

Salvaging salmon: Shasta Dam and the conservation movement

by

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CHAPTER 1. INTRODUCTION

The story of the Shasta Dam and of the Central Valley Project is a story about regional planning, ecology and agriculture. During the 1930s and 1940s, agricultural interests in California proposed an extensive irrigation project known as the Central Valley Project. This project was a major plan, decades in the making, which changed the way all Californians interacted with their environment. Though the primary goal of providing irrigation for agriculture succeeded, achieving that goal included significant costs, especially for the Central Valley Chinook salmon, *Oncorhynchus tshawytscha*. I will explore these issues in the context of conservation in the U.S. during the New Deal Era. This was a period when environmental consciousness in the U.S. was moving from conservation to environmentalism and ecology and was making large strides in knowledge. Understanding the Central Valley Project gives us insight into the conflicting ways scientists valued nature and how those values affected the eventual outcome of the Central Valley Project. Different stakeholders understood the policy problem in different ways, and tried to shape the outcome of the project.

Shasta Dam, completed in 1945, comprised a key part of the Central Valley Project, which was designed to move water from the northern half of California to the dryer southern

half. Created by the dam, Lake Shasta would serve as a major source of the water that would be redistributed throughout California's Central Valley. In addition to providing water to farmers, and electric power to urban dwellers, the dam also would have a major impact on the Central Valley Chinook salmon populations of the Sacramento River. The scientists and engineers who worked on the Central Valley Project knew about this impact, and a small team of biologists worked to devise a "salvage plan" for the salmon. However, major policy actors were focused on providing water to farmers and power to factories, and saving the salmon was clearly not a high priority for them. Even with the salvage plan, the dam had a large and negative impact on the fish.

Understanding the story of the salmon salvage plan provides insight into changes in the conservation movement during the 1930s and '40s. The process of creating the plan shows us that while the American conservation movement was in a time of transition, arguments over wildlife helped shape those changes. Environmental historians tend to focus on times of great activism, such as the creation of the national parks or the beginning of Earth Day. But it is important to look at the times between these events to understand the smaller changes and events shaping discussions leading up to those major mile markers.

The conservation movement in the early twentieth century is often seen through the lens of two controversial dams, Hetch Hetchy and Echo Park. In 1913 Congress authorized the flooding of the Hetch Hetchy Valley within Yosemite National Park to build a reservoir to supply water for San Francisco. But in 1956, after a hard fight from the Sierra Club and other environmentalists, Congress decided not to build Echo Park Dam in Dinosaur National

Monument near the Utah-Colorado border. The Echo Park Dam would have been part of the Colorado River Storage Project, intended to provide both water and power. Shasta Dam, built between 1938 and 1945, was constructed between those battles. Shasta Dam was not built in a federal reserve, so it was less controversial than either Hetch Hetchy or Echo Park.

Nevertheless, it was a major dam with great environmental impacts. Thus understanding what happened at Shasta Dam helps us to understand why the outcomes of those two dam proposals were different.

Californians had long envisioned a dam near the eventual site of the Shasta Dam. In 1933 the California legislature passed the Central Valley Project Act which approved the Shasta Dam as well as two other dams and several canals. The project was intended to bring water to the southern part of the Central Valley, provide flood control, and produce electricity. The construction of Shasta Dam started in 1938. In the same year a study of ways to preserve the salmon run started. This analysis was quite late in the process of building the dam, and the efforts to save the salmon would have been on better footing if the study had begun earlier and helped to shape the design of Shasta Dam to a greater degree.

The fisheries investigation was directed by Paul R. Needham. In 1940 his team had published a report on strategies to “salvage” the salmon runs. In the winter of 1942-1943, the dam reached a height that blocked the upstream migration of salmon. Needham’s team tried to mitigate the effects of blocking the salmon run but had many problems including having their trucks for transporting salmon confiscated by the army. Despite the fact that much of the plan was never put into practice, the biologists remained optimistic. In 1949 James W. Moffet

published a report on the state of the salmon runs in *California Fish and Game*, the journal of the California Department of Fish and Game, which stated that the fish were doing well. Moffett wrote, "Present ecological conditions in the Sacramento River are greatly improved for the natural production of salmonid fishes."¹

While ecology eventually became a focal point for the environmental movement, at the time of the Shasta salvage project, ecology had not yet gained full recognition as a science, and its primary focus emphasized the succession of plant communities. The scientists working on the Central Valley project used ecological concepts, such as connectivity of nature and population biology, but did not consider themselves ecologists. Most self-identified as aquatic biologists.² However, these scientists did see themselves as conservationists.

The Central Valley Project did not by itself turn untouched wilderness into a human-controlled disaster; instead it was part of a long series of changes. The Central Valley's rivers had been highly modified before the project even began by years of nearby mining and agriculture, which began in the 1850s; both used large amounts of water and altered the watershed considerably. By the 1930s urban and industrial users, especially those concentrated in the San Francisco Bay Area, were also having a significant impact on California's water systems. At the northern edge of the Bay along the Sacramento-San Joaquin Delta, industrial water users and municipalities were having trouble with brackish water that reached farther

¹ James W. Moffett, "First Four Years of King Salmon Maintenance Below Shasta Dam, Sacramento River, California," *California Fish and Game* 35 no 2 (1949): 102.

² Donald Worster, *Nature's Economy: A History of Ecological Ideas*, 2nd ed, (Cambridge: Cambridge University Press, 1994) 205-253.

and farther upstream as irrigation reduced the flow of fresh water into the Delta.³ Thus, the ecology of the Central Valley was quite different in 1933 than it had been in 1850. These changes had negatively impacted the salmon by clogging the streams with mud, blocking access to spawning grounds, polluting the waters with mining runoff, and reducing the water in many waterways making them an unsuitable habitat. Thus the salmon populations were declining even before Shasta Dam was built.

Salmon are iconic, holding significance and meaning. People are generally most passionate about conserving charismatic species; salmon with their dramatic lifecycle are quite charismatic. Salmon are anadromous fish; they live out much of their lives at sea but return to fresh water streams to spawn. Salmon travel incredible distances to return and spawn in the streams where they were hatched. They need to find the same cool water and shallow gravel beds for nests when they return to the place where they began life.⁴ The primary species of salmon found in California's Central Valley is the Chinook salmon (*Oncorhynchus tshawytscha*). Ecologists now divide the Sacramento salmon runs, populations that travel upstream every year at the same time, into four sections: Late Fall, Winter, Spring, and Fall. Runs are named for the

³ W. Turrentine Jackson and Alan M. Peterson, *The Sacramento-San Joaquin Delta The Evolution and Implementation of Water Policy: An Historical Perspective* (Davis, CA: California Water Resources Center, 1977):1-5.

⁴ David Yates et al. "Climate warming, water storage, and Chinook salmon in California's Sacramento Valley," *Climatic Change* 91 (2008): 337-338.

time when salmon enter the Sacramento-San Joaquin Delta.⁵ While Shasta Dam was being constructed, only two runs were recognized: Spring and Fall.⁶

Robert de Roos, who wrote about the Central Valley Project in 1948, called the story of the salmon life cycle “romantic,” suggesting that salmon were popular at the time the Central Valley Project was being built. Still, de Roos framed his discussion of salmon in terms of dollars spent and benefits to sportsmen, neglecting the intrinsic or cultural values of salmon. De Roos also placed faith in the hatchery as a technical solution to the danger to salmon posed by dams. Still, de Roos had a good grasp on the problems dams posed to salmon. He recognized that dams act as barriers to upstream migration and that they warm the water stored behind them, which can negatively impact the fish by lowering the amount of oxygen in the water. He also noted that the canals would be a problem because they would sweep the fish into their channeled flow.⁷

The Sacramento River salmon can serve as a lens for understanding the Central Valley Project. This story is primarily about the experts who worked on the Salmon Salvage Plan: the biologists who worked for the Fish and Wildlife Service, and the engineers who worked for the Bureau of Reclamation. Both engineers and biologists were willing to rearrange whole ecosystems to achieve their goals. While some of the biologists valued the salmon intrinsically,

⁵ Frank W. Fisher, “Past and Present Status of Central Valley Chinook Salmon,” *Conservation Biology* 8 No 3 (1994): 871.

⁶ Harry A. Hanson, Osgood R. Smith, and Paul R. Needham, *An Investigation of Fish-Salvage Problems in Relation to Shasta Dam* (Washington, DC: US Department of the Interior, Bureau of Fisheries, 1940): 24.

⁷ Robert de Roos, *The Thirsty Land: The Story of the Central Valley Project* (Palo Alto: Stanford University Press, 1948): 175-187.

most of the debate about the value of the salmon focused on their commercial value. This resulted in the salmon being undervalued in other categories: ecological function, aesthetic utility, and ethical valuation. I will examine how ways of valuing the salmon impacted actions that affected the salmon.

It is important to understand how Americans valued other types of nature than wilderness, and the Salvage Plan for salmon at the Shasta Dam is a fascinating part of that story. The story of Shasta's salmon is one of static as well as changing ethical views of animals, and of how people assigned extrinsic and finally intrinsic values to California's salmon. My thesis will discuss both these valuations of salmon.

Relevant literature

There are several bodies of literature that pertain to the story of the Shasta Salmon Salvage project. These are the history of conservation in the U.S., the history of water in the West, the histories and ecologies of West Coast salmon, California history, and the history of engineering. The literature addresses the political and economic aspects of water development in California and the long decline of northwestern fisheries, attempts to recreate the pre-European Sacramento River ecosystem, and the challenges of building the dam.

One of the foundational books in American environmental history is *Wilderness and the American Mind* by Roderick Nash. In this book, Nash explores the Hetch Hetchy-Echo Park story. He writes primarily about the idea of wilderness. Another book that is relevant to this study of people and fish in California is *Wild Animals and American Environmental Ethics* by Lisa Mighetto. The author traces changes in how Americans have viewed wild animals, arguing that

views began to change after evolutionary theory became more prominent. Mighetto discusses two schools of thought on why animals should be better treated. These schools of thought are humanitarianism which focuses on the individual animal, and biocentrism which focuses on the roles of species in ecosystems.

The Rights of Nature by Roderick Nash discusses the history of environmental ethics. Nash argues that the community to which one owes an ethical duty has been expanded. In the early 20th century the idea of the ecosystem was first articulated, and soon after people began arguing that such communities had rights, for example Aldo Leopold in “The Land Ethic.” Nash focuses mostly on the second half of the twentieth century, but the book still provides some context for the ethical changes happening at the time of the events discussed in this thesis.

There is extensive writing on the history of water allocation in the West and more specifically in California. This includes *From the Family Farm to Agribusiness* by Donald J. Pisani, *Rivers of Empire* by Donald Worster, *Cadillac Desert* by Marc Reisner, and *The Great Thirst* by Norris Hundley, Jr. These works tend to focus on the political and social aspects of dams and dam building. They help to explain the context in which these dams were built but don’t address in detail the impact of the dams on salmon or other wildlife. *Cadillac Desert* argues that water development in the West was economically as well as environmentally foolish, while *Rivers of Empire* argues that water development has helped to create a less democratic society. The general sense of these books is that the dams were politically motivated, benefited only a few, and had many negative environmental consequences. Pisani contends that early irrigation efforts were democratic in nature and enhanced life for small farmers and only later did the

larger projects such as Shasta Dam support large agribusiness. Hundley saw California's water history as one of fragmented institutions in which voters still maintained ultimate control. All of these narratives focus on political and economic power. While required to consult with wildlife agencies, the Bureau of Reclamation held most of the political cards and had to be persuaded to participate in mitigation efforts during and after dam construction.

Salmon have a literature of their own, though most environmental histories of salmon have focused on the Pacific Northwest rather than California. The most prominent environmental history of salmon is Joseph Taylor's *Making Salmon: an Environmental History of the Northwest Fisheries Crisis*, in which he argues that the blame for salmon population decline is constantly being passed around while little is done. He also documents the changing attitude of northwesterners to the fish. *Salmon without Rivers: A History of the Pacific Salmon Crisis* by Jim Lichatowich offers a biologist's perspective on salmon history. Lichatowich argues that the problem of salmon's decline has a long history and that Euro-American ways of understanding nature as something to be exploited have greatly contributed to the salmon's decline. A history of all California fisheries, not only the salmon fishery, *The Fisherman's Problem* by Arthur F. McEvoy offers useful information about commercial fisheries. McEvoy argues that all efforts to conserve fisheries before the 1970s were based on the commercial value of the fish. These works are primarily about the continuous decline of fish populations since European settlement of the West Coast and our political failures to stop the decline. They provide context for my study which focuses on one specific population of Chinook salmon.

Another critical source of information about salmon in California is the ecological literature. This literature is written by people whose primary training is in the sciences and is

intended for an audience of scientists, as opposed to historians writing about science. Especially helpful is *Fish Bulletin 179 Contributions to the Biology of Central Valley Salmonids*, published in 2001, which, in addition to papers on the current ecology of salmon, contains two historical ecology papers, one of which deals explicitly with Shasta Dam. In “Shasta Salmon Salvage Efforts: Coleman National Fish Hatchery on Battle Creek, 1895–1992,” Michael Black gives a biological overview of the Shasta Salmon Project showing how the fish have declined since the dam was built. In “Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California,” Ronald M. Yoshiyama, Eric R. Gerstung, Frank W. Fisher, and Peter B. Moyle attempt to estimate historical populations of Chinook in California. The Bay Institutes’ report entitled *From the Sierra to the Sea* on the San-Francisco Bay-Delta watershed, an ecological unit that includes the Sacramento River, attempts to provide a description of the pre-European watershed for purposes of ecological restoration and management. The literature that describes historic states of the ecosystem focuses on pre-settlement times which were taken as a baseline that ecological managers wished to recreate. I have not found any work which attempts to reconstruct the state of the ecosystem after European settlement.

A variety of books on aspects of the history of California proved helpful in writing this thesis. These include Richard Walker’s *The Conquest of Bread*, which is an agricultural history of California, and *The Fall and Rise of the Wetlands of California’s Great Central Valley* by Philip Garone, an environmental history that focuses on waterfowl and wetlands. Also Kevin Starr’s series, *Americans and the California Dream*, has provided a great deal of helpful background information. Starr explains that in the early 1930s there was lot of labor unrest in California. Both urban and rural workers were involved in extensive strikes. In the fall of 1933, ten

thousand cotton pickers went on strike in the San Joaquin Valley, and in 1934 what started as a longshoremen's strike became a three-day general strike in San Francisco. The 1930s was also a time when many long-planned infrastructure projects were built in California, for example the Bay Bridge, the Stockton Channel, and the Central Valley Project itself.⁸

A final source is *Big Dams of the New Deal Era* by David P. Billington and Donald C. Jackson. This book is an engineering history and offers many useful bits of information about how Shasta Dam was built and the engineering concerns that went into designing the dam.

This thesis attempts to fill in some gaps. For one thing, the environmental history of the 1930s and 1940s is still little explored. The impact of water policy on fish is also understudied. Additionally, most salmon history focuses on the area further north, paying little attention to the Sacramento River and major salmon runs in California. This thesis focuses on the interactions between water project engineers and biologists, and the formulation and development of extrinsic and intrinsic valuations for salmon and other fish in California.

Why it matters

The conservation ethics of this time period were dominated by progressive and utilitarian values—conservation was seen as the greatest good for the greatest number of people, a distinctly anthropocentric viewpoint. There were some hints of a more eco-centric viewpoint but for the most part only hints. Joel W. Hedgpeth, one of the research assistants on

⁸ Kevin Starr, *Endangered Dreams: The Great Depression in California* (Oxford: Oxford University Press, 1996) 61-121, 309-340.

the project, wrote in 1941 about “the preservation of a species for its own sake.”⁹ Hedgpeth also tried to bring the plight of the salmon to public attention by writing about it in newspapers and magazines. Paul R. Needham, the leader of the salmon investigation team, was a member of the recently-founded (1935) Wilderness Society, dedicated to protecting wild spaces; he corresponded with Aldo Leopold, Professor of Game Management at the University of Wisconsin-Madison, a leader in the development of modern environmental ethics.

Environmental values were changing. It seems that even among those working on the project, differing views on the value of non-human nature began to appear. These values may have been why these biologists, or at least some of them, put so much effort into saving the salmon. Generational shifts in values among the biologists emerged. Hedgpeth was much younger and more of an activist in nature than Needham. Differing ways of valuing nature may also explain many of the conflicts between biologists and engineers.

⁹ Joel W. Hedgpeth, “Livingston Stone and Fish Culture in California,” *California Fish and Game* 27 no 3 (1941): 147.

