturers of abalone curios and jewelry the state legislature passed a law prohibiting the export of unworked shells in 1913. Two years later complaints about odor helped pass a law that prohibited the drying of abalone meat, ostensibly for conservation purposes. In reality, however, the law was

aimed at driving the Japanese from the abalone industry, which would allow whites to enter the fishery easier than with direct competition.

In 1905 abalone meat was first canned at Cayucos and soon at other Southern California facilities, until by 1917 five plants were engaged in canning. With increasing difficulties in harvesting abalone the canners began giving up the practice until the last abalone canning operation ceased to exist in 1931.

The Japanese divers continued their hold on the fishery until the Second World War when they, along with other West Coast Japanese, were placed in concentration camps for the duration of the war. In the post-war period returning navy divers gained control before the Japanese could return. The war brought improvements to the fishery with wet suits, improved swim fins, and lighter breathing gear. However, improvements also meant increased pressure on a fishery that was forced out of Monterey, where from 1916 to 1935 the fishermen delivered eighty-eight percent of the state's total abalone landings. By 1967, with the abalone fished out, the Morro Bay abalone divers abandoned the abalone grounds. By the early 1980s the mainstay of the abalone fishery in California was at Santa Barbara, although increased fishing pressure caused concern there too.

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In 1970 the State Legislature placed a moratorium on the California Pacific Mackerel Fishery. This fishery developed into a large-scale cannery fishery during the 1928-1929 fishing season in Monterey and Southern California. In the late 1920s cannery developed a method for canning the Pacific mackerel and fishermen began landing large catches. However, the economic boom stopped during the initial stages of the Depression. By 1932 the fishery made a comeback, due to increased demand and high prices. Purse seiners switched from sardines to mackerel, for cannery delivery, during the 1940s. In 1952 a severe shortage caused the number of full-time boats in the Pacific mackerel fishery to drop from 348 to 10 boats. The fishery recovered in the mid-1950s and large landings were once more made; however, the landings were not nearly as large as they were in the 1930s or 1940s.

The California Department of Fish and Game, National Marine Fisheries Service, and Scripps Institute of Oceanography all tried to manage the fishery from 1936 until the moratorium was enacted in 1970. The proposals for efficient management of the Pacific mackerel followed those proposals for the sardine and, like the sardine, landed on deaf ears until much too late. By the late 1960s the Pacific mackerel fishery's landings fell to

under five million pounds annually. Scientists in 1968 argued that the Pacific mackerel fishery, as well as that of the sardine, should be closed.

The moratorium enacted in 1970 was shortlived, and in 1972 legislation allowing for a quota system, if the fishery regained its biomass, was passed. In addition to these provisions of the 1972 law, a quota allowing for an incidental eighteen percent of sardines caught while fishing for other species of fish was allowed. However, this amount was changed in 1977 when purse seine fishermen complained that jack mackerel were schooling with Pacific mackerel causing difficulties in keeping to the eighteen percent accidental catch quota. The legislature quickly passed a forty percent incidental catch quota law that contained a clause allowing for Pacific mackerel landings in loads of less than three tons. With this legislation more fishermen entered the mackerel fishery intent on catching Pacific mackerel. [7]

A clear case of overfishing occurred in the shark fishery. This fishery, like the Pacific mackerel fishery, was an older fishery before exploding in the late 1930s. During the nineteenth century Chinese fishermen caught soupfin sharks for their fins, which were dried and exported to China. The shark fishery remained at a small level until scientists at Stanford University discovered

that shark livers had the richest source of vitamin A oil available. The onset of the Second World War in Europe stopped the shipment of vitamin A oil from the normal sources. The prices quickly shot up to \$40 to \$60 a ton and sharks jumped from obscurity to the ninth most important fish in California. By 1941 fishermen began receiving up to \$2,000 per ton for sharks.

During the war years the United States government found that vitamin A helped night vision and this added another use for shark livers. Fishermen landed a record number of sharks in 1939 as 600 fishing boats entered the fishery. The numbers declined in the 1940s until by 1944 the fishery was starting to show extreme signs of overfishing. As the sharks became scarce fishermen began dropping out of the fishery, even though the livers brought as much as one dollar per ounce. The economic situation for sharks changed with the end of the war, as imported shark liver oil was much cheaper and [8] scientists developed an artificial vitamin A.

The fisheries discussed above experienced the same problems which led to overfishing in several other fisheries, including the whale, sturgeon, shrimp, albacore, and cod. What is interesting from a historical perspective is that the experiences of these fisheries

have provided so little input to the general management of California's fisheries over time. Each of the fisheries detailed or mentioned above experienced severe problems leading to commercial cutbacks or outright curtailment, yet, with the exception of fishery scientists, those with management responsibilities did not seem able to make connections between overfishing of one species and the replication of the same patterns in another species.