CHAPTER 2. STARTING TO BUILD

Before Shasta Dam

The Sacramento River drains the northern half of California's Central Valley, a rich agricultural region. The Valley is 450 miles long from north to south and varies from 40 to 70 miles wide. The San Joaquin River flows north from the southern half of the valley. In roughly the middle of the valley, between the cities of Sacramento and Stockton, the Sacramento and San Joaquin Rivers meet and flow through a complex delta into the San Francisco Bay. Intensive cultivation of the valley began soon after the Gold Rush in the mid-19th century, and the idea of a comprehensive water plan, such as the Central Valley Project, dates back to the late 1800s.¹⁰

The rainfall pattern in the Central Valley is not ideal for agriculture. The northern part of the valley receives an average of 30 inches a year while the southern part receives an average of only 5 inches per year. The rain falls primarily between December and April, leading to winter flooding and spring runoff and leaving little water during the height of the growing season.¹¹ The idea behind the Central Valley Project was to move water from the wet northern part of the valley to the drier southern part of the valley, and to provide irrigation water in the summer months by storing the winter rains.

¹⁰ Norris Hundley, Jr., *The Great Thirst: Californians and Water A History, Revised Edition* (Berkeley: University of California Press, 2001): 243.

¹¹ US Department of the Interior, Bureau of Reclamation, *Central Valley Project*, accessed July 11 2014, http://www.usbr.gov/projects/Project.jsp?proj_Name=Central Valley Project&pageType=ProjectPage.

In the mid-1800s gold miners in the Sierra Nevada developed a new technique called hydraulic mining. The technique relied on the fact that gold was much denser than the surrounding materials. Everything that was not gold was free to wash downstream, including tremendous amounts of dirt and gravel. Using vast amounts of water, the miners passed whole hillsides through their sluice boxes. The process brought large amounts of debris down the Sacramento and San Joaquin rivers. Hydraulic mining choked salmon spawning grounds with debris and silt and sometimes even blocked access to them altogether making it difficult for the fish to reproduce.¹²

Humans were also changing the salmon's habitat with intensive agriculture in the Central Valley. The transcontinental railroad was completed in 1869 making the products of California farms available to a much broader market. Railroads were extended where none had been before, providing once sleepy towns with new opportunities to sell their crops. The first refrigerated rail car entered service in 1851. At first this technology was used primarily by meat packers in Chicago to ship fresh meat to the East Coast, but in 1889 the first shipment of cooled fruit was sold in New York. By the late 1880s, fruits and vegetables became the dominant crops in the Central Valley, replacing the earlier wheat boom.

Human efforts to increase the salmon population also altered their habitat. The first salmon hatchery on the West Coast was established in 1872 in the McCloud River in Northern California, near the future site of Shasta Dam, by Livingston Stone, who worked for the federal government as a U.S. Deputy Fish Commissioner. His goal was to transplant Pacific salmon to

¹² Kahrl, William L. *The California Water Atlas* (Sacramento: Governor's Office of Planning and Research, 1979).

the East Coast to replace the declining Atlantic salmon there. The hatchery also shipped eggs to New Zealand.¹³ In addition to salmon, Stone also worked with trout and helped culture rainbow trout to stock the continental U.S. While Stone clearly valued salmon, he also thought that his actions could improve them. His ideas about nature and human interference with it were very different from those of most biologists working today. He saw no problem with transferring species around the globe. In an effort to improve salmon, he altered their lifecycle by raising them in a hatchery. In many ways Stone helped set the precedent for the scientists who would work to save the salmon whose spawning ground would be cut off by Shasta Dam.

The beginning of the idea for the Central Valley Project dates back to March 1873 when Congress authorized the Army Corps of Engineers to carry out a year-long survey of the Central Valley. This study began in April, and a year later the results were reported back to President Grant. Given the limited time and funding available, the survey was not particularly detailed, but it did recommend a large dam at the northern end of the Sacramento Valley similar to the modern day Shasta Dam.¹⁴

Mining debris flowing downstream damaged farms in the Central Valley by increased flooding and debris which was deposited on the fields. The damage was so severe that the farmers went to court. In 1884, Justice Lorenzo Sawyer of the 9th Circuit Court in San Francisco, in the case of *Woodruff v. North Bloomfield Gravel Mining Company*, ruled in favor of the farmers, placing a permanent injunction on hydraulic mining and arguing that the damage was

¹³ Joel W. Hedgpeth, "Livingston Stone and the Fish Culture in California," *California Fish and Game* 27 no 3 (1941)126-148.

¹⁴ David P. Billington and Donald C. Jackson, *Big Dams of the New Deal Era* (University of Oklahoma: Norman, 2006), 283.

irredeemable, uncontrollable and impaired the community at large. This was a key turning point in California history; for the first time, miners lost out to farmers. It was also an important ruling in environmental law¹⁵. Even though hydraulic mining lasted only about thirty years, it would affect the hydrology of the state and the sedimentation of rivers for many more years by increasing the sediment washing down California's rivers and streams. Some of this sediment clogged salmon's gills.

In 1902 Congress created the Reclamation Service, which in 1907 became the Bureau of Reclamation, whose job it was to bring irrigation to small farmers in the West.¹⁶ Their mandate was to build irrigation infrastructure and "make the desert bloom." Thus the focus was on using natural resources to help people. Dams and canals created by the Bureau of Reclamation would further these goals. Settlers would help pay back the cost of the construction over time. Reclamation was limited to providing water to farms of 160 acres (the size of a federal homestead grant) or less. Congress did not intend that the Bureau would break up existing farms, but rather that the Bureau of Reclamation would help create new farms up to a certain size.

Meanwhile, California agriculture was changing. Growers were moving away from the wheat which dominated in the late 1800s and towards fruits and vegetables. Chinese immigrants had introduced rice to the state during the Gold Rush, but it was not until the early 20th century that it became a major crop. Farmers grew rice in flooded paddies, which

¹⁵ Kahrl, *The California Water Atlas*.

¹⁶ Newlands Reclamation Act of 1902, Pub. L. No 57-161: (1902).

demanded large volumes of water.¹⁷ This practice increased the demand for agricultural water in the Sacramento basin and thus the need for a dam on the Sacramento River.

Ideas about irrigation for the Central Valley continued to be developed. In 1919 Colonel Robert Bradford Marshal of the United States Geological Survey (USGS) proposed a plan to build several dams and canals in the Central Valley to send water south. While several plans to control flooding in the Sacramento Valley had been proposed, this was the first plan to control water in the whole of the Central Valley. In 1921 the California legislature considered Marshal's plan. It passed in the State Senate but failed in the Assembly. Voters also rejected this plan three separate times when it was placed on the ballot in 1922, 1924 and 1926 (due to political maneuvering Marshal supported only the 1924 initiative).¹⁸ Few people took Marshal's plan seriously.

Since the time of the Gold Rush, the salmon had not been faring well. In 1929 the California Division of Fish and Game published Fish Bulletin 17, entitled *Sacramento-San Joaquin Salmon (*Oncorhynchus tshawytscha*) Fishery of California*, written by G. H. Clark. This document helps us understand not only the health of the Central Valley salmon before the Central Valley Project, but also how people thought about the salmon at that time. Clark stated: "It is a foregone conclusion that the salmon fishery of the Sacramento-San Joaquin Rivers is depleted. The facts brought forth in this paper prove and strengthen the case. The causes of

¹⁷ W. Turrentine Jackson and Alan M. Peterson, *The Sacramento-San Joaquin Delta: The Evolution and Implementation of Water Policy* (Davis, California: California Water Resources Center, 1977), 2.

¹⁸ de Roos, *The Thirsty Land*, 20-21; Hundley, *The Great Thirst*, 242-244.

this depletion and their corrections are now the important things.”¹⁹ It is clear that even before the Central Valley Project began construction, the salmon were in trouble, and some people were concerned about it. In detailing the condition of various rivers in the watershed, the Fish Bulletin stated:

There are thirty-five dams in the Sacramento system that directly or indirectly affect the salmon migration. Of these, sixteen have working fish ladders, and at eleven of these dams the ditches have adequate screens; four of the ladders in the system are under construction or repair. It has also been determined that the available spawning grounds do not support as large a population of spawning fish each year as they are capable of doing.²⁰

This statement makes it clear that by 1929 the rivers had been modified heavily by dams and ditches; presumably the primary purpose of these modifications was to irrigate agricultural lands. Despite the extreme habitat degradation, Clark claims that the “greatest single cause”²¹ of population decline in California’s salmon is “extensive overfishing during the last fifteen or twenty years.”²² It is not clear why Clark focused on overfishing, though he does note the declining catch. Clark worked for the Bureau of Marine Fisheries, so he may have felt that overfishing was something he could do more about, or he may have felt political pressure to blame the group that was least able to fight back.

Ultimately, Clark was not optimistic about the future of salmon in the Central Valley. He wrote, “The fishery seems to be at a point where it will require a great deal of concentrated

¹⁹ G. H. Clark, *Sacramento-San Joaquin Salmon (Oncorhynchus tshawytscha) Fishery of California*, California Division of Fish and Game, *Fish Bulletin* No. 17 (1929), 24.

²⁰ *Ibid.*, 29.

²¹ *Ibid.*, 23.

²² *Ibid.*, 23.

effort on the part of the people of the state to protect it and if possible to build it up.”²³ Yet he did not say if he thought such an effort was likely. The Central Valley Project would not help matters as it would alter the watershed in ways that would damage the salmon population.

Another problem faced by salmon at the time was pollution. Clark noted, “Pollution of the river from the drainage of rice fields has been known to kill adult salmon.”²⁴ There were other sources of contamination as well. A 1940 report, written as part of the Salmon Salvage Project, noted that five streams in the Shasta area were “appreciably contaminated by mine tunnel drainage.”²⁵ Paul A. Shaw, working for the U.S Bureau of Fisheries (USBF), measured copper, zinc and pH levels in these streams and in the Sacramento River. He found that, “The copper content of the Sacramento River rose above the lethal limit for trout on several sampling days and calculations indicate near lethal limits for most of the investigation period.”²⁶ Thus the watershed was polluted from several sources, and often this pollution reached lethal levels for salmon. It is likely that these chemicals had negative effects on the Chinook even at well below lethal concentrations.

The ecology of California’s salmon had also been altered by fish cultivation. In 1929 there were three salmon hatcheries on the upper Sacramento River: Baird Station, Battle Creek, and Mill Creek. Baird Station, the oldest of these, had been operating almost continuously since

²³ Ibid., 17.

²⁴ Ibid., 25.

²⁵ Paul A Shaw, “Mine Tunnel Drainage In the Shasta Reservoir Area,” Appendix E of *An Investigation of Fish-Salvage Problems in Relation to Shasta Dam*, (Washington, DC: US Department of the Interior, Bureau of Fisheries: 1940) 195.

²⁶ Ibid., 197. Trout are discussed here rather than salmon, because studies had been conducted on trout but not salmon. Because trout and salmon are closely related, it was assumed that salmon would have a similar tolerance.

1872. Battle Creek had operated since 1895, and Mill Creek since 1910. These hatcheries gathered eggs from spawning salmon and raised them to young fry, the river dwelling stage of the young salmon's life cycle. The fry were then released—mostly to the rivers they came from, but some were transplanted to other rivers, although after 1888 very few fish left California.²⁷

Clark stated:

The fish culture work, considering its magnitude, should show better results. However, other contributing causes of depletion such as overfishing, dams, overflow basins, and fishes predatory on the young and eggs may have offset any good that artificial propagation has done. There is no evidence on either side conclusive enough to warrant making a definite statement as to the success or failure of artificial propagation.²⁸

Thus it was unclear at the time what effect these hatcheries were having on salmon ecology. However, it was certainly clear that overfishing and habitat loss were major dangers to the salmon.

In his 1929 report, Clark wrote:

Salmon conservation depends basically on only one factor, that is, that sufficient adult salmon are allowed to spawn, so that the population can be perpetuated at a reasonably high level. Destruction of the spawning reserve by any means, whether it be by overfishing, pollution, impassable dams or any other factor, can result in but one condition: the eventual disappearance of salmon from our waters.²⁹

Clark's report shows that the Chinook already faced many problems in the years before Shasta Dam was constructed, as construction on Shasta did not begin until 1938.

However, the forces favoring a vast rearrangement of the Central Valley's water had not disappeared, despite the lack of interest in Marshal's plan. In March of 1931, State Engineer

²⁷ Clark, *Sacramento-San Joaquin Salmon (Oncorhynchus tshawytscha) Fishery of California*, 13-17.

²⁸ *Ibid.*, 23.

²⁹ *Ibid.*, 44-45.

Edward Hyatt proposed a “state water plan” similar to what eventually became the Central Valley Project. By this time the Great Depression was well underway and large civic projects were being proposed across the country. Hyatt’s plan included the Shasta Dam (then called Kennett), the Friant Dam, and 120 miles of canals with pumps. This was somewhat scaled back from Marshal’s USGS plan for multiple dams and canals and based on better data which had been collected in the 1920s. The engineering requirements were also better detailed and more realistic, and the plan would be cheaper to implement.³⁰ This time the project received much more political support and became the basis of the Central Valley Project Act.

There were several factors that lead to the legislature finally approving such a project. These included: much improved engineering data; the drought which started in 1929; the state’s need for more electric power; and the belief that the project would help stop salt water intrusions. Finally, it was important that the dam would help create jobs.³¹

The New Deal and non-human nature

To understand the Central Valley Project it helps to have an understanding of the wider context of the New Deal and how the government was approaching nature at the time. The Civilian Conservation Corps (CCC) is emblematic of how the Federal government saw nature in the 1930s. The CCC was part of Roosevelt’s job creation program. Young men were hired to live in camps on federal land and work to improve and conserve these lands. These young men changed the outdoor landscape of many parks. They created trails, visitors’ centers and roads,

³⁰ de Roos, *The Thirsty Land* 22; Hundley, *The Great Thirst*, 244-247; Billington and Jackson, *Big Dams of the New Deal Era*.

³¹ Hundley, *The Great Thirst*, 252.

planted trees, and worked to reduce erosion. These projects reflected the idea that outdoor recreation was valuable and should be accessible. On the other hand, changing the landscape in this way did not please advocates of wilderness. They thought that the reserves should not be modified by human labor.³² In California's Central Valley Project, the former view in favor of accessible nature was much more in evidence than the latter view in favor of isolated wilderness. For example, the project created Lake Shasta that was used for recreation, but as humans had created the lake, advocates felt it could not be considered wilderness.

Roosevelt established the CCC in 1933, the same year he approved funding for the Central Valley Project. The president's conservation ethic focused on human uses of nature. Before becoming president, Roosevelt had practiced scientific forestry on his family estate in New York, managing the estate for efficient timber production. He also advocated that rural land be put to the use from which "greatest economic return can be derived." As governor of New York, he helped create similar programs on smaller scales in the state. In September 1931, Roosevelt created the Temporary Emergency Relief Administration (TERA), which provided jobs for the unemployed in New York State including many jobs in re-forestation³³.

The CCC was an offshoot of a strand of American thought that identified virtue with spending time in nature and rural life. This philosophy dates back at least as far as Thomas Jefferson, who claimed that farmers made engaged and virtuous citizens. The CCC embodied

³² Neil M. Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement*, (Oxford University Press, 2008).

³³ Neil M. Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement*, (Oxford University Press, 2008).

the New Deal's approach to nature, combining Pinchot-style conservation and a concern for individual interactions with nature.

The Central Valley Project was built during an era of immense construction projects. For example, in California the Hetch Hetchy project was completed in 1934, and the San Francisco Bay Bridge and the Golden Gate Bridge were both built in the 1930's. Other big projects built at this time were Hoover Dam, Bonneville Dam and many other dams on the Columbia as well as the system of dams of the Tennessee Valley Authority (TVA). Many of these projects had been planned long before the New Deal, but the work programs provided the funding that made them possible.³⁴ Among engineers and planners, there was a persistent willingness to rearrange nature and a feeling of optimism about humans' ability to control natural forces. Thus politicians and engineers were willing to rearrange things on a grand scale. However, they felt little concern for wildlife, often believing that wildlife, too, could be controlled.

Legislation and funding

In July 1933, the California legislature passed a bill authorizing the Central Valley Project. The bill passed with a strong majority in the Assembly and a narrow majority in the Senate. Governor James Rolph, Jr. signed into law the Central Valley Project Act, which authorized \$170,000,000 in bonds to build the project.³⁵

The California Legislature was not thinking of salmon when they authorized the Central Valley Project. There were many social and economic forces at work in the Central Valley. The

³⁴ Kevin Starr, *Endangered Dreams: The Great Depression in California* (Oxford: Oxford University Press 1996), 309-339.

³⁵ de Roos, *The Thirsty Land*, 21-23.

valley was and remains a rich agricultural area but also a place of great economic inequality between landowners and migrant workers.³⁶ Other economic interests played the primary role in bringing the project to fruition. For example, John B. McColl, a California State Senator from Redding, the district where Shasta Dam was eventually built, played a major role in getting the state act passed. His constituents thought the dam would help provide them with good jobs.³⁷ The district was suffering economically due to the many copper mines in the region being abandoned.³⁸ Labor and farm interests in the Central Valley also strongly supported the bill because it would mean jobs building the dam for union workers and irrigation for farmers.³⁹

Legislators also saw the project as providing irrigation, hydro-electric power, and flood control. The three dams and five canals would transform California's water system by shipping water from the northern part of the Central Valley to the southern part where grapes, cotton, almonds, tomatoes, walnuts, apples, and other water-hungry fruits and vegetables were grown.⁴⁰ The valley receives relatively little rain, and most of that occurs in the wet winter months; snowmelt can also cause frequent spring flooding. Thus the Central Valley Project would store the winter rains and the spring snow melt providing water for irrigation during the dry summer months. Shasta Dam, the northern most piece of the project, would sit near the

³⁶ Carey McWilliams, *Factories in the Fields: the Story of Migratory Farm Labor in California*, (Santa Barbara: Peregrine Smith, 1939:1971); Don Mitchell, *The Lie of the Land: Migrant Workers and the California Landscape* (Minneapolis: University of Minnesota Press, 1996).

³⁷ de Roos, *The Thirsty Land*, 24-25.

³⁸ Al M. Rocca, *Shasta Dam: A History of Construction 1938-1945*. (Redding, California: Renown Publishing, 2009), 32.

³⁹ de Roos, *The Thirsty Land*, 30-31.

⁴⁰ Kenneth W. Umbach, "A Statistical Tour of California's Great Central Valley," California Research Bureau, California State Library: 1997, accessed 2014 <https://www.library.ca.gov/crb/98/11/98011.pdf>.

headwaters of the Sacramento River. In addition to storing water for irrigation, the dams would be used to generate hydro-electric power.

The legislature, knowing that the state couldn't afford to fund the project fully, opted to include a public power provision in the Central Valley Project Act. Federal policy at that time was much more likely to fund projects with public power provisions. The provision provided for all power generated by the project to be sold by the government rather than by private companies. This angered officials at Pacific Gas & Electric (PG&E), the major utility in Northern California, who didn't want to compete with cheap public power.

PG&E responded by launching a referendum campaign. The company gathered enough signatures to force the law authorizing the project to face a repeal election. A yes vote would mean that the law as it was would go forward, while a no vote meant that the law would be repealed. The Central Valley Project was unpopular in Southern California because that part of the state did not benefit from the Central Valley Project as proposed at the time. Southern California orange growers also feared that the project would create competition for them by increasing the number of farmers. PG&E hoped the law would be repealed. Governor James Rolph strongly supported the Act, saying, "If any special interests try to block this measure or delay it in any way, I am prepared to fight them to the last ditch of my executive authority."⁴¹ Despite PG&E's campaigning, in December 1933 when the measure went before the voters, the referendum passed, though only by a slim margin with low voter turnout. This meant that the

⁴¹ Hundley, *The Great Thirst*, 255-257.

project would be built. The vote was split between northern California, which favored retaining the law, and southern which opposed the referendum.⁴²

To build the Central Valley Project, the state would need money. The law that authorized the project called for it to be funded by bonds that would later be paid back through the sale of power and water from the project. While the state was authorized to issue bonds for the project, it could not afford to do so. After the referendum passed, California legislators were quick to ask the federal government for help. The state applied for a grant from the Emergency Administration for Public Works, a forerunner of the Works Progress Administration. At the time California was a solidly Republican state and out-going president Hoover, an engineer from California, was very sympathetic to the project. At first, Hoover's reelection defeat seemed likely to prevent the project from ever receiving federal funding. However, it soon became clear that Roosevelt's New Deal might be a source of funding, and an appeal was made to Congress to provide the funds since the state could not sell the bonds authorized for the project. When the money was not quickly forthcoming, the state sent Edward Hyatt, the State Engineer, to testify before the House Committee on Flood Control in early 1935. During his testimony, Hyatt repeatedly said that he didn't care if the project remained under state control or was under federal control—the main thing was to get the Central Valley Project done.⁴³ Hyatt stated that the state was willing to work with either the Bureau of Reclamation or the Army Corps of Engineers so long as the project got built.

⁴² de Roos, *The Thirsty Land*, 27-35; Hundley, *The Great Thirst*, 254-255.

⁴³ de Roos, *The Thirsty Land*, 37-38.

In the end, the federal money came through different channels than originally expected. The 1935 Rivers and Harbors Act authorized the federal government to contribute \$12,000,000 toward the Central Valley Project. However, this money was never appropriated. Then in December 1935 Roosevelt authorized \$20,000,000 (later reduced to \$4,200,000) from the Emergency Relief Appropriation. The President put the Bureau of Reclamation in charge of the project, reducing California's control. Funding for the project was part of the New Deal and was motivated by a desire to create jobs. The stated purpose of the project was to supply water for irrigation to the southern part of the Central Valley.⁴⁴ While some argue that irrigation was a driving factor for agriculture in California, Walker argues that agriculture was driving the need for more irrigation.⁴⁵

Central Valley Project overview

Precipitation in California is seasonal; the state has a Mediterranean climate, with rainy winters and dry summers. In addition the state is much wetter in the north than it is the south. Both of these are problems for the irrigated agriculture in the Central Valley .The Central Valley Project aimed to store winter rainfall and spring snowmelt for summer use, and also to move water from the north of the state to the south.

To understand what the project does, it is helpful to start at Friant Dam on the headwaters of the San Joaquin River. This dam impounds the water coming out of the Sierra Nevada Mountains into the river, which is then sent south in the Friant-Kern Canal which ends

⁴⁴ Hundley, *The Great Thirst*, 255.

⁴⁵ Richard A. Walker, *The Conquest of Bread: 150 years of Agribusiness in California* (New York: The New Press, 2004), 125-128, 171-175.

near Bakersfield. The water is used primarily for irrigation. The water taken at Friant is enough to seriously deplete and in many years even de-water the San Joaquin. To replace the water in the river, water is pumped through the Delta, down the Delta-Mendota Canal to the Mendota Pool. This water is used to refill the San Joaquin so that rights holders along the river can continue to withdraw water.

The water pumped from the Delta to refill the river comes from further north: Shasta Dam which sits near the head waters of the Sacramento River. Shasta is the key source of water in the system.

Early considerations

Due to the time needed to make plans and hire contractors, it was not until 1937 that construction of the Central Valley Project began with the Contra Costa Canal. This canal would bring fresh water through the Delta to the cities in Contra Costa County, such as Pittsburgh and Antioch. Because so little water was reaching the sea, the cities on the edge of the Delta were having trouble getting fresh water. Brackish water from the Bay was intruding far up into the Delta where the cities were obtaining their water.

The officials at the Bureau of Reclamation divided the Central Valley Project into three regional divisions: Kennet, Delta and Friant. Each of these was responsible for a different part of the project. The Delta division worked on the various canals through the Delta, the Friant division worked on the Friant Dam and related canals in the Southern part of the San Joaquin Valley, and the Kennet division was responsible for Shasta and Keswick Dams.

The earliest record that anyone contacted the Bureau of Reclamation about the salmon that would be impacted by Shasta Dam was on February 14, 1936, when District Counsel Honnold at the Sacramento office of the Bureau of Reclamation wrote to Construction Engineer Walker Young. Young had joined Reclamation in 1911, played an important role in building the Hoover Dam, and worked as the supervising engineer for Shasta Dam. He later became Chief Engineer of the Bureau of Reclamation.

Honnold began by saying, “The upper reaches of the Sacramento River, particularly McCloud River, are the spawning grounds of much of the Salmon and Steel heads of the state and interference with the fish industry and sport is sure to provoke much publicity and perhaps criticism.”⁴⁶ Existing state law required the builders of dams to construct either fish ladders or hatcheries when they built dams that affected any species of native fish. This law dated from the 1850s but was not enforced until the 1970s. This was in part because the law was in conflict with other parts of California water law which demanded water be put to “beneficial use.” Attempts in the 1920s by the California Department of Fish and Game to enforce the law were overruled by the state Water Board.⁴⁷ There was also a federal law, the Fish and Wildlife Coordination Act of 1934, that directed the USBF, then in the Department of Commerce, to study the effects of federal water projects on fish. District Counsel Honnold wrote, “Since it will

⁴⁶District Counsel Honnold to Young, February 14, 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, National Archives and Record Administration–Rocky Mountain Region (Denver).

⁴⁷ Karigan S Bork et al. “The Rebirth of California Fish & Game Code Section 5937: Water for Fish,” *UC Davis Law Review* 45 (2012): 809-913.
http://lawreview.law.ucdavis.edu/issues/45/3/Topic/45-3_Bork.pdf (For some of this time there was no minimum flow requirement so there could be a ladder, but no water.)

require months for investigations, preparation of plan and designs by the state and federal agencies, a considerable period for construction and the cost will be of large dimension, I believe early consideration of this matter is desirable.”⁴⁸

Young forwarded Honnold’s letter to the Chief Engineer, Raymond F. Walter, with a brief note, which remarked that there was an existing hatchery.⁴⁹ On March 6, 1936, Walter replied to Young and stated that the matter would be “carefully studied” and instructing Young to request the California Fish and Game Commission [sic] to “... make tentative recommendations on such fish structures or facilities as may be deemed necessary at the project mentioned above and also at the Friant Dam on the San Joaquin River.”⁵⁰

On May 7, 1936, Young received a letter from Herbert C. Davis, Executive Officer of the Department of Natural Resources, Division of Fish and Game, which was probably in response to this request. Davis said that the project was required by state law to include fish ladders or hatcheries and that \$250,000 should be estimated for this cost.⁵¹ After this the matter seems to have been dropped, despite earlier statements indicating that some type of study was planned. It is unclear whether the money was budgeted; certainly it is not referred to in later

⁴⁸District Counsel Honnold to Young, February 14 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁴⁹ Young, letter to Raymond F. Walter, Chief Engineer, February 15, 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁵⁰ R. F. Walter, letter to Young, Sacramento, Calif, February 15, 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁵¹ R. F. Walter, letter to Young, Sacramento, Calif, March 6, 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

budgets. Young did not investigate the problem any further, feeling this type of thing was beyond the scope of Reclamation's work. It seems that Reclamation simply ignored California and Federal Law. In fact the law seems to have largely been unenforced at that time, and most Californians also paid it little heed.⁵²

On July 8, 1936, the Bureau of Reclamation announced the winning bid for "core drilling and excavation for investigation"⁵³ at the Kennet Dam site. This preliminary investigation needed to take place before the design of the dam could be completed.

Very little relevant to the salmon happened between Young's receipt of Davis's letter and 1938. On December 8, 1936, Walter sent plans for Friant Dam to Young to be forwarded to the Division of Fish and Game.⁵⁴ And on April 7, 1937, Fred J. Foster, Regional Director of Fish Culture, USBF, Seattle Washington, wrote to Roy M. Snell, the regional engineer in Reclamation's Redding office. Foster explained that USBF was considering decommissioning the hatchery at Baird on the upper Sacramento River and wanted to know if Reclamation would be interested in purchasing the hatchery. Foster stated that his agency was quite short of funds so that they couldn't afford to just give Reclamation the buildings.⁵⁵ This shows that the USBF was

⁵² Karigan S Bork et al. "The Rebirth of California Fish & Game Code Section 5937: Water for Fish," 833-841.

⁵³ US Department of the Interior, News Release, July 8, 1936, Box 165 file Central Valley Dams & Reservoirs Shasta Dam Thru 1938, Project correspondence, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁵⁴ R. F. Walter, letter to Young, Sacramento, Calif., December 8, 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁵⁵ Fred J. Foster to Roy M. Snell, April 7, 1937, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

quite worried about money and likely constantly underfunded. No action seems to have resulted from either of those letters.

Promoting the dam

In the time before construction began on Shasta Dam, the Bureau of Reclamation did much to promote the dam to the general public. For example, on March 9, 1937, Supervising Engineer Young went to Bakersfield, the largest community in the San Joaquin Valley, to give a speech. In his speech Young said, “Briefly stated, the Central Valley Project embodies a plan for the conservation, regulation, distribution, and utilization of the water resources of the Sacramento and San Joaquin Rivers to provide urgently needed water supplies for existing agricultural, industrial, and municipal developments in the Sacramento and San Joaquin Valleys and upper San Francisco Bay region, which contain 3,000,000 acres of 900,000 persons.”⁵⁶ Young especially pointed out the agricultural benefits; overall his speech focused on how the dam would benefit humans and said very little about non-human nature.

Another part of Reclamation’s public relations campaign was naming the dam. On Sunday September 12, 1937, it was announced that the dam would be named Shasta, in honor of nearby Mt Shasta. Before this the dam was unofficially know as Kennet. In a press release, John C. Page, the Commissioner of Reclamation, explained the significance of the new name, “Mt Shasta, a double-peaked extinct volcano towering 14, 161 feet above sea level is one of the

⁵⁶Walker R. Young, “Plans for the Development of the Central Valley Project and the Relation of the Government Therewith” March 9, 1937, Box 99 Entry 7 File 021, Central Valley—Publicity 1936 thru 1945, Project Correspondence File 1930-1945 Central Valley 021.-023 FY 13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

Nation's highest and one of the world's most beautiful mountains."⁵⁷ As a volcano, Mt. Shasta has a distinct cone shape and is significantly taller than the surrounding mountains. In the same press release, Page stated that, "By providing better distribution of water in the semi-arid interior valleys of California, the project will preserve or restore these rich areas already highly developed—areas representing a producing agricultural investment of two billion dollars now facing decline or collapse because of an inadequate water supply."⁵⁸ At this point, Page thought of the project as helping existing farms rather than creating new ones. The quote also demonstrates his continued focus on irrigation.

In December 1937 major flooding in the Central Valley and Northern California strengthened the resolve of Reclamation. They believed that if the Central Valley Project was in place, it would prevent floods like that from occurring. California had real problems and Reclamation felt they had a solution.⁵⁹

Young received a warm welcome from California growers who believed the project would benefit them. For example on January 12, 1938, he was the guest of honor at a "valley wide meeting in Tulare."⁶⁰ Young was also the subject of many newspaper profiles and was invited to give a number of speeches.

⁵⁷ News release, September 12, 1937, Box 165, File: Central Valley Dams & Reservoirs Shasta Dam Thru 1938, 1, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

⁵⁸ Ibid.

⁵⁹ News release, March 30, 1938, Box 103, File 023.6 Central Valley Press Releases 1 Jan 1938 thru 31 Dec 38, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

⁶⁰ Ibid.

Bell and Page

The project got its real start on January 13, 1938, when Frank T. Bell, the Commissioner of the USBF wrote to John C. Page, a Nebraska-educated civil engineer who rose through the ranks to become Commissioner of the Bureau of Reclamation in 1936, suggesting “the Reclamation Service should provide funds for the Bureau of Fisheries that a study of the situation can be made with regard to the maintenance of the salmon run in the Sacramento River.” Bell went on to explain that the salmon fishery is “very valuable” and to request \$25,000 from Reclamation.⁶¹ This was a rather daring move on Bell’s part. However, this letter led to Reclamation’s first serious consideration of the needs of salmon.

After receiving Bell’s letter, Page wrote to Chief Engineer Walter and Supervising Engineer Young to ask their opinions on the matter. Walter was agreeable with the expense, but Young wrote: “This office is of the opinion it would be proper to render financial assistance to the USBF in making this investigation, but the amount requested, \$25,000, seems extremely high especially if the investigation is to be a joint one with other agencies who will bear their own expense.”⁶² Young seemed very reluctant to work with the fish; he clearly didn’t see concern for the environment as part of an engineer’s role.

⁶¹ Frank T. Bell to John C. Page, January 13, 1936, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁶² Walker Young to Commissioner [Page], Box 128 file fish conservation Thru Dec 1939, Project correspondence, Department of the Interior, FY 10, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

On February 28, 1938, Page replied to Bell agreeing that investigation should be made and saying the bureau would provide some funds.⁶³ It is not clear why Page agreed. There were no environmental impact reports required; Page was legally bound by the Fish and Wildlife Coordination Act and California law to mitigate the dam's effect on fish, but he had been ignoring these requirements until now. However, he must have had some sympathy for the salmon—unlike many others in his organization.

Starting to write the Hanson, Needham and Smith report

Paul R. Needham, the USBF biologist at Stanford, was to take charge of the project. He was the team leader for the biological investigation of the salmon problem that began in 1938. While he did not lead the team in the field, he was the person who corresponded with Bureau officials. He served as an Aquatic Biologist with the USBF from 1931 to 1940, stationed at Stanford University, and then he worked with the U.S. Fish and Wildlife Service from 1940 to 1944. In 1944 Dr. Needham became Director of Fisheries with the Oregon State Game Commission. He later came back to California to assume a zoology professorship at the University of California - Berkeley. His father was an entomology professor at Cornell and a well-known conservationist.

Osgood R. Smith from the California Division of Fish and Game was also brought into the project. Later a third biologist, H. A. Hanson, was recruited and was in charge of most of the work in the field. These three scientists would author the major report on the science of the

⁶³ John C. Page to Frank T. Bell, February 28, 1938, Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

fish and what should be done to save them. While the biologists were starting their investigations, construction of Shasta had already begun.