The California sardine fishery has many lessons for fishery managers as well as those charged with making public policy decisions within the state's fisheries. While the possibility of overfishing the sardine was an early concern voiced by fishery scientists, no real evidence of overfishing could be proven until the 1937-1938 season when fishermen experienced difficulties in locating schools of sardines. During this season the catch dropped from the all-time high of 726,000 tons of the previous season to less than 420,000 tons. In looking at the catch per-unit-of-effort the fishery began showing danger signs in both the 1935-1936 and the 1936-1937 seasons when the average monthly catch of fishermen began declining. [9]

In addition to a decline in return per-unit-of-effort, fishery scientists demonstrated that California's sardine fishery shared one population base, as the sardine

was a migratory fish. Therefore the simple expansion of the fishing grounds did not exploit a different sardine population. [10] This led to what was termed a "fundamental principle" which was that given both premises about the sardine population--that the return per-unit-of-effort was declining and that California's sardine fishery drew from the same pool of fish--then the sardine fishery could not continue with the same tonnages that occurred in the 1930s "without dangerously reducing the basic supply." [11]

Furthermore, the discovery of dominant year groups led to the conclusion that because the canning and reduction industry relied on dominant groups, if these groups failed to appear then the industry would suffer. [12] Finally, by placing all the relevant information concerning unit-of-effort, migration, and reliance on one group with the understanding that older fish were the first to be overfished and that older fish were necessary in the creation of dominant year groups, by virtue of the vast numbers of eggs they lay, then the fishing efforts of the 1930s would lead to conditions favorable to a failure of the fishery. [13]

With this in mind William L. Scofield concluded in 1938 that "[f]uture catches must ... be drastically cut

so [that] ...the annual crop can be maintained at a maximum." Scofield felt that the 250,000 ton limit on sardines for all purposes should be enacted, but that even [14] this limit might not be enough.

This theme was picked up the following year with specific figures for a catch limit. The average catch of about 500,000 tons of sardines should be cut in half "to check the present population decline." Furthermore, in order to build the sardine stock up to a safe level quickly, then the future catch should be reduced to one-third of the annual average size during the late [15] 1930s.

While specific proposals were submitted to try and save the sardine fishery these proposals were never acted upon. And once the collapse occurred there were various attempts to explain what had happened. Attempts to fix the blame for a lack of sardines occurred as early as 1930 when the lampara fishermen felt that the supply of sardines in Monterey Bay was decreasing due to the use of purse seines. In addition, the lampara fishermen felt that the operation of new reduction plants would [16] contribute to further strain. However, the lampara fishermen's view concerning purse seines did not withstand [17] investigation by Dr. Tage Skogsberg.

In 1938 William L. Scofield pointed out that

some people felt that the sardine supply would adjust itself to the economics of the industry if left alone. However, Scofield countered that indeed the sardine fishery would do just that, "[t]he buffalo did."^[18]

By the 1940s, with the decline upon the fishery, other people tried to place the blame on water temperature changes, availability of plankton, the atomic bomb, earthquakes, and poison gas dumped in the ocean by the Army.^[19] Sport and commercial fishermen who fished for other species blamed the Department of Fish and Game for not doing something to save the sardines. They revived the old charge that the purse seine fleet was responsible for overfishing the sardines.^[20]

E. B. Gross reported that when the sardines did not show up on schedule the fishermen complained that the naval fleet practicing out of Magdalena Bay off Baja California scared them off. The fishermen also reported that the whales no longer drove the sardines into Monterey Bay as the whales were themselves overfished. Gross also felt that the oil tankers sunk during the Second World War contaminated the water, forcing the sardines to change their course of travel up and down the coastline. The canner predicted that the heavy rains during the winter of 1951-1952 would build up nutrients

from rivers and create a good food source for the resurgence of the sardines. However, foreseeing the eventual disaster, Gross sold his plant in 1943 to the Oil and Seed Products Company of Fresno. [21]

From the 1920s through the 1930s state scientists continually warned of depletion, but due to the success of the spawn from 1936 to 1940, when the collapse occurred, industry leaders and federal fisheries biologists focused on natural causes rather than on overfishing. [22]

Of all the explanations for the sardine collapse perhaps that of John Steinbeck's close friend, and a Cannery Row institution, Edward F. "Doc" Ricketts, was the closest to what happened: "The Sardines we are searching for have already been canned and reduced." [23]

That there is someone, some group, or something to place the blame on may not be the important element if one can hope to utilize the sardine experience as a learning tool. As Albert Campbell and Earl Rosenberg pointed out in their respective theses, if blame is needed then the blame can be equally shared by all the groups engaged in the fishery: fishermen, cannery and reduction plant operators, researchers, regulators, and policy makers.