On April 1, 1938, a conference was held at the USBF offices at Stanford. In addition to Needham, and Smith, Herbert C Davis, A.C. Taft, N. B. Scofield, and G. H. Clark, all employed by the California Department of Fish and Game, were present. These were all biologists, not engineers, which makes sense for the beginning of the project. Many people important in California fisheries science were present. Scofield and Clark worked for the State Fish and Game Agency, and both had done extensive work on salmon. The scientists worked to put together a preliminary plan for the investigation. The plan as outlined dealt with both migratory and non-migratory fish that would be affected by Shasta Dam and had an estimated initial cost of \$17,100. The planned investigation would count salmon at Redding Dam, survey the spawning grounds above and below the dam, and research what diversion screens and other engineering features would be needed to protect the salmon. Needham wrote up the plan as a memorandum and sent it to Bell, who on May 10, 1938, sent it on to Page.⁶⁴

In the memo, Needham wrote that migratory fish were of more importance than non-migratory fish, because of their commercial value and because actions would need to be taken sooner to protect these fish. The memo showed that they knew very little about the problem at this point since some very basic information still needed to be researched, such as the “extent

⁶⁴ Paul R. Needham, “Suggested Investigation of Fisheries Problems Relating to the Shasta Dam on the Upper Sacramento River near Redding California,” Box 128 file fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

of spawning area that will be cut off by the dam.”⁶⁵ They also needed to know how many fish migrated up the Sacramento each year.

In the late 1930’s biologists had a rudimentary understanding of salmon ecology. It was becoming a matter of settled scientific consensus that salmon migrated far out to sea, but returned to the stream where they hatched to spawn, and that each seasonal run was a breeding population. This meant, for example, that allowing more fall run salmon to spawn would not create more spring run fish because the two populations were separate and did not interbreed.⁶⁶ Needham and his fellow biologists knew that the Sacramento River runs were not interchangeable with fish from other rivers or between runs.

On April 30, 1938, Ralph Lowry, who had worked on Hoover Dam, was appointed as the Construction Engineer at Shasta.⁶⁷ While the dam was built by a third party contractor, not the Bureau of Reclamation directly, the Reclamation Construction Engineer still played an important role. Lowry served as the Bureau of Reclamation’s engineer who worked most closely with the builders since the Construction Engineer was in charge of overseeing the fabrication of the dam.

Meanwhile, the Bureau of Reclamation continued its public outreach. On May 10, 1938, a radio address sponsored by the Bureau entitled “California’s Most Precious Resource” was

⁶⁵ Ibid.

⁶⁶ Jim Lichatowich, *Salmon Without Rivers: A history of the Pacific Salmon Crisis* (Island Press: Washington D.C., 1999), 168.

⁶⁷ Department of the Interior, news release, April 30, 1936, Box 103 File 023.6 Central Valley Press Releases 1 Jan 1938 thru 31 Dec 38, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

broadcast by radio stations across the state. This broadcast praised the Central Valley Project and how it would change California's relationship with water, providing flood control while "conserving" the winter rains for human use. However, the broadcast did not once mention salmon.⁶⁸

On May, 12 1938, Bell telegraphed Needham to say Page had agreed to fund the salmon salvage project. Needham then wrote to Young and requested a meeting soon.⁶⁹ This would be the first in-person meeting of a biologist from the USBF with an engineer from Reclamation. This is the first reference to Page's officially funding the project. Needham seems to have been on top of things and ready to get started right away, especially since he had already done some work before this, outlining the project and hosting a meeting.

However, the Chief Engineer of Reclamation, Raymond F. Walter, was not entirely pleased with the project. He wrote to Young "... we had understood that the commercial fish problem would not be of much importance at Shasta Dam, and it is hoped the proposed investigation will so demonstrate, which is largely the reason for our cooperation in the investigation."⁷⁰ Walter clearly hoped that the investigation would find that salmon were not

⁶⁸ The National Emergency Council, "California's Most Precious Resource" May 2, 1936, Box 103 File 023.6 Central Valley Press Releases 1 Jan 1938 thru 31 Dec 38, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁶⁹ Needham to Young, May 12, 1938, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁷⁰ Walter to Young, May 8, 1938, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

worth bothering about. He claims to have understood this already, even though he and Young had not investigated or researched the fish.

The first conference between the biologists and the engineers was held on May 18, 1938, at Young's Sacramento office. Needham, Smith, G.H. Park, Young and "others of this office" were present (Hanson had not yet been brought into the project.) They discussed how little data they had at this point; only one count of the yearly salmon run had been performed. It was generally agreed that Needham and his colleagues would do all the work and Reclamation would fund the project. In his report to Walter, Young doesn't seem upset or worried about the salmon project, though his later communications became more hostile to the fish.⁷¹

A letter dated June 1, 1938, from J. W. B. Rice protested continuing damage by human activity affecting the salmon. This is the first record of public concern from outside of the project. Rice said that the salmon were disappearing not because of the "Japs" but because of the "construction of dams by power companies."⁷² He rejected one fairly dominant narrative but still placed the fault as belonging to a single actor. It is interesting how seriously this letter seemed to be taken. Secretary of the Interior Harold Ickes forwarded the letter to Page who wrote a short reply. The reply is not very specific and makes no concrete promises, but it is still more than a form letter. Page struck an earnest tone, writing, "I appreciate the interest you

⁷¹ Young to Walter, May, 25, 1938, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁷² J. W. B Rice to John C Page, June, 1, 1938, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

have shown in making available the results of your observations. You will be pleased to know that this Bureau is cooperating with the Bureau of Fisheries and the State of California in an investigation of the fish problems in the Sacramento River, particularly concerning the effect of the construction of Shasta Dam.”⁷³

The construction of the dam continued. Bidding on the dam construction contract was held June 1, 1938, in Sacramento. Only two major bids were received. The two companies bidding were Pacific Constructors Incorporated (PCI) and Shasta Construction Company, a reorganization of the six companies which had built the Hoover Dam.⁷⁴ PCI underbid the Shasta Construction Company slightly and won the contract. However, this did not have much impact on the salmon. The major actors in the story remained biologists and agency officials. PCI did not get involved in the conversation between Reclamation and USBF about the fish.

The USBF’s biologists also communicated to the general public about their work. The October 1938 issue of *Associated Sportsman* contained an article by Smith, one of the investigators, called “Fact Finding Survey in the Sacramento Drainage Basin.” Sport fishers were already interested in the project at this point and would become more involved later. The article provided an overview of the project. Smith also noted that “... we know that the run has decreased.” He went on to say, “Obviously the runs must be salvaged in some safe manner

⁷³ John C. Page to W B Rice 6/17/38, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁷⁴ Rocca, *Shasta Dam*, 32.

which will be in accord with the normal migratory instincts of the fish concerned.”⁷⁵ This showed great optimism that salvage could be done, and it is also worth noting that Smith thought such a course of action was obvious. This article gives us a clue as to how Smith thought about the value of salmon—to him they were obviously, and without need for debate, worth saving. That suggests that Smith valued salmon for their own sake though he did not come out and say so directly.

On October 22, 1938, a ceremony was held at Redding celebrating the “start of heavy construction at Shasta Dam.”⁷⁶ Secretary of the Interior Harold Ickes gave a speech in which he said Shasta Dam was “another milestone in this nation’s progress on the road to practical conservation.”⁷⁷ Ickes is using the word “conservation” here in a progressive sense. This concept of conservation focuses on management of water not protection of the environment. Most people today think conserving water means using less—shorter showers, fewer water greedy lawns, etc. But for many people involved with the Central Valley Project, conservation was about making more water available, so it was not “wasted” by flowing out to sea. In this concept of conservation any water not put to human use is lost. Dams, which allowed water to be stored, were seen as conserving water.

⁷⁵ Osgood R. Smith “Fact Finding Surveys in the Sacramento Drainage Basin,” *Associated Sportsman*, 5 (Oct 1938): 12.

⁷⁶ *Central Valley Project History*, Feature Histories and Reports 10, Box 92 File: Central Valley, Vol. 1, 1936, 86, Project Histories, FY10, Department of the Interior, Bureau of Reclamation, RG115, NARA—Rocky Mountain Region (Denver).

⁷⁷ Harold Ickes, speech, Feature Histories and Reports 10, Box 92 File: Central Valley, Vol. 1, 1936, 86, Project Histories, FY10, Department of the Interior, Bureau of Reclamation, RG115, NARA—Rocky Mountain Region (Denver).

On November 14, 1938, S. Ross Hatton of the California Division of Fish and Game produced a two page document called "Preliminary outline of proposed investigation of fishes in the Sacramento-San Joaquin River System." This report was similar to Needham's memo but a bit more detailed. It listed several areas of investigation such as spawning, which included then present spawning areas, the characteristics of good spawning areas, and spawning migration; migration, which included counting migrants, and migration timing, food, which included available food, sampling plantings and the river bottom; and predation and abundance, which included caught records and sampling methods. Hatton also included a rough cost estimate of \$16,082 for the first year of the investigation.⁷⁸

The team soon began work investigating the salmon's biology. Joel W. Hedgpeth was a student at the University of California-Berkeley at the time and the "junior member of the field crew" working on the investigation of the salmon. In 1941 he would write a paper about Livingston Stone in which he talked about saving species for their own sake. He later became an environmental activist and wrote several newspaper articles opposing the construction of the Central Valley Project for environmental reasons. In the 1960s he worked to oppose the construction of a nuclear power plant on Bodega Head on the California coast. While his role in the Salmon Salvage Project was relatively minor, he is important because he exemplifies a newer way of thinking about and advocating for salmon, valuing them for their own sake rather

⁷⁸ S. Ross Hatton, "Preliminary Outline of Proposed Investigation of Fishes in Sacramento-San Joaquin River System," February 15, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

than merely as food or sport. Hedgpeth was part of the slow movement to increase environmental awareness.

Hedgpeth described the working conditions thusly: “During the long summer we were based at Baird on the McCloud River; in the winter some of us continued at Stanford University in a basement office in the museum, directly underneath Governor Stanford’s locomotive No. 1. We often looked thoughtfully at the beams overhead, hoping that the next earthquake would not occur during working hours.”⁷⁹ This gives a feel for what the work was like. Clearly those working on the salmon project did not have prime office space.

1939

On February 8, 1939, a conference was held at State Engineer Hyatt’s office. Smith, Hanson, Clark, Hatton, Hyatt, Calland, the Assistant Supervising Engineer on the Central Valley Project, and Young were all present (this was the first meeting between biologists and Engineers where Hanson was in attendance). Young wrote, “The State and the Bureau of Fisheries appear to be giving joint study to the possible effect on fish, not only of the construction of the project as now authorized but on the ultimate state if and when it is carried out.” He went on to say that the biologists asked the engineers many questions about the

⁷⁹ Joel W. Hedgpeth “The Passing of the Salmon” in *California’s Salmon and Steelhead: The Struggle to Restore an Imperiled Resource*, ed. Alan Lufkin, (Berkeley: University of California Press: 1991), 57.

operation of the dams, but that most of the answers were unknown, and that he therefore felt that it was not a very productive meeting.⁸⁰

On February 27, 1939, Hanson, one of the biologists working on the project, sent a manuscript of “Sacramento River Salmon Nest Redds” to Lowry to be approved for publication. The paper described in detail how female salmon built redds, the gravel nests where they lay their eggs. The biologists also dug up the redds to study the eggs and tried to keep them for observation until they hatched. However, due to flooding the eggs were lost. They hoped to repeat the experiment with better results the following year.⁸¹ Despite the results, this paper helps us understand the types of investigations that were on going and how little biologists still knew about the early stages of the salmon lifecycle. Their lack of knowledge meant that biologists didn’t always understand the long term impact of Shasta Dam and were not in positions of power when advocating for the fish.

By early 1939, the salmon project was already beginning to exceed the original estimated budget. On February 24, 1939, Jackson wrote to Page, “For your information we should also tell you that the magnitude of the salmon salvage problem in connection with Shasta Dam is as large as or larger than that brought about by the construction of the Grand

⁸⁰ Young, report on meeting of February 8, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁸¹ Young to Walter, February 11, 1939; Harry A Hanson to Ralph Lowry, February 27, 1939 ; Harry A Hanson and Leo Erkkila, “Sacramento River Salmon Nests of Redds” (draft manuscript) nd; Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

Coulee Dam.”⁸² Jackson was probably trying to secure more project funding by making this comparison, but he was also emphasizing the importance of the project. It really was a substantial project that affected a very large salmon run. Jackson also included Needham’s financial statement and a tentative plan for further work.

In a letter on March 11, 1939, to Chief Engineer Walter, Commissioner of Reclamation Page wrote, “I feel that we will have to go along with the Bureau of Fisheries in this work...”⁸³ It is still unclear why Page decided to support the salmon project. Here he seems reluctant to support the project but thinks he is obligated; however, it is not clear whether it is a legal or moral obligation. Page also asked Walter and Young for comments on the matter. They both sent telegrams. Walter’s was brief and stated that he had “no objection” to giving the USBF funding.⁸⁴ Young’s reply was longer—he objected to financing “general aspects of problems of another department,” but given the USBF’s lack of funds, saw “no alternative.”⁸⁵

Yet later that month, on March 20, 1939, Walter wrote a much more hostile letter to the Salmon Salvage Program. “I believe, however, that a considerable part of this cost is involved in securing data on the Sacramento Salmon Industry problem in general, as it is

⁸² Jackson to Page, February 24, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁸³, Page to Walter, March 11, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁸⁴ Walter to Page, teletype message, March 15, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁸⁵ Young to Page, telegram, March 17, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

known, that it becomes practically dormant during recent years, and I doubt if the Shasta Dam will have much influence on it as it now exists. I had hopes that the report would conclusively so show.”⁸⁶ He felt that the program was trying to help a dying industry and that doing so was well beyond the scope of Reclamation. This shows a fairly extrinsic view of the salmon, one based on the fish’s value to humans and not the salmon’s inherent worth. Walter was implying that they are important only as a commercial catch and that since the industry was then not very profitable, the salmon were no longer worth bothering about.

On April 8, 1939, Hanson, the field leader of the biological investigation, sent a letter to Construction Engineer Lowry asking for permission to proceed with a conference abstract.⁸⁷ In the abstract Hanson discusses the data they have so far—mostly the 1938 count at Redding Dam and the 1938 commercial catch. He goes on to say, “The choice of salvage lies between bringing new waters to the fish or the fish to new waters.”⁸⁸ Both of these are major interventions—and neither is “natural.” Hanson thinks that some combination of these two strategies will be most likely to succeed. He seemed reasonably optimistic about salvaging the salmon.

On April 26, 1939, another conference was held, this time in San Francisco. Foster of the USBF, Davis, Taft, Hatton, and Leo Shapovalov from the California Division of Fish and Game, as

⁸⁶ Walter to Page March 20, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

⁸⁷ Hanson to Lowry, May 8, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

⁸⁸ Harry A Hanson “The Sacramento River Salmon Salvage Problem” (unpublished abstract) nd, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

well as Needham, Smith and Hanson, the leaders of the investigation, were all there. Based on this meeting, Needham sent Young a work program giving him a rough outline of the work to be done.⁸⁹

From June 6 to June 8, 1939, Needham and Smith were in the field near Redding where they conferred with Lindgren, an engineer working for the USBF, and Hanson and other engineers working for the Bureau of Reclamation. The fieldwork was making progress. The spring run was being counted, tributaries below the dam had been surveyed (and found wanting) and holding and ripening experiments on how to best raise salmon eggs were being conducted. Needham wrote to Jackson, Acting Commissioner of USBF, "The only salvage scheme developed to date, other than relying entirely on artificial propagation for all time, consists, briefly of diverting water into a stream which now goes dry in summer and transferring the running to it." This was Hanson's plan for bringing water to the salmon. Needham explains that the stream that the team thought would be best suited for this was Stillwater Creek which flowed into the Sacramento just below the town of Redding. This creek was dry in the summer so it could not support salmon. Needham thought that hatcheries would be needed as well as "natural propagation."⁹⁰ It is interesting that Needham didn't want to rely solely on hatcheries, since at the time, the fisheries biologists, including Needham himself, were

⁸⁹ Needham to Young, April 27, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁹⁰ Needham to Jackson, June 21, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

questioning the use of hatcheries.⁹¹ These biologists wanted hatcheries to be carefully evaluated so that their impact could be better understood. This was likely why Needham pursued a plan that focused on salmon spawning in the river, rather than primarily relying on a hatchery.

Needham reported on his meeting with Smith and Lindgren to Jackson and included a list of immediate steps which included a list of surveys that he wanted undertaken. On June 6, 1939, Jackson wrote to inform Page that Needham had requested immediate surveys of trapping sites and Stillwater Creek.⁹² Needham's interest in Stillwater Creek would continue in his proposed plan. Lindgren remained in the field after Needham had left and was there for several days. After this study he wrote a report which he sent to Needham as well as to Foster and Holmes. In the report, Lindgren outlined the problems of trapping fish below Shasta Dam and of supplying water to Stillwater Creek. He concluded that both projects were "entirely feasible from an engineering point of view."⁹³ The Stillwater Creek plan was continuing to gain favor among the biologists.