Most of the focus for reasons concerning the

decline of the sardine has centered in California; however, other states and countries contributed to the sardine dilemma. Between 1917 and 1942 British Columbia did not place any limitation on the quantity of sardines that could be reduced. The only regulations concerned size of fish caught and the size of the mesh in the purse seines. Occasionally limitations were placed on season opening and closing dates. The states of Oregon and Washington allowed no reduction until 1935. After this year there were no limitations on quantity of sardines that could be reduced or the season they were caught in. The authorities in Baja California, Mexico had no legal restrictions on gear, seasons, quantities, or use; however, this was tempered by the fact that Baja's sardine fishery relied on small fish and that the processors canned most of the catch and the sardines caught there were not wasted on non-edible products as was the case in [24] California.

In California the legislature passed laws that protected food fishes from reduction into non-human edible products; however, in the case of the sardine fishery these laws did not apply. At the beginning of the commercial phase the legislature held that restrictions against reduction would inhibit the development of the new

industry. Then, when the fishery scientists finally convinced the legislature of the need for limits on the annual catch, the depression hit and restrictions were viewed as detrimental to the economic well being of all those involved in the fishery--the fishermen, cannery owners, and cannery workers.

The only limits on each night's catch were those placed on individual boats by the canners. The canners, in the 1920s, did not want more fish landed than the plant's capacity; however, in the 1930-1931 season the fishermen began bringing in more fish, in hopes that the reduction operations would buy the excess catch, as they had in previous seasons. The result, in Monterey, was the dumping of 2,000 tons of fish that the processors could not utilize.

Using their conservation powers to stop the dumping of sardines at sea the Fish and Game Commissioners issued General Order Number 12 in July 1931, after consulting with fishermen on how best to implement controls. The resulting order prohibited fishermen from delivering more sardines to canneries than the canners ordered. The Fish and Game Commission accomplished this by not allowing fishermen to take in their nets more sardines than they could dispose of. Furthermore, the fishermen were required to allow additional sardines to

escape the nets before the crews started brailing the fish
[25]
into lighters.

The new measure proved effective during the 1931-1932 season. The following season, however, with the price of meal and oil starting to climb, the packers began to take off former limits, as excess was now seen as
[26]
profit.

During the 1931 session of the California Legislature the Division of Fish and Game sponsored a bill to reduce the amount of sardines which could be utilized for reduction. Because the overall catch was to be limited the permit section of the 1925 law would be eliminated. The canners wanted the law to specify how much of the catch each canner could receive, which could then be used for any purpose the canner wished. Furthermore, the amount used for canning would not be charged against the allotted amount used for reduction. Working with the canners, the Division of Commercial Fisheries came to a mutually agreeable catch limit of 200,000 tons. This amount would placate the scientists' fears of over utilization and at the same time allow the processors to remain in business at a profitable level.

The agreement came to a halt when the canners could not agree on how to divide the yearly catch among

themselves. This, coupled with the outright opposition of the reduction plant operators, led to the defeat of the bill. [27]

Competition between shore plants and the floaters became another factor that kept the legislature from enacting any efficient legislation to conserve the fishery. Although Department of Fish and Game lawyers did what they could legally to inhibit the growth of the floating reduction industry, by taking the operators to court whenever they appeared to break a law, the legislature remained quiet on the subject of conservation of the sardine fishery.

Finally, during the 1939-1940 season, the state legislature enacted a measure to prohibit fishermen licensed by the State of California from delivering sardines caught in California waters outside the state's boundaries. However, this act was a little too late as most of the reduction ships were forced out of the business by reduced landings the previous year. [28]

Any thought of reducing the amount of sardines landed during the Second World War years was doomed to failure, as the nation threw every resource into production. Conservation, however, was still an issue with those charged with managing the state's fisheries who felt that: "When regulation is finally undertaken, it must

[29]

be in the form of control of the total catch."

When the sardine fishery collapsed in 1946, the Fish and Game Commission asked that the number of reduction plants be limited; however, the California Attorney General replied that the commission did not have the power to regulate economic conditions and the legislature could not legally enact such a law. [30]

The State Legislature did recognize that the sardine fishery "has developed a serious crisis because of the great reduction in the number of available fish, almost to the point of extinction," and authorized, in 1947, a cooperative research between the California Bureau of Marine Fisheries, the Scripps Institute of Oceanography, and the United States Fish and Wildlife Service. This research was coordinated with research underway in the states of Oregon and Washington. The Assembly Interim Committee on Fish and Game was looking for an agreement among the industry officials and fishery scientists "as to the exact cause of the loss of availability" of the sardines. Such an agreement was impossible, however, and the legislature decided that "[m]easures of an ill-advised or hasty nature formulated in the hope of solving the serious sardine problem should be avoided." The Pacific Coast fishery scientists,

however, while recognizing that they might not have "the" answer to the question of sardine depletion, nevertheless, in unison, asked for the same drastic cutbacks in sardine landings that they had been asking for over the past three decades.

Rather than take any immediate action, such as that suggested by the fishery scientists, the Assembly Committee recommended that the Legislature follow "various sections of the industry [that] ... made recommendations and suggestions on methods of alleviating the shortage." Thus, the Committee decided that the Legislature enact "such legislation as may appear necessary." ^[31] This seemed to mean "necessary to the industry," in that nothing was done during the immediate years following the collapse.

The policy of inaction was bolstered by biologists working for the United States Fish and Wildlife Service who believed that changing oceanographic conditions--the temperature of the ocean which resulted in different spawning, feeding, and schooling conditions--led to poor fishing conditions. The Pacific Marine Fisheries Commission, composed of members from the states of California, Oregon, and Washington reported, in 1948, that if the Fish and Wildlife Service was correct then "no immediate plans for management would be necessary." The

Fish and Wildlife Service scientists felt that the sardines would return to the fishing grounds once the oceanographic conditions reversed. [32]

The Pacific Marine Fisheries Commission, however, disagreed with the federal biologists. The West Coast biologists felt that the correct interpretation for the lack of sardines was that since 1939 the sardine spawn survival rate was so reduced that the population was at a "dangerously low level and ... management of the fishery should not be postponed." The Commission members agreed, during their August 1948, meeting, that not more than 100,000 tons and preferably no more than 50,000 tons of sardines should be the annual limit for all three states combined. This limit should remain in effect until an increase in the sardine population warranted a larger limit. [33]

The 100,000 ton limit proposed in 1948 was the limit that the California Bureau of Marine Fisheries and the California Division of Fish and Game recommended to the Assembly Interim Committee on Fish and Game the previous year for California. At that time the Assembly Committee heard from the two departments that "in the case of sardines, ... all that is necessary is to set seasonal catch limits or quotas based on our knowledge of the

fishery."

The proposal gave several ways to enact quotas in a manner that tried to address the needs of all the parties concerned: 1) A statewide quota on a first-come first-serve basis following the example of the halibut fishery, 2) Quotas for each of the sardine regions in the state, 3) Seasonal quotas for each plant, based on its previous output, which would be, according to the Bureau and Division, the most equitable method of control, 4) Seasonal quotas on each vessel depending on size, or 5) [34] Various combinations of the four proposals.

Nothing came of these ideas. During the 1950s and 1960s surveys and studies of the sardines showed that the sardine population reached a low level and "should be [35] completely protected from further fishing mortality."

Finally, in 1967 after several more years of a declining sardine population the State Legislature managed to place a two year moratorium on sardine fishing after the Marine Research Committee recommended a complete moratorium on sardines. The legislature placed a complete moratorium on the catching of sardines in 1970 and in 1974 strengthened the moratorium with restrictions on sardines [36] caught incidentally to the catch. The moratorium stayed in force until the mid-1980s.

In 1976 the United States Congress enacted the

Fishery Conservation and Management Act establishing a 3 to 200 mile conservation zone off the shores of the United States. This was partially the result of other nations' similar zones and partially the result of trying to manage fisheries extending beyond the old three-mile limit that were being adversely effected by foreign fishing fleets, such as those from Japan and the Soviet Union. With this federal conservation measure, those involved in the Marine Research Committee realized that the committee was then duplicating work by federal officials and by mutual consent agreed to disband. In 1978 the California Legislature dissolved the Marine Research Committee, but recognized the continuing efforts of the California Cooperative Fisheries Investigations which was then set up [37] as an independent body.

A portion of the legislation that imposed the sardine moratorium allowed for the resumption of sardine fishing, although limited to 1,000 tons, if the spawning [38] biomass of sardines reached 20,000 short tons.

Over the years that followed the implementation of the moratorium the California Department of Fish and Game conducted annual surveys of the sardine to measure the population. Data from ichthyoplankton surveys, aerial spotter surveys, sea survey cruises, as well as the

numbers of sardines inadvertently caught in the mackerel fishery and the live bait fishery were used to determine [39] the biomass of the sardine population.

Finally in 1986, research by several members of the Department of Fish and Game in both the Southern California spawning grounds and in Monterey Bay as compiled by Patricia Wolf indicated that the spawning biomass had reached the 20,000 short ton minimum and [40] fishing began.

Although most of the sardines landed at Monterey were frozen for bait some of the catch was canned on a trial basis by the Monterey Fish Company of Seaside. The owner Philip Tringali has indicated that if the fishermen can land enough he will have his cannery start up the [41] first serious canning operations since the 1950s.