On August 1, 1939, Needham and Higgins visited Young's office and discussed the Stillwater plan in more detail. Young expressed concern about the cost of the plan and wrote to

⁹¹ Lichatowich, *Salmon Without Rivers*, 147.

⁹² Jackson to Page, June 6, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁹³ Lindgren to Needham, June 17, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver). Was Lindgren's report an enclosure with Needham's letter to Jackson? It should be indicated as such or given its own note.

Lowry asking that field surveys be done so that a cost estimate could be drawn up.⁹⁴A conference was held at Needham's Stanford office on August 25, 1939, where these plans were further discussed. Higgins, Hanson, Smith A. Ketchum, M. M. Ellis, Westfall, Smith and Needham were all present. Ketchum was an engineer working for Reclamation; everyone else worked for USBF. Needham wrote in a report to Young, "We discussed in detail the location of the trapping sites in the main river and the amount of water that should be requested for diversion into Stillwater Creek. Additional discussion was carried on with regard to the matter of temperature that will prevail in the main river below the dam following completion of construction."⁹⁵ These discussions continued to be attended mostly by biologists, while Reclamation made engineering choices without reference to the fish. Despite Needham's concern about the water temperature, the dam outflow had already been designed to draw from the warm water on the top of Lake Shasta. This meant that there was very little control of the temperature of the river downstream and that the dam would warm the river, altering the salmon's habitat and reducing the oxygen in the water.

A month later Young continued to question the Salmon Salvage Project. On September 5, 1939, he wrote, "... I question whether his [Needham's] office will be responsible for final decision in all matters pertaining to the salmon problem, although it is my understanding that the Bureau of Fisheries has been made responsible for all investigation and that it will submit a

⁹⁴ Young to Lowry, August 1, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

⁹⁵ Needham to Young, August 26, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

report and recommendations regarding the plan designed to solve the problem arising by reason of the construction at Shasta Dam.”⁹⁶ Young appears to have wanted to control what was going on in all matters relating to Shasta including the Salmon Salvage project. He continued to focus his complaints around money.

In September, Lindgren wrote a longer report including his further recommendations to Needham. The plans for Keswick Dam were still not finalized so Lindgren recommended continued discussion with Reclamation. Communication difficulties like this were common. The fisheries personnel would ask for information that Reclamation did not yet have and the lack of information would delay their plans. Most of Lindgren’s report was spent discussing the possible transfer of water from the McCloud River to Stillwater Creek. This would require a diversion dam, a canal to move the water, a bridge and a tunnel. Many structures would be needed to bring water to fish. Lindgren also commented that at this point it would not be “economically justified” to lower the penstocks, the intakes of water to the power plant, to release colder water from lower in the reservoir.⁹⁷ If the dam had been designed with the needs of fish in mind from the beginning this would not have been a problem. While it was clear that fish would be impacted by the dam before it was designed and built, the salmon were not taken into account in this process. This was similar to how events played out on the

⁹⁶ Young to Lowry, September 5, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

⁹⁷ Lindgren to Needham, September 6, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

Columbia River.⁹⁸It seems that the type of approach that integrated ecology was not taken at the time.

Since Reclamation didn't employ any biologists, they needed a way to evaluate the information they were receiving from USBF. On October 5, 1939, Calland, Acting Supervising Engineer for Shasta Dam, wrote a letter to S. O. Harper, the Chief Engineer of the Bureau of Reclamation, suggesting that a Board of Consultants be formed to help deal with the Shasta salmon. "The general situation was discussed with the Commissioner during his last visit here, and it was his suggestion—with which we concur—that upon receipt of the official report and recommendation from the Bureau of Fisheries, a board of consulting engineers be appointed to consider the report and submit appropriate recommendation as was done at Grand Coulee."⁹⁹ The Columbia River was serving as model for the Central Valley Project—at least in terms of dealing with fish because the problems on that river seemed similar to Reclamation.

Meanwhile federal fisheries personnel continued to work on their Salvage Plans. On October 18, Needham sent Page an outline of the Stillwater Plan and strongly urged Reclamation to approve this approach to salmon salvage. He also wrote that biological investigation should be continued along with the project. In this letter Needham brought up the issue of the sports fishery for salmon for the first time, though he mostly seems to have been

⁹⁸ Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (University of Washington Press: Seattle and London, 1999), 226-230

⁹⁹ Acting Chief Engineer S. O. Harper to Commissioner Page, November, 10, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

talking about trout, not salmon.¹⁰⁰ Still, sport fishers would later become involved in the project and champion the needs of the salmon.

The California Division of Fish and Game was not very involved in the Central Valley Project during this time period. However, on October 18, Lester A. McMillan, executive officer of the state Board of Fish and Game Commissioners, wrote a letter to Reclamation asking about the project. He stated he was aware that Reclamation and USBF were working on a plan to mitigate the effects of Shasta Dam on salmon and stated, “Consequently the California Division of Fish and Game is not concerning itself with this work except to cooperate with United States agencies in any way possible to assure a complete and logical salvage program so that these runs of fish may be preserved, at the least possible maintenance cost.”¹⁰¹ However he was still concerned about other aspects of the Central Valley Project and how they would affect aquatic life, especially in the San Joaquin River. The State officials would later seek more input into the project, expressing concern for the wellbeing of the fish.

On October 25 to 28, 1939, Holmes, Lindgren, Needham and Ketchum met at Harper’s office in Denver, where they discussed fish trapping, specifically using Keswick Dam as a site for trapping. Harper, the acting Chief Engineer, was there along with D. C. McConaughy, W. E. Blomgern and other unnamed Reclamation engineers. Needham wrote in a report to Jackson, “An extremely profitable discussion was had on matters relating to design and location of the

¹⁰⁰ Needham to Page, October 18, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁰¹Lester A. McMillan, Letter to US Bureau of Reclamation, October 18, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

various structures which will be necessary to have ready for operation.”¹⁰² The group also discussed appointing a Board of Consultants, but at that time no possible names were put forth. Needham thought that the biologists’ final report would not be ready until March or April 1940, but that to move things along more quickly, it might be possible to supply the board with the raw data. The group also discussed how to improve “administrative coordination” between USBF and Reclamation and whether the California Division of Fish and Game or USBF would be in charge of running the project. Needham worried that a change of agency would delay the program which was already short on time. They also discussed the possibility of using water from Shasta Lake rather than from the McCloud River for the Stillwater plan. D. C. McConaughy, an engineer from Reclamation, also at the meeting, wrote a memo about it for Commissioner Page. McConaughy would become more involved in the Salmon Salvage Project and write many memos about it. McConaughy’s memo dealt mostly with how to trap salmon, though it also discussed the Stillwater plan and the possibility of a Board of Consultants. McConaughy expressed concern that the size of the salmon run was not clear as, even in the 1939 season, some fish were not counted due to faulty equipment.¹⁰³

Shortly after this meeting, on November 10, 1939, Harper wrote to Page and recommended that Reclamation appoint a consulting board at once so that they would be able to deal with the USBF report as soon as it was finished. Harper went on to recommend that this

¹⁰² Needham to Jackson, November 2, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁰³ D. C. McConaughy, “Memorandum to Chief Engineer,” November 27, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

board be the same people who were on a similar board acting for the Columbia Project.¹⁰⁴ This board consisted of Professor W. F. Durand, an engineer at Stanford; Professor R.D Calkins, an economist at the University of California; and Professor Willis H. Rich, a fishery biologist, also at Stanford. On November 20, 1939, Harper wrote to Rich and Calkins asking them to be on the Board of Consultants for Shasta.¹⁰⁵ The next day, Young wrote to Durand to ask the same thing.¹⁰⁶ Durand also worked for Reclamation as a consulting engineer on other parts of the Central Valley Project. The three members of the board were now aware of the Shasta Salmon Salvage Project and their upcoming role in it. The board seems to have been chosen entirely by Reclamation engineers without USBF having any input. This board would have final approval of the plan Needham and his crew developed.

As a result of the discussion of inter-bureau coordination, Jackson wrote to Page about some changes in communication. Foster was to be in charge of fish culture, Holmes in charge of trapping, while Needham remained in charge of fieldwork, and carbons of communications

¹⁰⁴ Harper to Page, November 10, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁰⁵ Harper to Robert D. Calkins, November 20, 1939; Harper to Willis H. Rich November 20, 1939, Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁰⁶ Young to Durand, November 21, 1939 Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

which were sent to Foster and Holmes were directed to be sent to Needham as well.¹⁰⁷ This streamlined things slightly, but did not seem to result in clearer communications.

Parallel science

While the California Department of Fish and Game was not involved with creating the Salmon Salvage Plan in 1939, they did continue to carry out research on the fish. In 1939, an article about the 1938 salmon catch, written by G. H. Clark, was published in *California Fish and Game*, the California Department of Fish and Wildlife's official journal. The news was not good; the commercial catch had been small compared to the previous five years. Offshore fishing in Monterey Bay was especially bad, although river fishing in the Sacramento River was actually better than in previous years. Clark speculated that this was because salmon were evading the nets in the ocean and getting to the river. In 1939, Needham's investigators counted how many salmon made it up the river to Redding Dam. They used this count to estimate how many salmon typically made it up the river—and how many salmon the project should try to save. Yet it was known that 1939 was a bad year for the fish and not typical. Later on, Young and others wanted to use the 1939 estimate even though the 1940 run was much bigger, and they even argued that there was no reason to suppose 1939 was atypical. Yet the low catch in 1939 already suggested that it was not a typical year.

In October 1939, *California Fish and Game* published an editorial entitled "Cattle and Fish" which compared cattle ranchers to fishery managers. The editorial explained that, "The

¹⁰⁷ Jackson to Page, November 10, 1939, RG 115 Box 128 file: fish conservation Thru Dec 1939, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

citizens of California are the owners of the fish along the coast of this State, and the Division of Fish and Game has been appointed by the owners to act in the capacity of range boss.”¹⁰⁸ The editorial then went on to discuss how fish should be managed more like cattle. A conservationist is described as someone who “...wears a white collar and an air of high ideals and altruistic sentiment.”¹⁰⁹ Contrast this image to the “practical nature”¹¹⁰ of the cattle man who was a good conservationist “not in spite of, but because of, his desire to make money...”¹¹¹ The editorial goes on to argue that the conservationist should be more like the cattleman. The editorial assumes that cattle and fish are valuable for the same reasons—because their flesh has commercial value. It concludes, “We like to profess the principles of conservation for that makes us feel idealistic and altruistic, but actually we could do with less sentiment about our natural resources. We need more facing of the fact and the direct application of the cattleman’s common sense business management.”¹¹² This was not just a call for pragmatic management of fish but also a call to focus on salmon’s economic rather than intrinsic value. It was also a call to pay less attention to ecology and more attention to economics. That this editorial was published in a professional journal aimed at state officials suggests that the focus on monetary values was common among professional fisheries management personnel of the time.

¹⁰⁸ W. L. Scofield “Cattle and Fish,” *California Fish and Game* 25 no 2 (1939), 183.

¹⁰⁹ *Ibid.*, 182.

¹¹⁰ *Ibid.*, 182.

¹¹¹ *Ibid.*, 182.

¹¹² *Ibid.* 184.

Early 1940

At the beginning of 1940, Young, Lowry, Ketchum and McConaughy from Reclamation, Needham and Hanson from USBF, and the members of the Board of Consultants met at Redding. The group drove from Redding to Toyon and en route were able to inspect Stillwater Creek from the road. A report of the biological investigation had still not been written, so the discussion was more general. However the Stillwater Plan seems to have received the most attention though there was also a discussion of using Battle Creek. The Board had received “a number of documents outlining the general character of these problems” from Needham before this meeting.¹¹³

After the meeting McConaughy wrote a memo summarizing the meeting for Page. In the memo he provides an estimate of the cost of re-watering Stillwater Creek: \$2,920,000, and of the whole project including trapping, a hatchery, and trucks to haul fish: \$4,645,000. The Stillwater Plan represented more than half of the money in McConaughy’s budget. In his conclusion he wrote, “The short time available for construction and the doubtful character of any available emergency measures were touched on.”¹¹⁴ It is clear that at least some people on the team were not feeling optimistic about the salmon’s chances at this point.

If any traps were to be built, timely construction would be critical. Reclamation asked the Board of Consultants to advise them on fish trapping at this time. The Board thought that

¹¹³ Board of Consultants, “Report on Fish Traps,” Stanford, January 9, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹¹⁴ McConaughy, “Memorandum to the Chief Engineer,” January 9, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

trapping facilities should be built at Keswick (rather than somewhere else) and issued a short report to this effect on January 9, 1940, called “Report on Fish Traps.”¹¹⁵ They wrote that:

“For these various reasons it is our judgment that in the interest of the salmon ascending the river in the vicinity of Redding, especially at spawning time, and in the interest of the protection of the people of Redding from undue river hazards, the construction of a re-regulating after-bay below Shasta Dam is a desirable feature of this part of the Kennett Project . . .”¹¹⁶

The Board took into consideration more than just the salmon’s biological needs; they were considering human needs as well as the needs of the fish. Page, Jackson and Higgins conferred briefly on January 17, 1940. Page asked Jackson to make sure Needham shared his data “raw or otherwise” with the Board of Consultants. Page also agreed to write a letter to McMillan about jurisdictional issues between state and federal agencies.¹¹⁷ As a result, on the 25th of January, Page wrote to McMillan, “You may rest assured that the importance of the fishing industry to the state of California is not being overlooked, and the plans for properly maintaining the industry have been giving me considerable concern.”¹¹⁸ Page may have overstated the case a bit. However, he did not go into details about what action he was taking. Page remained focused on the commercial rather than the ecological value of the fish. Page also invited McMillan to correspond directly with the USBF.¹¹⁹

¹¹⁵ Board of Consultants, “Report on Fish Traps,” Stanford, January 9, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹¹⁶ *Ibid.*, 4.

¹¹⁷ Page to McMillan, January 25, 1940, January 9, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹¹⁸ *Ibid.*

¹¹⁹ *ibid.*

Fieldwork continued through January 1940. Observations were made on Stillwater Creek, Battle Creek, Cow Creek and Bear Creek during the high water stages; the spawning areas of Deer and Antelope Creeks were surveyed. Fyke nets, a type of fish trap, were set to catch the first smolts (young salmon) to migrate downstream in order to better understand this phase of the salmon's lifecycle. Samples of the liquid draining from mines were taken to test for pollution.¹²⁰

A monthly report for February 1940, stated, "The fyke net fishing on the Sacramento River at Redding revealed the start of seaward movement of young salmon on February 1. Downstream migrants were also captured in the McCloud River at Baird. The collection of weekly mine drainage samples was continued. The salmon count at Battle Creek has also continued, except for temporary interruptions due to high water."¹²¹ Quite a bit of fieldwork was still ongoing at this point. The date of downstream migration was another important fact about the salmon's life cycle that was not well understood before they began building the dam. In March USBF personnel measured salmon redds and continued collecting mine drainage which they studied for pollution.¹²²

Even though the Board of Consultants had made a report in January on the location of fish traps, no decision had been made by early March 1940 when Needham wrote to Page to urge a quick decision on the location. "In any event the time element is of tremendous

¹²⁰ Budget sheet, revised March 29 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

¹²¹ *Ibid.*

¹²² *Ibid.*

importance and unless rapid progress is made, it is extremely like we may lose one or more annual runs before trapping facilities are completed and ready for operation. The importance of this matter has been emphasized in previous correspondence and cannot be over-emphasized now.”¹²³ Needham feared that the traps would not be ready before the dam became impassable to salmon. If that happened all of the salmon which would normally spawn above the dam would die before they could spawn, severely depleting or even destroying future runs. The salmon returned on a four year cycle; if one year’s returning salmon were damaged, it would impact that run every fourth year forever. Each annual run is a separate population.

In March 1940, there was dramatic flooding in the Sacramento River basin. The Bureau of Reclamation put out a press release to explain how once Shasta was built these floods would be a thing of the past.¹²⁴ For the people working on the project the effects of the dam on flooding were not hypothetical; they saw the real damage that could and did happen. This event probably strengthened public support for Shasta Dam.

Also in early March, Foster and Needham got into a debate about the merits of artificial propagation—raising fish in hatcheries. It is unclear how the debate began, but on March 11 Foster wrote to Needham, “You express the opinion that no run of salmon has been maintained

¹²³ Needham to Page, March 11, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

¹²⁴ Bureau of Reclamation, press release, March 13, 1940, Box 103 File 023.6 Central Valley Press Releases 1939+1940, Project correspondence, FY 13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

by artificial propagation. In this I must disagree with you...."¹²⁵ Foster goes on to argue that natural spawning isn't doing all that well either. He seems to have been fairly invested in hatcheries. This was part of a larger scientific debate that was ongoing at the time about the impact of hatcheries; they were generally assumed to work, though little data had been gathered on their impact.¹²⁶ Needham wrote back to Foster on March 14, pointing out that hatcheries feature in his alternative plans. He goes on to say "... our thesis is that even though small runs have been maintained artificially, these artificial runs in no case, so far as we know, have been large enough to affect the total commercial run of the river system."¹²⁷ Needham argued that all the commercial runs rely on fish from natural spawning and that hatchery fish play a small role.

In reply to Needham's concern about constructing and positioning traps as quickly as possible, Chief Engineer Harper wrote, "We are more concerned about completion of works for care of the fish after they are trapped than about completion of the traps themselves. It is our understanding that if such works are not completed by the time they are needed, the only possible method of disposing of the fish will be to dump them in the river above Shasta Dam, which probably will result in a huge loss."¹²⁸ Reclamation engineers were not even sure that

¹²⁵ Foster to Needham, March 11, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

¹²⁶ Lichatowich, *Salmon Without Rivers*, 147.

¹²⁷ Needham to Foster, March 14, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

¹²⁸ Harper to Page, March 20, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

they could have their mitigation efforts in place before they finished the dam and were having to pick and choose between different mitigation strategies.

Meanwhile, work continued on developing an overall plan for the salmon. On March 27, 1940, Senior Engineer Grant Bloodgood of Reclamation wrote a memo about the technical details of a canal from the McCloud River to supply water for the Stillwater Creek Plan. His cost estimate for the project was \$3,104,069, which was a bit more than McConaughy's estimate.¹²⁹ In a cover letter for Bloodgood's memo, Lowry wrote, "It cannot be emphasized too strongly that, due to the character of the material and the rugged topography of the country through which the canal must be located, the construction of the canal will be difficult and expensive."¹³⁰ He goes on to say it will also be expensive to operate and that, if possible, another plan should be chosen instead. His objections seem to come from an understanding of the engineering difficulties rather than a feeling that salmon are not worth bothering with.

The report

On April 6, 1940, Hanson, Needham and Smith produced a report which stated what they had learned about salmon and proposed four different possible plans for salvaging the salmon.¹³¹ This started a debate as to which plan should be adopted. The plans were labeled Stillwater Plan, Battle Creek Plan, Sacramento River Natural Spawning Plan and Transfer to

¹²⁹ Grant Bloodgood "Memorandum to Construction Engineer" March 27, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

¹³⁰ Lowry to Walter, March 28, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

¹³¹ Hanson, Smith and Needham, *An Investigation of Fish-Salvage Problems in Relation to Shasta Dam*, US Department of the Interior, (Washington, D.C.: Bureau of Fisheries, 1940).

Trinity River. None of the plans involved a fish ladder over Shasta Dam as the dam was considered too high for fish to climb, and scientists were not sure that the fish would migrate in the slack water of Shasta Lake.¹³² For each of the first three plans, they provided an outline, estimated the cost, and provided a numbered list of advantages and disadvantages of the plan. (The fourth plan was thought to be not worth considering and was only given a few paragraphs) The fisheries biologists favored the Stillwater Plan. They devoted the most page space to explaining this plan and listed more advantages for this plan than for any other. The Stillwater plan was also the most expensive.

The Stillwater plan was the only one of these plans that Needham and his people had written to Reclamation about directly. This plan called for fish to be trapped and brought to Stillwater Creek to spawn. To make the seasonal creek fit for salmon year round, water would be brought from the McCloud River overland to the creek. Water from Lake Shasta was considered unusable because reservoir water had been shown to be harmful to salmon in other places. The Creek would provide enough habitat for the spring run and part of the fall run. To maintain the rest of the fall run, a hatchery would be built along Stillwater Creek. It was estimated that it would cost \$4,254,000 to build the necessary infrastructure and \$54,190 annually to operate the project. Stillwater Creek was favored in part because there were no other water users and no need to purchase water rights.

The second plan detailed in the report was called the Battle Creek Plan. It involved building a hatchery (or expanding the existing Fisheries hatchery) on Battle Creek and trapping

¹³² Needham, Smith and Hanson "Salmon Salvage Problems in Relation to Shasta Dam, California" (Washington, D.C.: Bureau of Fisheries, 1941), 55.

fish downstream and hauling them to Battle Creek. The plan called for 18 trucks to haul the fish. There was no cost estimate for this plan. An alternative mentioned within the Battle Creek Plan would involve transferring some or all of the spring runs to Deer Creek. The report states that, “The only outstanding advantages of the Battle Creek plan over the Stillwater Plan are its lower initial costs and the fact that it would not entail a power loss at Shasta Power Plant.”¹³³ Both of these points seem more important than the report acknowledged. A major disadvantage of this plan was that it would involve entrusting the fall run solely to artificial propagation about which Needham had expressed serious doubts. Other disadvantages listed in the plan included the unreliability of the water supply, competition between native and hauled salmon in Deer and Battle Creeks, and the need to construct roads.

The next plan was called the Sacramento River Natural Spawning plan. Foster is credited with suggesting this plan. The plan involved building racks across the Sacramento River to prevent fall run salmon from migrating upstream—forcing them to spawn lower in the river. This was based on studies that suggested there was room for 25,000 female salmon to spawn in the river between Keswick Dam and Battle Creek. Spring run salmon would be trapped and transferred to Battle Creek or Deer Creek. The biologists had many concerns about this plan. They were worried about pollution from disused mines getting into the river, about the water temperature, the river being too hot for salmon, and about flooding damaging the rack. It was estimated that it would cost \$ 1,595,500 to build the infrastructure for this plan and \$40,380 to operate the plan. The authors wrote that the main advantage of the plan was that it had the

¹³³ Hanson, Smith and Needham *An Investigation of Fish-Salvage Problems in Relation to Shasta Dam* (1940), 109.

lowest capital costs of any of the plans. It also provided the greatest “natural spawning area” of any of the plans. However, they also wrote, “The most serious disadvantage of this plan is the uncertainty of its success.” They were doubtful that the fish would behave in an orderly fashion.

The final plan mentioned in the report was called “Transfer to Trinity River;” only three paragraphs describe this plan. This plan would have involved hauling all the fish that spawned in the Sacramento River into the nearby Trinity River. The biologists worried that introducing a new “race” (or what we might call an ecotype) of salmon into the Trinity might cause problems. This was a very early example of this type of concern. Two dams were planned for the Trinity River. The Trinity River is a tributary to the Klamath River and thus part of a different watershed than the Sacramento. The Chinook salmon of the Trinity River are thus a separate population.

All three of the plans that Needham, Smith, and Hanson discussed in detail required shipping salmon from place to place. The Stillwater plan involved transferring salmon to Stillwater Creek and building and maintaining a hatchery there. Likewise the Battle Creek plan involved transferring salmon to Battle and Deer Creeks. The Sacramento River Natural Spawning plan was to hold the fall-run salmon in the Sacramento River below Redding, but the spring run would be transferred to Battle Creek.¹³⁴ While the fisheries biologists thought it a bad idea to ship salmon between watersheds, they did not anticipate problems with shipping salmon within a watershed.

The Hanson, Smith and Needham report published in 1940 is notable for its dismal outlook for the success of the project. For example, “only experience in the actual salvage work

¹³⁴ Hanson, Smith and Needham, *An Investigation of Fish-Salvage Problems in Relation to Shasta Dam* (1940), 95-113.

itself will indicate the efficacy of salvage measures and serve as a guide to future procedures” was one of the more optimistic statements about the salmon’s future.¹³⁵ But there was much doubt that any of the plans would be effective. The biological experts did not have much faith that the salmon could be saved. The report also complained about the limited amount of time that biologists had to work on the problem compared to the amount of time that the dam had been planned.

The report included five appendices, the first of which featured tables, and the others were mini-reports in their own right, including one about the water temperature and one about pollution from former mine sites.

The appendix on water temperature used Lake Mead (behind Hoover/Bolder Dam) as a point of comparison. O. E. Sette, the author of the report, constructed a mathematical model and compared the theoretical temperatures of Lake Mead with the actual temperatures, then applied this model to Shasta Lake. This is an impressive bit of math, but the report came to no conclusions. Still it is important to note that the possibility that water from the dam would be harmful to the fish because it would warm the waters of the Sacramento River was considered before the dam was built. Higher water temperatures did in fact become a problem but were not addressed until the 1990’s. At that time a Temperature Control Device was installed which draws water from different elevations of the lake to keep the outflow within a temperature range suitable for salmon.

¹³⁵ *Ibid.*, 17.

The next appendix was called “Fish-Catching Facilities for Shasta Project” and was written by Harlan B. Holmes and O. W. Lindgren. The report began by stating, “... it has not been determined where the fish-catching facilities for the Shasta Dam Project will be located, it has become desirable to make generalized plans for such facilities without respect to specific dam or powerhouse structures.” It seems they still had not decided where the traps would be despite the Board of Consultants’ report which came out in January and urged a quick decision on the matter. The rest of the report contained technical details about best ways to construct a fish trap.

The next appendix to the 1940 report was titled “Study of the Extent to which the Natural Flow of Stillwater Creek Can Be Used to Replace Diverted Flow from the McCloud River” by Holmes and Lindgren. It is a study of how much water would need to be diverted from the McCloud to make the Stillwater Plan work. The McCloud River was one of the rivers which would be blocked by the dam, so diverting the water would not harm Chinook runs there more than the dam itself already would. They estimated that if the flow could be regulated on a daily basis, about 11,500 cubic feet of water could be saved by using the “natural flow” of the creek instead of just diverting water.

The final appendix was “Mine Tunnel Drainage in The Shasta Reservoir Area” by Paul A Shaw. There were several creeks near Shasta that were contaminated with mine drainage, and this report looked at whether contaminated water would enter Shasta Lake and thus the Sacramento River where it could potentially harm the fish. This study looked at copper, zinc and pH levels. The report noted that five streams had pollution levels high enough to kill trout (and

presumably salmon) and recommended further studies to determine if the pollution came primarily from “tunnel water or natural runoff.”¹³⁶ If tunnel water was the major source, then the report recommended that “definite consideration” should be given to sealing the tunnels and to requiring active mines to treat their runoff. This was technically possible but would require funding from Reclamation.

Responses to the report

The report was met with a variety of reactions. Young, the construction engineer for Reclamation, was not pleased. He wrote:

“In view of the considerable expenditure which is now generally regarded as necessary for salvaging migratory fish and the more or less constant trend toward higher cost as investigation and discussion reveal additional difficulties and more exacting requirements, it seems appropriate to recognize some limit in expenditure that will represent the maximum economic justification. It is believed that the establishment of such a limit would serve to circumscribe the scope of investigation and discussion. Unreconcilable [sic] expedients would be eliminated and our attention concentrated on measures known to be sound from all stand points.”¹³⁷

Here Young focused on the economic value of the fish once again.

Meanwhile, Needham was beginning to worry about when the dam would start blocking the salmon’s access to their spawning grounds. He was already worried about the 1941 fall run. “...We think that the fall run of 1941 can spawn above the dam and its progeny can return to the sea safely, provided there is no obstruction at the dam site. If the salmon are blocked in 1941, a ladder should be provided or the fish should be trapped and hauled above the dam site.

¹³⁶ Hanson, Smith and Needham *An Investigation of Fish-Salvage Problems in Relation to Shasta Dam* (1940), 199.

¹³⁷ Young to Walter, April 11, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

As other features of a salvage plan, such as possible hatcheries, would not be needed in 1941, but would be needed in 1942..."¹³⁸ Thus in the spring of 1940, Needham thought they had a bit less than two years to get the plan in place. This was not that long considering that Reclamation had not yet chosen a course of action. The longer they waited to decide, the less time they would have to build the infrastructure. If facilities needed for the salvage were not in place in time, there was potential to permanently damage salmon populations.

Yet the debate about the report continued .On April 15, 1940, Jackson, the acting commissioner of USBF, wrote to Page, "The reason one specific plan has not been decided upon finally is that the one most satisfactory from the standpoint of salmon biology is the most expensive from a construction standpoint, and the investigators themselves properly raise the question as to its economic justification." ¹³⁹ Even the biologists who wrote the Salmon Salvage Plan were unclear about their own values. They felt drawn to the salmon, but they couldn't justify the cost of the project in rational economic terms, and they didn't use another model to argue for the fish. (Hedgpeth had previously talked about the value of the salmon for their own sake, but he was the junior member of the team and didn't have a lot of say in the final report.)

The Reclamation engineers were thus able to use economic logic to argue for a plan with less chance of success. Walter wrote, "The report shows that the board had great difficulty

¹³⁸ Needham to Young, April 12, 1940, Box 127 file: fish conservation May 1940 to Oct, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver). Is this Box number correct? The dates don't match.

¹³⁹ Jackson to Page, April 15, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

in finding economic justification for the expenditure of even that amount of money and was obliged to rely in part on such intangible items as value of the knowledge gained concerning fish, in order to approximate such justification.” He also noted, “It appears obvious that there should be at least some connection between the value of a natural resource and the cost of its preservation...” For Walter, cost/benefit type analyses were very important in how he saw the salmon. He also complained that, “Regardless of the cost involved, the Bureau of Fisheries apparently is unwilling to recommend anything which it considers might be, in the slightest degree, unsuccessful or short of perfection.”¹⁴⁰ Since the USBF people felt doubtful that even their most favored Stillwater Plan would save the salmon, this complaint does not seem justified. Reclamation had asked for a biological option, but now they were rejecting the biologists’ opinions based on economic considerations.

On April 27, 1940, Young instructed the Board of Consultants that, “It is our opinion that further progress on the determination of salvage measures must be predicated on economic considerations.”¹⁴¹ Again, he was focusing the process on salmon’s economic value and continued to ignore any concept of intrinsic value.

Another reaction to the report was a press release put out by Reclamation, which continued to focus on the economic value of the salmon. For example, the press release stated,

¹⁴⁰ Walter to Page, April 19, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁴¹ Young to Board of Consultants, April 27, 1940, Box 128 file: fish conservation Jan-April 1940, Project correspondence, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

“There is evidence that most of the salmon caught in the ocean from Mendocino County south to Monterey are spawned in the Sacramento-San Joaquin river system, and therefore the commercial value of the Sacramento salmon must be the value of the ocean plus the river catch. For the ten years from 1929 to 1938, this has averaged \$196,000 annually in prices paid to the fishermen alone.”¹⁴²

This is used to explain why the salmon were worth salvaging. Thus Reclamations’ public focus remained on economics and also on the commercial fishery.

On May 10, 1940, Needham spoke at the Sacramento Valley Council local conservation committee of the state Chamber of Commerce. However, after Needham gave his report on progress at Shasta, things got off track. “Mr. Charles Bonham of Gridley, representing a conservation department of the American Legion, alleged that commercial operation on the lower rivers and bays were more injurious to the migratory fish runs—salmon, steelhead, striped bass and shad—than dams and canal diversions. He proposed a resolution calling for stopping all commercial fishing on all fresh water streams in California. A representative of the commercial fish companies was present and countered Bohram’s arguments rather heatedly. The squabble ended in no decision or action of any kind.”¹⁴³ The committee seems to have been torn about the causes of the decline of the salmon and what they should do about it. There may also have been a class issue as the committee members were probably middle to upper class while commercial fishermen would have been lower class, meaning they would have had less political

¹⁴² Bureau of Reclamation and Bureau of Fisheries News release, May 5, 1940, Box 127 file: fish conservation May 1940 to Oct, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

¹⁴³ Ibid.

power. Taylor discusses how class differences between anglers and commercial fishers created tensions on the Columbia, and it is likely that a similar dynamic was in play in California.¹⁴⁴

Foster's plan

On May 14, 1940, Fred J. Foster of the Bureau of Fisheries put out his own plan for salvaging the fish. Foster was not part of the investigative team, but he had helped with the study. He was higher up the chain of command than Needham, and had differing views on hatcheries. He probably felt this gave him authority to design a program even though he was less familiar with the circumstances than the investigative team. Foster's plan had five main points. 1) The spring run would be trapped and hauled to Deer Creek and Battle Creek, 2) the early part of the fall run would be trapped and hauled to a holding pond near Battle Creek, while (3) the rest of the fall run would be held in the river with racks. 4) A hatchery would be constructed at the Coleman site on Battle Creek, and finally (5) USBF would abandon its station on Battle Creek except for the previously mentioned holding pond. Despite Foster's previous arguments in favor of hatcheries this plan relies mostly on the salmon spawning in the wild. Still, Foster failed to support Needham's favored Stillwater Plan. Foster's report is also much more optimistic than Hanson, Smith and Needham's report, as Foster does not dwell on the possibility that the program will not work. In fact Foster thought that after the dam was completed it would be possible to increase the size of the run "to the capacity of available spawning area."¹⁴⁵ Foster's plan was much closer to the final plan than any of the plans in the

¹⁴⁴ Taylor, *Making Salmon*, 167-168.

¹⁴⁵ Fred J. Foster, *A Plan For Salvaging fish which will be affected by the Shasta Dam*, (US Department of Commerce, Bureau of Fisheries: Seattle, 1940), 25.