Robert Leos, who is with the Monterey station of the Department of Fish and Game, reported in February 1987, that four boats had applied for the special sardine permit and he expected another twelve boats to enter the sardine fishery if the catch looked promising. The Department of Fish and Game will continue to monitor the situation and will call a halt to the fishing if the spawning biomass dips below the 20,000 short ton [42] limit.

Debate continues over the cause of the sardine

collapse and will very likely continue on for the foreseeable future. Researchers and others looking for the cause of the disappearance of the sardines have come up with explanations of their own and explanations of others. John Radovich reported that in January 1979, an industry official, C. Smith, reported to the San Diego Union and to a group of scientists later that same year that climate changes produced a major biological upheaval [43] and this allowed the anchovy to replace the sardines. Garth I. Murphy blamed the rise of the reduction industry for setting up conditions that led to the commercial [44] demise of the sardine. A. D. MacCall reported that had the catch limit been 250,000 metric tons there would still be a commercial sardine fishery on the West [45] Coast. A historian, Arthur McEvoy, pointed out that another expert, Milner B. Schaefer, felt that the fault lay with the state's inability to control large scale industries when they begin to expand, such as the sardine [46] reduction industry did in the 1920s. McEvoy went on to explain his belief that, under economic pressure from growth-oriented industries, the very process of fragmented decision-making at the governmental level makes it difficult to corral the independence of these growth [47] industries.

At the 1986 CalCOFI Conference a paper delivered by Dr. Daniel Lluch-Belda of the Centro de Investigaciones Biologicas de Baja California looked into climatic variations as a cause of the demise of the sardine fishery. Lluch-Belda agrees with most of the current research undertaken from Mexico south to Peru and points at both a reoccurring cycle of abundance and decline added to climatic variations that effect both the sardine spawn and the ichthyoplankton that is used as food for the sardine. [48]

Whatever the real cause was for the decline of California's sardine fishery the history of the fishery illustrates the problems inherent in the conservation of an exploitable natural resource. A public policy designed to protect a natural resource is difficult to achieve in the best of circumstances and usually takes place in an atmosphere of confrontation. As early as 1890 Professor W. K. Brooks of Johns Hopkins University published a report on the "oyster empire" of Maryland. Brooks demonstrated that the Maryland oyster population had declined by half between 1879 and 1882. This enormous decline over a three year period led to his prediction that the oyster fishery was being seriously overfished. The Maryland legislators rejected Brooks' findings for those of the "practical oystermen." Brooks' prediction

proved correct, however.

In the Second World War fishermen overfished spiny dogfish (Squalus acanthias) for their livers, which, while not as valuable as shark livers, were commercially exploitable. Unlike species with a high fecundity rate, the dogfish is a longlived species that produces only three offspring at eleven to thirteen years. By the age of thirty to thirty-five, they produce only fourteen to fifteen offspring. Under the intense pressure of the wartime vitamin A fishery the dogfish were commercially fished out. The species only began to recover after 1946 and the development of synthetic vitamin A.

King crab in the Bering Sea and Gulf of Alaska also experienced signs of overfishing, as their landings dropped from 80,000 metric tons in 1966 to 62,000 metric tons the following year to only 27,000 metric tons by 1969.

[50]

The United States is not the only country to experience mismanagement of its fisheries. The Norwegians spent almost one hundred million dollars building up their herring purse seine fleet between 1964 and 1968. However, the size of the fleet and its unit-of-effort could not turn around a declining fishery, as the herring landings dropped from 1.2 million metric tons in 1967 to 0.70

million metric tons the following year to only 0.10 million metric tons by 1969 as the herring stock dropped to only one-fifteenth of its 1950 level. This disaster also effected Iceland, as that country fished the same [51] stocks.

This same scenario seems to dominate wherever commercial fish are exploited. Canadian and United States fishermen in the Great Lakes region fished out the commercially viable species and the public was left with trash fish, fish unsuitable for human consumption. When Canadian authorities realized that they were facing a serious problem of overfishing in their West Coast herring fishery, they finally placed severe restrictions, but again only after the effects of overfishing were present, not earlier when fishery biologists recommended action. In 1949 the United Nations held a scientific conference on the Conservation and Utilization of Resources at Lake Success, New York. This conference identified thirty fish stocks then underfished. Twenty years later fifty percent of these once-underfished stocks were either exploited to [52] their maximum capacities or overfished.

Patterns of overexploitation reappear with enough disguises to hide the fact that natural resources are not only disappearing worldwide but are in reality interrelated. Over several years various groups of

scientists engaged in ocean research and related fields began to realize that what other scientists were doing might be important to their research. Often this is hidden behind the belief that a particular species occupies a different ecological level and therefore the findings of one now defunct fishery, such as the sardine, cannot be applied to the salmon, or the black cod, etc., as they are not the same or a closely related species. What is lacking in this shortsighted approach is the realization that man views and exploits nature with no regard to scientific species identification. Those working on fisheries management problems must realize that changes in fishery conditions can be caused by both environmental and/or economic factors. Further, often the effects of one of these two factors can be masked to appear to be the other.

[53]

These patterns were clearly established by fishery scientists working in Peru. For the first twenty years that the California sardine fishery was viable anchovies were available off South America, yet they were not exploited until there existed an economic need for their exploitation--the Second World War. During the war-time emergency the United States relied on the Peruvian fishery to supplement the greatly expanded fisheries of

the United States. The need for canned and salted fish, fish livers and oil built up many fisheries: Bonito, skipjack, tuna, swordfish, shrimp, and anchovy. After the war, however, and the return into the world market of European and Asian fishing fleets, Peru's newly developed fisheries hit hard times. This was partially due to the fact that Peru's processors did not have a background in international marketing. Peru, with slightly more than three million people, was not in the position to utilize its expanded fishery potential.

The situation was slightly different for the newly developed anchovy fishery. As California's sardine fishery began its dramatic decline, reduction interests began looking for other sources of meal and oil. In 1950 a fish meal factory was dismantled on Cannery Row in Monterey, shipped to Peru, and set up on a remote bay. The entrepreneurs desired secrecy for fear that Peru's guano industry might force the fish meal factory to close. Guano is the natural by-product of birds which relied on anchovies as their primary source of food. Used as a fertilizer, guano was Peru's chief source of foreign exchange. As prices for fish meal climbed during the 1950s more plants were taken apart and shipped to Peru, or built from new parts. By the early 1960s Peru was the largest fish meal producer in the world and fish meal

became the nation's chief source of foreign exchange. Over 25,000 people were employed by the purse seine fleet of 1,700 boats and 150 reduction factories. [54]

By 1970 the United Nation's Food and Agriculture Organization and Peruvian fishing authorities recommended an anchovy limit of 9.5 million metric tons per season. The scientists who were working on the problems in Peru's anchovy fishery were often those who had worked on the California sardine problem, or had utilized the data from that defunct fishery. However, that year the fleet and processing capabilities were so efficient that in ten days one million metric tons were landed, and by the end of the season, fishermen landed a total of over twelve million metric tons. The additional tonnage was allowed after several small, non-efficient producers lobbied the government for an extended season to take advantage of the unusual availability of anchovies and the high price of meal. [55]

The management of the Peruvian anchovy fishery placed the fishery in extreme danger. Scientists continued to warn of the dangers of overfishing, and in 1972 a re-occurring natural phenomena again happened, an El Niño. The resulting change in the ocean's current drove the fish close to shore where they were landed in

record numbers. The next season's collapse was not
[56]
unexpected by fishery scientists. While the fishery
did recover to some extent over the next decade, another
El Niño occurred in 1983 that left the anchovy fishery
devastated.

The long range effects found in Peru,
California, and in other countries indicate that there are
two major problems facing the conservation of the world's
fisheries: the first problem is that those working in
fisheries management choose not to become an advocate for
the species they are studying, secondly, research fishery
scientists are divided into basically two separate
methodological camps--those looking for environmental
answers and those looking at overfishing. Until the two
groups join forces, little can be accomplished in the way
of public policy, as lawmakers are simply not equipped
with the knowledge to decide which faction might be right.

For those scientists who feel that each species
is crucially different with respect to past fisheries it
is too easy to say that the Monterey Bay whale fishery
died off due to nineteenth century excess; that the
commercial abalone fishery in Monterey Bay was simply not
regulated in time to save it; that the Central California
commercial salmon fishery suffered due to a combination of
overfishing and siltation of spawning beds; or that the

Chinese swept the San Francisco Bay mud flats clean of shrimp and to conclude that the fates of these diverse fisheries offer little or no insights which would be helpful for the management of other fisheries.

Man cannot be allowed to separate public policy decisions by species. The use of raw materials from most extractive industries, such as lumbering, mining, or fishing is similar in that the material is used for economic gain. There is nothing in nature that civilized man does not exploit once the economic advantage is revealed. This economic exploitation is, like the very nature of business/industrial economics, based on immediate return. Long-term exploitation is not considered with non-renewable resources such as coal or oil, much less with renewable resources such as fish.