Hanson, Smith and Needham report. While Foster had not been involved in the biological study, his plan was more acceptable than those proposed by Hanson, Smith and Needham, because it was cheaper and also hewed closer to the accepted wisdom on hatcheries.

The Board of Consultants weighs in

On June 21, 1940, the Board of Consultants published its own report on what was to be done about the salmon. This report valued salmon in multiple ways, but all were extrinsic. In fact, the report included several pages discussing the value of the fish; however, most of these pages were taken up discussing what proportion of the offshore catch of salmon is from the Sacramento River. Like the other reports, it continued to discuss the monetary value of the fish. However, it also mentioned other types of values. For example the report called salmon a “natural food resource” which focuses on their extrinsic value but not on their monetary value.¹⁴⁶ The report continued to say, “Indeterminate allowances for the value of those runs to sport fisherman, to the fish trade, social values, etc. may bring the total valuation to a figure somewhat above [the monetary value to commercial fishermen].”¹⁴⁷ It is a bit unclear what the board meant by “social values”. Here—it seems to be something like the value to society and something they consider hard to measure monetarily. The Board also talked about the “recreational value”¹⁴⁸ of the fish, which conveys the enjoyment the sports fishers get from fishing.

¹⁴⁶ Board of Consultants on Migratory Fish Problems of the Sacramento River, *Report of the Board of Consultants on the fish problems of the upper Sacramento River* (Palo Alto: Stanford University, 1940), 2

¹⁴⁷ *Ibid.*, 11.

¹⁴⁸ *Ibid.*, 24.

Still the Board felt that sports fishing was “of small or indeed negligible importance.”¹⁴⁹ They did not give a lot of space in the report to it. They wrote “... we do not consider that the U.S. Bureau of Reclamation is responsible for this phase of the broad problem of fish life in the Sacramento River and make, therefore no recommendations regarding sport fishing in the usual sense of the term.”¹⁵⁰ Thus the Board didn’t think they had to consider the issues. However anglers would become some of the more vocal voices urging the conservation of the salmon.

The Board of Consultants’ report summarized each of the three plans and listed advantages and disadvantages for each; these were similar to what was written in Hanson, Smith and Needham’s report. Before explaining their plan, the Board wrote “Whatever is done involves a serious hazard and may well end in more or less complete failure insofar as maintaining the present supply of adult salmon is concerned”¹⁵¹ They were not confident that they could control nature, or fix everything with technology.

The Board recommended a combination of the Sacramento River Natural Spawning Plan and the Battle Creek Plan “with the role of Deer Creek left open.”¹⁵² Their reasoning was “[the Sacramento River Plan] appears to involve the least capital expenses, while at the same time it offers, in our judgment the best biological conditions for the immediate salvage and for the future build of salmon in the Sacramento River.”¹⁵³ This plan featured three river racks to space out the naturally spawning fish, a holding pond on Battle Creek, a hatchery and four trucks for

¹⁴⁹ Ibid., 32.

¹⁵⁰ Ibid., 32.

¹⁵¹ Ibid., 12

¹⁵² Ibid., II

¹⁵³ Ibid., 25

hauling fish. The Board's report estimated the capital costs at \$1,064,500 to \$ 1,082,500 depending on whether a holding pond was built at Deer Creek and annual operating costs at \$35,000.

On July 1st of 1940, the organizational framework of the project changed when the Biological Survey and USBF were merged to form the Fish and Wildlife Service (USFWS), a new agency with a more ecological outlook. This also meant that the Bureau of Fisheries, which had been in the Department of Commerce, was now in the Department of the Interior. Ira Gabrielson was appointed as Director of the new agency and Charles E. Jackson, who had been the Acting Commissioner of USBF, became the Assistant Director.

Hanson, Smith and Needham's report was sent to members of the California Department of Fish and Game, and on July 1, 1940, McMillan wrote to Jackson to request that his people be allowed to present their views. This was after the Board of Consultants had already written their final report; apparently the Board had not considered consulting the state officials before then.

McMillan also had strong opinions about what was and what was not Reclamation's responsibility. He wrote, "It is the full responsibility of the United States Government to see that this run of salmon is adequately provided for so that there is no loss of fish or lack of facilities for existing salmon to spawn, and to provide for the increase in the numbers of spawning salmon."¹⁵⁴ He thought that Reclamation should not only have to maintain the

¹⁵⁴ McMillan to Jackson, (July 1, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the

current runs, but be responsible for restoration as well. These views were dramatically different from those of Reclamation personnel. However, Reclamation held the purse strings in this case, and so their views held more weight.

Meanwhile, the dam construction was proceeding rapidly. In July 1940, the Shasta Dam head tower was completed,¹⁵⁵ a key piece of infrastructure needed so that they could pour the concrete. The head tower was connected by cables to tail towers each of which was on tracks and could be moved. The wet concrete was placed in enormous buckets which were lifted up the head tower and moved along the cables between the head tower and the tail towers. The buckets were dumped into frames and men spread the concrete out. Work went on 24 hours a day.

On July 22, 1940, Chief Engineer Harper wrote to McMillan, sending him a copy of the Board's report and suggesting that the state people could meet with the Board on July 29. McMillan was out of the office when Harper's letter arrived, so G. H. Clark replied instead. He said that there was no great disagreement but that the state people would like to talk to the Board. Clark also wanted to know, "In the event that the main Sacramento River holding plan and the utilization of Battle Creek and Deer Creek are adopted, what will be done with the salmon if it is later discovered that the fish in the Sacramento River will not or cannot spawn in

Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

¹⁵⁵ Billington and Jackson, *Big Dams of the New Deal Era*, 283

the main river?"¹⁵⁶ This was an important point which had not been properly addressed as many of the biologists felt that the success of the main river spawning plan was in doubt.

Harper did not share McMillan's view of Reclamation's responsibility. In a letter to Durand he wrote, "It is the view of this office that, in making recommendations in regard to the Stillwater Creek plan, the Board should distinguish carefully between the salvage of and the building up of the existing run. The former has been admitted as a responsibility of the Central Valley Project; the latter is a matter for a decision of policy-making officials of the Government."¹⁵⁷ The contrast that he draws here is very interesting. Harper felt Reclamation was responsible for maintenance of salmon but not for their restoration.

The role of the investigative team was not yet over, although they had written their report. Harper requested, "Definite recommendation on all features, or definite dates on which such recommendations may be expected, would be most helpful and you are urged to submit one or the other at an early date."¹⁵⁸ Even though Reclamation had the Board's recommendations and the report they asked for, they still seem to be complaining that they didn't have enough data, even though they had not given Fisheries the engineering data when

¹⁵⁶ G. H. Clark to Harper, July 26, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

¹⁵⁷ Harper to Durand, July 30, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

¹⁵⁸ Harper to Needham, September 7, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

asked. Still, the USFWS biologists seem to have cooperated as on September 10, 1940, Needham sent a tentative program and budget for year 1941 to Young. This consisted of a list of studies to be carried out at an estimated cost of \$20,000.¹⁵⁹

On August 12, 1940, the Board of Consultants and Needham met with McMillan, Taft and Clark for the State Division of Fish and Game to discuss the Board's earlier report. After this meeting McMillan submitted a letter stating his office's concerns. The state officials wanted to have a better backup plan in place in case the Sacramento River Natural Spawning Plan failed. Since no one was sure that the plan would work, their concerns seem well founded. They were also concerned about the fact that more spring run salmon had been counted that year and asked the Board to recommend more trucks. They also requested that an official agreement be drawn up stating the "jurisdiction and responsibility" of each agency.¹⁶⁰

On Friday September 13, 1940, Charles E. Jackson, Fred J. Foster and Harlan B. Holmes of the Fish and Wildlife Service met with D.C McConaughy, Smith A. Ketchum and Nelson B. Hunt of Reclamation in the Sir Francis Drake Hotel in San Francisco. McConaughy announced that Keswick would include a fish trap and that bids would hopefully open on the first of the year.¹⁶¹ The USFWS personnel were generally pleased by this as they felt it was the best

¹⁵⁹ Needham to Young, September 10, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA-Rocky Mountain Region (Denver).

¹⁶⁰ McMillan to Durand, August 12, 1940, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA-Rocky Mountain Region (Denver).

¹⁶¹ Nelson B. Hunt, "Memorandum for Supervising Engineer," September 14, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley

possible trapping solution and had been waiting for many months for a trap location to be decided on. They also discussed the details of the salvage plan such as the number of racks to be placed in the river. The group debated whether Reclamation was responsible for protecting the interests of sports fishers. They decided to let the Commissioner of Reclamation make that decision.¹⁶²

After the meeting Foster, Holmes, Needham and McConaughy went to Redding.¹⁶³ That weekend they “spent [time] in examination of the site of the proposed structures.”¹⁶⁴ Hanson joined the party on Saturday. The following Monday, Needham and McConaughy met with Young in Sacramento. They discussed the California Department of Fish and Game’s concerns about the salmon. Young claimed that the fish problems could not be solved until the engineering problems were solved.¹⁶⁵ Young generally viewed these as separate issues, even though they were closely linked. In fact some of the engineering solutions impacted the fish, so it would have been better to take a holistic view of the problems.

Young continued to balk at spending money on the salmon. He wrote, “It is our opinion that expenditures for the fish investigation should be restricted in the same way it has been necessary to curtail other features of the project, examples of which are failure to award

107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA–Rocky Mountain Region (Denver).

¹⁶²Ibid.

¹⁶³ D. C. McConaughy, “Memorandum to the Chief Engineer,” September 19, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA–Rocky Mountain Region (Denver).

¹⁶⁴ Ibid.

¹⁶⁵ Ibid.

contracts on Contra Costa, Medera and Friant-Kern canals. ¹⁶⁶ He seems to have felt that the salmon were getting more than their fair share, even though they were in fact getting very little.

However, Harper was more generous to the USFWS than Young had been. He wrote to

Page:

“This office is in sympathy with the Supervising Engineer’s [Young’s] vexation at the ever increasing amount requested by the Fish and Wildlife Service. It is believed, however, that these requests result chiefly from inability of the officials of that Service to prepare accurate estimates, or from careless preparation of such estimates, rather than from inefficient expenditure of funds provided or from over-investigation. So far as this office is able to judge, the information sought is necessary to the development of adequate measure for salvage of the fish run, and I do not concur in the Supervising Engineer’s view that fund for such investigations should be arbitrarily curtailed .”¹⁶⁷

Even though Harper agreed with Young that costs were escalating, he also thought the USFWS people had a valid need for money and was willing to keep funding them.

On October 5, 1940, the Board of Consultants published a Supplemental Report to address the concerns of California’s Fish and Game Department. One of these proposed ideas was to provide Stillwater Creek with water from the reservoir to create year-round flow to help create an alternative to the Main River Spawning Plan. This was similar to Hanson, Smith and

¹⁶⁶ Young to Harper, September 24, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA–Rocky Mountain Region (Denver).

¹⁶⁷ Harper to Page, September 26, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA–Rocky Mountain Region (Denver).

Needham's Stillwater Plan, but used a different source of water. It was doubted that reservoir water would work as well as river water for raising salmon. The Board was not willing to spend what it deemed "a very considerable figure"¹⁶⁸ on a safety feature, preferring instead to focus the money on the main plan. The report states, "We have taken the practical stand that the value of the salmon runs affected are not sufficient to justify large expenditures on multiple plans for their maintenance; that one general plan should be selected from the several proposed and that every effort should be made to make that plan successful."¹⁶⁹ This decision was based more on economics than on biology. The Board felt there was no money for a backup plan.

However the Board did approve of the second safety measure proposed by the state officials—experimentally transporting adult salmon over the dam as this would be inexpensive. However, this measure would have to wait until after the dam was completed.¹⁷⁰ It is unclear if these experiments were ever carried out. The Board also approved of the California Fish and Game Department's suggestion to expand the planned hatchery facilities, writing, "The further development of a more scientific program of artificial propagation is perhaps the most important safety factor that can be suggested..."¹⁷¹ The Board also increased the number of trucks they recommended be provided from four to seven. Overall the supplementary report did not make any major changes to the salvage program.

¹⁶⁸R.D. Calkins, W. F. Durand and Willis H. Rich *Supplementary Report on Matters Relating to Salvage of Salmon on the Upper Sacramento River*(Unpublished Memo, 1940), 2.

¹⁶⁹ Ibid., 3.

¹⁷⁰ Ibid., 5.

¹⁷¹ Ibid., 5.

The final plan involved both natural and artificial propagation of salmon. Of the plans in the report, it most closely resembled The Sacramento River Natural Spawning plan, but it also had features of the Battle Creek Plan and was very similar to Foster's plan published after the report. The new plan was not given a name. There were three phases from Jan 1 to June 15: the spring run salmon would be transferred to Deer Creek, where they would spawn "naturally," and to Battle Creek where the eggs would be harvested for the hatchery. The second phase would take place between June 16 and Oct 10, and salmon would be transferred from the Sacramento to Battle Creek for artificial propagation. The third phase would take place between Oct 1 and Dec 31 and would involve trapping the fall-run salmon in the Sacramento using fish racks to force them to remain there to spawn.¹⁷²

The path to deciding on this final plan was heavily influenced by values. The Board chose to value the salmon in an economic way and thus to minimize spending rather than maximize the salmon's chances of survival. The process of creating the plan was long and often frustrating with many deadlines being missed. Reclamation personal were aware of the problem as early as 1936 when Honnold wrote to Young about California law which protected salmon. Still, research need for the plan did not begin until 1938, and the plan was not finalized until 1940, two years after construction of Shasta Dam began. During that time most people working to produce the plan focused on the extrinsic value of the fish rather than their intrinsic value.

¹⁷² Ibid., 7.

CHAPTER 3. AFTER THE SHASTA SALMON SALVAGE PLAN

Now that a plan had been completed, it required execution. Researching and writing the plan had involved a complex and often not fully expressed conflict over values. Putting the plan into action would involve more of the same. Conflicts between USFWS and Reclamation over funding would continue. Eventually some parts of the plan would be abandoned. In addition, the entrance of the United States into World War II in December 1941 would shift the focus of the Central Valley Project from agricultural needs to industrial needs and reduce the resources available for the salmon salvage.

Around this time the Bureau of Reclamation underwent some reorganization. On November 6, 1940, Walker Young, the supervising engineer of the Central Valley Project, was promoted to Assistant Chief Engineer. In this role he had less direct contact with Shasta but continued to influence the salmon project. To replace Young, R. S. Calland, who had been assistant supervising engineer on the Central Valley Project, was promoted to Acting Supervising Engineer.¹⁷³

In the fall of 1940 the biologists began noticing that there were many more salmon than in the previous year, 1939, which was so far the only year that fish had been counted. The

¹⁷³ Press release, November 5, 1940, Box 103 File 023.6 Central Valley Press Releases 1939+1940, Project correspondence, FY 13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

number of spring run salmon at the Anderson-Cottonwood Dam was nearly twice what it had been in earlier counts.¹⁷⁴ Since they had so little baseline information, it was hard for them to decide what to do with this new data. The problem of deciding which data to use as a baseline would become contentious later. The number of fish that had to be accounted for had implications for the cost of the project. On December 13, 1940, Young wrote a letter to Page in which he said he saw no reason to think that 1940 should be considered a base year rather than 1939. Of course using the lower number from 1939 would be better for Reclamation because if there were fewer fish then less money could be spent on them.¹⁷⁵

1941

An agreement between Reclamation and USFWS went into effect on January 1, 1941. The formalization of the agreement was probably promoted by the California Fish and Game Department's request for clarification. The agreement itself is quite short—just barely over two typewritten pages. It basically said that the Fish and Wildlife Service would investigate the problem and provide information to Reclamation and that in return Reclamation would provide Fish and Wildlife a sum not exceeding \$2,350 for work done between the finalizing of the

¹⁷⁴ Foster to Rich, September 26, 1940, Box 127 file: fish conservation May 1940 to Oct 1940, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

¹⁷⁵ Young to Page, December 13, 1940, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

agreement and the end of the fiscal year on June 30, 1941.¹⁷⁶ This was very little money for a project of the size and scope of the Shasta Dam Salmon Salvage.

On January 15, 1941, Needham sent Calland, now holding Young's job, his proposed budget for the first half of fiscal year 1941. His total estimated cost was \$7,300 which was more than double what the agreement allowed. Needham wanted to pay for an assistant aquatic biologist, a junior aquatic biologist, laborers, fish counters and truck drivers. In addition, he needed to pay for the trucks and a variety of small structures such as fish traps.¹⁷⁷ Needham was not requesting anything unreasonable here. Needham believed that left over money from what had previously been allotted to the fisheries commission would cover \$6,000 of the expenses. Needham didn't know about the new agreement and doesn't seem to have been consulted in the writing of it.