Renewable resource conservation is quite recent in man's history and mostly forced by governmental regulations. Unfortunately, in the case of many renewable fisheries governmental regulations occur at a point in the biological history of the fishery when the impossibility of reversing a declining trend in the fishery population is obvious to the researcher. However, the practicality of reversing biological trends is often not recognized by policy-makers who are under pressure during earlier phases

of the fishery to allow maximum exploitation. Over a long period of time those most directly affected by a declining fishery are the two groups who oppose early workable controls to limit the exploitation--the processors and fishermen.

If the current sardine fishery continues to grow allowing for a large commercial industry to once again be established there will be few fishermen or processors ready to take advantage of the situation. With the exception of sport fishermen, a few bait haulers, and the limited number of commercial fishermen who have expressed an interest in the new sardine fishery very little could be done with sardines. The canning industry moved on to other fisheries, or, in the case of Cannery Row in Monterey, simply ceased to exist. The Monterey Fish Company's plant at Seaside would be hard pressed to take in a 200 ton purse seiner load of sardines, much as Robbins' cannery was overwhelmed by a few rowboats full of sardines at the turn of the century.

[57]

CHAPTER IX: ENDNOTES

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- [3] California Fish and Game 18:1 (1932):99.
- [4] California Department of Fish and Game, Fish Bulletin number 49 (1937):53 hereafter cited as Fish Bulletin with appropriate number; Monterey New Era 4 and 25 May, August 9 and 10 August 1904.
- [5] Fish Bulletin 49, pp. 56, 58.
- [6] Ernest Ingersoll, "The Oyster, Scallop, Clam, Mussel, and Abalone Industries," Part XX, George Brown Goode et al, The Fisheries and Fishery Industries of the United States, Section V History and Methods of the Fisheries, Vol. II (Washington D. C.: Government Printing Office, 1887) pp. 622-625; Monterey New Era, 22 February 1899; Fish Bulletin 49, pp. 107-112; Biliiana Cicin-Sain, John F. Moore, and Alan J. Wyner, "Management Approaches for Marine Fisheries: The Case of California Abalone," Sea Grant Publication 54, January 1977, University of California San Diego, La Jolla, California p. 1-2; Herbert W. Frey, ed. California's Living Marine Resources and their Utilization (State of California, The Resources Agency, Department of Fish and Game, 1971) p. 31.
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[15] Clark, "Measures of Abundance...", pp. 34-35.

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- [19] Ted M. Taylor, "Cannery Row's Last Catch," Oceans, November 1974.
- [20] Richard S. Croker, "An Iconoclast's View . . .," p. 33.
- [21] Ritch Lovejoy, Interview with E. B. Gross, Monterey Peninsula Herald, 28 February 1952.
- [22] John Radovich, "The Collapse of the California Sardine Fishery: What Have We Learned?" CalCOFI Report, Vol. XXIII (1982):63.
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- [24] Elbert H. Ahlstrom and John Radovich, "Management of the Pacific Sardine," in Norman G. Benson, ed., A Century of Fisheries in North America, Special Publication Number 7 (Washington D. C.: American Fisheries Society, 1970), pp. 183, 186.
- [25] Scofield, p. 212; Thirty-Second Biennial Report of the Fish and Game Commission, 1930-1932, p. 69.
- [26] Clark, pp. 10-11.
- [27] Thirty-Second Biennial Report..., p. 69.
- [28] Michael Culley, The Pilchard: Biology and Exploration (New York: Pergamon Press, 1971), p. 169.
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[39] Ibid.

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[41] Phone interview with Robert Leos, Department of Fish and Game, Monterey, California, February 4, 1987.

[42] Ibid.

[43] Radovich, p. 57.

[44] McEvoy, p. 51.

[45] Radovich, p. 57.

[46] McEvoy, p. 52.

[47] Ibid.

[48] Leos, interview. See Daniel Lluch-Belda, "Long Term Sardine Fluxuations Along the Coast of the Californias: Possable Causes," Paper delivered at the annual CalCOFI Conference, October 1986.

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APPENDIX I

Sardine Data
Raw Fish to Finished Product
Monterey

FISHING SEASON	TONS LANDED	CASES PACKED 48 ONE-LB OVALS	MEAL REDUCED TONS	OIL REDUCED GALLONS
1895	3			
1904	225			
1915	2,003	47,234*		
1916-1917 (1916)*	7,690	97,100	249	25,563
1917-1918 (1917)*	23,005	331,065	875	92,393
(1918)*		593,315	2,874	261,466
1918-1919	36,100	798,566	3,812	341,173
1919-1920	43,090	687,777	3,969	419,474
1920-1921	24,955	287,954	2,115	226,826
1921-1922	16,285	353,188	2,695	295,858
1922-1923	28,965	580,464	3,806	576,553
1923-1924	46,125	631,286	6,601	1,240,296
1924-1925	67,325	737,743	7,105	1,246,561
1925-1926	69,011	972,970	6,393	1,110,983
1926-1927	76,690	1,172,532	6,447	1,501,384
1927-1928	98,678	1,377,411	9,355	1,601,993
1928-1929	119,102	1,451,524	12,395	2,651,524
1929-1930	159,434	1,887,804	16,671	3,887,472
1930-1931	108,953	1,246,011	11,490	3,363,912
1931-1932	68,823	764,334	7,825	2,143,101
1932-1933	89,257	263,815	14,370	3,761,387
1933-1934	151,937	862,548	22,206	4,819,900
1934-1935	229,992	772,314	36,396	9,379,239
1935-1936	184,113	1,513,688	26,933	6,854,372
1936-1937	206,229	1,288,205	31,867	6,814,184
1937-1938	104,464	828,737	15,383	3,067,587
1938-1939	180,090	1,063,363	28,859	5,462,066
1939-1940	227,231	1,763,401	34,568	7,090,963
1940-1941	165,145	1,219,846	25,805	5,197,570
1941-1942	249,717	2,429,804	36,309	7,222,683

(continued on next page)

1942-1943	183,158	1,429,652	28,255	5,590,335
1943-1944	212,383	1,563,036	32,840	6,578,416
1944-1945	234,613	1,659,053	34,920	8,305,401
1945-1946	142,282	1,220,579	20,297	4,803,560
1946-1947	26,818	243,492	3,893	755,670
1947-1948	14,492	222,867	1,756	260,375
1948-1949	40,610	671,290	4,527	664,060
1949-1950	131,884	1,579,085	17,326	3,419,720
1950-1951	53,023	759,172	6,442	1,132,643
1951-1952	24,864	495,542	2,217	327,149
1952-1953	285	5,740	14	2,345
1953-1954	58	1,335	3	410
1954-1955	8,674	192,525	567	86,032
1955-1956	14,133	313,255	1,143	168,796
1956-1957	5,787	124,393	330	49,410

*Reported by year.

Source: Milner B. Schaefer, Oscar E. Setter, and John C. Marr, "Growth of Pacific Coast Pilcard Fishery to 1942." United States Department of the Interior, Fish and Wildlife Service, Research Report 29 (1951), pp. 3, 5; California Department of Fish and Game Bulletin 49, 74; California Department of Fish and Game Circular 2, 14, 34.

APPENDIX II

Sardine Data
Prices Wages Paid in Dollars
Monterey

FISHING SEASON	PRICE PAID FISHERMEN PER TON	PRICE PAID FISHERMEN SEASON	WAGES PAID CANNERY WORKERS SEASON
1895	\$ 19.70	\$ 59.10	
1904	22.80	5,130	
1915	12.60	25,237.80	
1916-1917	12	92,280	
1917-1918	15	345,075	
1918-1919	15	541,500	
1919-1920	12.50	538,625	
1920-1921	12	299,460	
1921-1922	10	162,850	
1922-1923	5 - 8	217,200+-	
1923-1924 (1924)*	10 - 7 (EXCESS)	400,000+-	\$ 458,948
1924-1925	10+-	673,250	
1925-1926 (1926)*	10	690,110	800,000+-
1926-1927	11	843,590	
1927-1928	11	1,085,458	
1928-1929	11	1,310,122	
1929-1930	11	1,753,774	1,581,000
1930-1931	8	871,624	
1931-1932	8	550,584	
1932-1933	4 - 4.25	357,028+	
1933-1934	7+	1,063,559+	
1934-1935	7.50	1,724,940	
1935-1936	8	1,472,904	917,000
1936-1937	10	2,062,290	941,000
1937-1938	13	1,358,032	
1938-1939	11	1,980,990	1,750,000
1939-1940	11	2,499,541	1,197,000
1940-1941	10.50	1,734,023	2,856,000
1941-1942	17	4,245,189	
1942-1943	22	4,029,476	
1943-1944	22	4,672,426	

(continued on next page)

1944-1945	22	5,161,486	
1945-1946	22	3,130,204	
1946-1947	30 - 40	938,600+-	
1947-1948	45 - 60	797,000+-	
1948-1949	50 - 67.50	2,120,855	
1949-1950	32.50	4,486,950	2,790,000
1950-1951	(\$15 - \$20 a ton trucked from Southern California 35,000 tons trucked to Monterey at \$700,000-)		

*Reported by year.

Source: Milner B. Schaefer, Oscar E. Setter, and John C. Marr, "Growth of Pacific Coast Pilcard Fishery to 1942." United States Department of the Interior, Fish and Wildlife Service, Research Report 29 (1951), pp. 3, 5; California Department of Fish and Game Bulletin 49, 74; California Department of Fish and Game Circular 2, 14, 34.

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