On Tuesday February 11, 1941, Bashore, McConaughy and Higgins, all Reclamation engineers, had a conference in Denver. They discussed the cost of building the hatchery, which they estimated to be about \$50,000 and which they thought was a high price. One of the topics that came up was the need to have someone from the USFWS work with Reclamation

¹⁷⁶ Agreement Between the Bureau of Reclamation and the Fish and Wildlife Service, not dated 67-69, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

¹⁷⁷ Needham to Calland, January 15, 1941, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA—Rocky Mountain Region (Denver).

engineers in Denver.¹⁷⁸ As result of this conference, Jackson wrote to Foster to ask him to correspond more directly with Reclamation.¹⁷⁹

While the salmon project was still slow to start, work on Shasta was progressing rapidly. On May 3, 1941, the millionth cubic yard of concrete was poured in Shasta Dam.¹⁸⁰ This was the result not only of careful engineering but also of much manual labor. The rapid progress of the dam building meant that the biologists had to struggle to keep the salmon conservation efforts meeting deadlines imposed by construction.

On June 30, 1941, a new agreement between USFWS and Reclamation went into effect after the first agreement expired. This agreement was much more favorable to the USFWS than the previous one. The USFWS had the same obligations to complete the project, but Reclamation provided more realistic expenses. Reclamation would loan the trucks for the duration of the project, pay for the construction of structures needed for salvage, and provide \$22,000 for operations.¹⁸¹

¹⁷⁸ Page to Young, February 18, 1941; D. C. McConaughy "memorandum to the commissioner," February 18, 1941, (93 3/20), Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115 NARA–Rocky Mountain Region (Denver).

¹⁷⁹ Jackson to Foster, February 28, 1941, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁸⁰ Bureau of Reclamation "Central Valley Project Studies," nd, Project Correspondence 023 Box 99 Entry 7 File: 022.08 Central Valley Project Bibliographies, 8, FY 13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁸¹ "Agreement between the Bureau of Reclamation and the fish and wildlife service covering biological investigations and planning salvage of migratory fish involved in the central Valley Project, California," nd, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project

Now that the Shasta Salmon Salvage Plan was finalized and was being put into operation, Needham, Smith and Hanson all remained with the project as aquatic biologists. They were joined by Dr. James W. Moffett who was given the title Associate Aquatic Biologist. Lewis P. Parker also started work as an Assistant Aquatic Biologist with the Shasta Salmon Salvage Project.¹⁸²

The first transfer experiment occurred in 1941. This first season of transporting salmon was seen as test of the concept. Between June 3 and June 30, nine hundred twenty salmon were transferred from the Sacramento River and Redding to Deer Creek. The salmon were trapped in rather make-shift contraptions, which caught 11 to 49 fish at a time. The fish would be caught and then forced to swim up the fish ladder at Redding Dam and into a 500 gallon steel loading tank. The loading tank was then emptied into a tank on the back of a truck. The salmon were next driven 65 miles to Deer Creek. This took about two hours. At Deer Creek the salmon were dumped through a tube “made by attaching two pieces of half-round galvanized iron irrigation flume together” into a holding tank; the fish were held there for about half an hour and then released into Deer Creek.¹⁸³ This complex process must have stressed the salmon. Indeed, about 30 percent of the transferred fish had died by the end of August.¹⁸⁴

correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁸² Needham, Hanson, and Parker, *Supplementary Report*, 4.

¹⁸³ *Ibid.*, 19, 39.

¹⁸⁴ *Ibid.*, 20

Continued interest in salmon from the public prompted Reclamation to issue another press release in July of 1941.¹⁸⁵ Entitled “Salvage of Salmon in the Sacramento River,” the press release started out by discussing the “annual \$300,000 salmon run of the Sacramento River.” In this case the commercial value of the fish was front and center. Other discussions of the problem focused on the romantic lifecycle of the fish empathizing with the Chinooks’ intrinsic value. Otherwise it was a fairly bland document focusing on the construction work still to be done for the project.¹⁸⁶

In addition, the July 1941 issue of *California Fish and Game*, the scientific journal published by the state’s Division of Fish and Game, featured a history of Livingston Stone written by Joel W. Hedgpeth, who was no longer working on the Salmon Salvage Project. This article helps highlight the differing views of the value of salmon. While this paper was primarily historical, the author also commented on the current state of salmon in California. He wrote, “It is not unreasonable to assume that Livingston Stone, were he alive today, would admit that another hatchery seems a poor substitute for California’s once magnificent river system and that here at last is the doom of the salmon which he foretold.”¹⁸⁷ This was in tune with most scientific writing of the time, most of which seemed very pessimistic about the future of Central Valley Chinook salmon. However, perhaps Hedgpeth’s most interesting statement was this:

¹⁸⁵ Calland to Page June 20, 1941, Box 103 File 023.6 Central Valley Press Releases Jan 1941 Thru Dec 1941, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁸⁶ “Salvage of Salmon in Sacramento River,” July 1941, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁸⁷ Joel W. Hedgpeth, “Livingston Stone and Fish Culture in California,” *California Fish and Game* 27, no 3 (1941): 147.

“To the engineer who plans the dams and the politician who promotes them for the glory of his constituents, the salmon have little sentimental value, although in fairness to these gentlemen it must be said that the fish had been given up for lost in California long before this, and they could hardly be expected to share the biologist’s peculiar interest in the preservation of a species for its own sake.”¹⁸⁸

It was rare for a scientific journal of the period to reference the intrinsic value of salmon.

Hedgpeth is suggesting not only that he values the fish intrinsically, but that other biologists do so as well.

Reclamation remained focused on the human rather than the environmental impact of the dam. On August 1, 1941, bids were received for building Keswick Dam and Power Plant about nine miles downstream of Shasta on the Sacramento River.¹⁸⁹ This smaller dam would help regulate the backwash and generate more electricity. It also formed a barrier for salmon, marking the farthest upstream the fish would be able to reach after its completion. The contract included construction of fish traps. The press release stressed the electric power generated at the dam, far more than its role in the irrigation system; this shift would become more prominent after the U.S. entered the Second World War.

About two weeks later, on August 15, 1941, the bids for Balls Ferry rack and trap, which was part of the river spawning plan, opened. This was the farthest downstream of the fish racks planned for the project. The structure would consist of a 600 foot long rack across the river, with a trap the on east side, and a cableway. The contractor was allotted 120 days to build the structure. The press release mentions the monetary value of salmon (\$300,000 annually),

¹⁸⁸ Ibid.

¹⁸⁹ “Keswick Dam Contract Awarded,” August 12, 1941, RG 115 FY13 Records of the Bureau of Reclamation Project correspondence Box 103 File 023.6 Central Valley Press Releases Jan 1941 Thru Dec 1941 National Archives Denver

continuing a strong focus on the commercial value above all others.¹⁹⁰ Sometime between late August and early October, construction began on Keswick Dam. .¹⁹¹

Spawning that fall began on September 10 and continued until October 25.¹⁹² Since there were many Chinook native to Deer Creek present as well as the salmon transferred in June, and because tracking methods were rather primitive, it was hard to judge if the transplanted salmon spawned well. Still the scientists believed, based on where they recovered the marked bodies of the fish, that this experiment taught them “that salmon removed from the Sacramento River and transferred to Deer Creek will distribute themselves similar to native-run salmon and will spawn naturally in that stream.”¹⁹³

In November 1941, fyke netting, a type of fish trap was installed in Deer Creek. This netting was used to capture salmon smolts, young fish that have begun the physiological changes necessary to live in the ocean, migrating downstream. This was done so that the biologists could find out when the young fish began their journey as this was one of the basic parts of the salmon lifecycle that was still not well understood after the original investigation.¹⁹⁴ The investigators had used fyke netting for similar purposes the previous season. On November 10, 1941, Reclamation put out a press release about the soon-to-begin construction of Coleman

¹⁹⁰ News release, August 15, 1941, Box 103 File 023.6 Central Valley Press Releases Jan 1941 Thru Dec 1941, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁹¹ Bureau of Reclamation “Central Valley Project Studies” Box 99 File 022.08 Central Valley Project Bibliographies, FY 13 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁹² Needham, Hanson, and Parker, *Supplementary Report*, 20

¹⁹³ *Ibid.*, 21.

¹⁹⁴ *Ibid.*, 2.

Hatchery. This release focused on the technical aspects of the hatchery. Bidding for the construction contract began on November 27, 1941.¹⁹⁵

However, ten days later, the attack on Pearl Harbor (on December 7, 1941) triggered the U.S. entry into the Second World War and a shift in focus among the dam builders from water to power. The official Reclamation history of the dam stated: “Outbreak of war emphasizes need for additional electric power generating facilities in northern California. Central Valley Project placed on war basis.”¹⁹⁶ The outbreak of war also meant fewer resources for the salmon as supplies, such as building materials and trucks, became more tightly controlled.

One of the signs of the change in focus was that on December 30, 1941, Charles E. Carey was assigned to occupy a new position in charge of the electric power part of the Central Valley Project. Carey had been working for the Bonneville Power Administration before he came to the Central Valley Project.¹⁹⁷ Yet another sign of this shift was a press release published on January 8, 1942, entitled “Central Valley Project to add to America’s War effort,” which indicated that the project’s focus was shifting toward electricity generation instead of water supply.

¹⁹⁵ News release, November 10, 1941, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁹⁶ “Central Valley Project Studies,” Box 99 Entry 7 File: 022.08 Central Valley Project Bibliographies, 9, Project Correspondence 023, FY 13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁹⁷ “Charles E. Carey to Supervise Central Valley Power Development,” December 30, 1941, Box 103 File 023.6 Central Valley Press Releases Jan 1941 Thru Dec 1941, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, NARA–Rocky Mountain Region (Denver).

1942

The January 1942 Issue of *Outdoor America* ran an article by Hedgpeth called “California’s Forgotten Fish” in which he called for more focus on the salmon. Even though Hedgpeth was no longer working for the project, he still cared for the fish and worked to advocate for them.

On January 14, 1942, Paul A. Shaw, who had written the report about copper pollution in the Sacramento River, wrote to Harper, the Chief Engineer at Reclamation, and explained what he had learned about the ownership of various mine tunnels which were leaking copper into the Sacramento River. Shaw had tracked down the owner of several abandoned mine tunnels and gotten permission to close the largest of these tunnels. Shaw felt that these tunnels would have major impact on aquatic life if not sealed.¹⁹⁸ However when Harper replied, he indicated that he did not favor closing the tunnels. Instead he wrote,

“... the Bureau of Reclamation has not, as yet, determined to its satisfaction either the extent to which the tunnel sealing method of dealing with the problem to which you may present the most effective solution of that problem, or the extent to which that work, even if it should be concluded to be the most effective remedial measure, is an obligation which could or should be assumed by this Bureau.”¹⁹⁹

Harper most likely thought that sealing the tunnels would be expensive and also not very glamorous. Still, despite his claim that Reclamation was not obligated to do anything about the

¹⁹⁸ Paul A. Shaw to Harper, January 14, 1942, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

¹⁹⁹ Harper to Shaw, February 3, 1942, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

tunnels, the pollution surely affected the salmon for which Reclamation had accepted some measure of responsibility.

On Feb 19, 1942, a conference between Reclamation and USFWS held in Redding discussed “controlling factors” in handling the 1942 run of salmon. They outlined a plan for the salmon salvage that year. One part of this plan was that the Balls Ferry Rack would be ready two weeks before Shasta Dam cut off the river, at the time planned for August 1. Any fish that passed the rack before it was closed were thought to have enough time to get past the dam, and the fish that showed up later would be hauled in tank trucks to the McCloud River above the dam. This plan didn’t make provisions for the newly hatched fish to get downstream although earlier Needham had expressed concerns about this problem.²⁰⁰ It would later turn out that this timeline was incorrect for both the dam and the Balls Ferry Rack to the detriment of the salmon.

On February 20, 1942, Gabrielson, the director of the USFWS, wrote Page to complain that Reclamation was not giving USFWS enough funding. He wrote that, “The allotment of \$75,000 in lieu of the amount requested in our letter of November 29 must of necessity, involve a radical revision of the scheduled program.”²⁰¹ Gabrielson also complained that many facilities would not be ready for the 1942 season. Neither the Coleman Hatchery nor the Balls Ferry Rack

²⁰⁰ Jackson to Page, March 9, 1942, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁰¹ Gabrielson to Page February 20, 1942, NAD 219 3/20115, Box 127 file: fish conservation Nov 1940 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY 10, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

and trap would be ready. Gabrielson requested \$20,000 for ongoing biological investigations and \$60,000 for the salvage efforts between then and June 30. As the director of a new agency, Gabrielson needed to defend his turf; he was more involved with the project than Bell had been as the Commissioner of Fisheries.

On March 1, 1942, Hedgpeth published an article in the *Oakland Tribune*. It mainly concerned one of the canals near the American River, but also discussed the impact of the Central Valley Project on salmon generally. Hedgpeth continued to advocate for the environment with the public. He was articulating values beyond the agencies. His voice was loud enough that Reclamation would soon take notice.

On March 25, 1942, four tank trucks were delivered to USFWS personnel working on the project with three more about 30 days later. These trucks were specially built and better than the trucks used the year before.²⁰² 1941 had been a test of concept that had worked well enough that special equipment was acquired. The trucks were quite important to the Shasta Salmon Salvage Plan as they would be used to haul fish trapped at Keswick or Balls Ferry to Deer Creek.

On March 27, 1942, William L. Finley, Vice President of the Izaak Walton League, a major sports fishing group, made a speech opposing the Central Valley Project at the League's twentieth annual meeting. . Finley made similar complaints to Hedgpeth, namely that the Central Valley Project was a waste of money and that it was impossible to build a canal through

²⁰² Needham, Hanson, and Parker, *Supplementary Report*, 10.

the Delta.²⁰³ Surprisingly, his speech did not focus on the effects the CVP was having on the salmon. His complaints together with Hedgpeth's greatly upset Reclamation engineers.

Reclamation responded defensively to Hedgpeth and Finley's statements. On April 3, 1942, Calland wrote to Harper about Hedgpeth and Finley. He explained, "If widely circulated, this specious argument could succeed in killing the American River Diversion Plan, however meritorious, before it could be started." Calland seemed quite upset. He recommended that a joint press release be issued by Reclamation and the USFWS dealing with Hedgpeth and Finley's thoughts on salmon. He also recommended a separate burst of publicity in favor of the American River diversion.²⁰⁴ Calland seemed quite convinced of the merits of the American River project and unwilling to consider criticism.

On April 9, 1942, Harper wrote to the Commissioner of Reclamation about the public relations problems caused by Finley and Hedgpeth. Harper wrote that surveys had found the Delta Cross Channel, a piece of the Central Valley Project needed to convey water through the Delta, to be possible, and that the American River Diversion plan was "only an idea." He recommended publishing "true stories" to counteract the bad press.²⁰⁵

²⁰³ "Izaak Walton League Official Charges U.S. Irrigation Blunders," *Washington Star*, March 27, 1942.

²⁰⁴ Calland to Harper, April 3, 1942, Box 99 Entry 7 File 021, Central Valley—Publicity 1936 thru 1945, Project Correspondence File 1930-1945 Central Valley 021.-023, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²⁰⁵ Harper to Page, April 9, 1942, Box 99 Entry 7 File 021, Central Valley—Publicity 1936 thru 1945, Project Correspondence File 1930-1945 Central Valley 021.-023, FY13 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

Around this time, the Bureau of Reclamation became generally much more worried about publicity. As well as trying to directly counter activists like Hedgpeth, Reclamation launched a program called Central Valley Project Studies. This program launched on April 13, 1942, produced classroom curricula which supported the project. Reclamation also called “for broad analysis of power, agricultural, industrial and other economic aspects of the project by 40 federal, state and local agencies under sponsorship of the Bureau of Reclamation.”²⁰⁶ There is no evidence that they actually sponsored any studies.

On April 16, 1942, Page approved of a planned press release to counter Hedgpeth and Finley. He wanted the document to be “of a positive character, and if practical keyed to a spot occasion rather than as specifically for a denial of Mr. Finley’s assertions.”²⁰⁷ On May 13, 1942, Harper sent Page a copy of the proposed press release. The press release did not mention fish; instead, it refuted criticisms based on the engineering problems of building the Delta Cross Channel and the American River Diversion.²⁰⁸ So even though the issues were brought up by people who were concerned about the fish, Reclamation did not address salmon-centered criticism of the Central Valley Project, instead preferring to focus on engineering details where they were on firmer ground. Thus Reclamation never really addressed the biological concerns.

²⁰⁶ “Central Valley Project Studies” with cover letter, Box 99 Entry 7 File: 022.08 Central Valley Project Bibliographies 9, Project Correspondence 023, FY 13 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁰⁷ Page to Harper, April 15, 1942, Box 99 Entry 7 File 021, Central Valley—Publicity 1936 thru 1945, Project Correspondence File 1930-1945 Central Valley 021.-023, FY13 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁰⁸ Harper to Page, May 13, 1942, Box 99 Entry 7 File 021, Central Valley—Publicity 1936 thru 1945, Project Correspondence File 1930-1945 Central Valley 021.-023, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

On May 7, 1942, a new agreement between Reclamation and the USFWS went into effect. This gave the two agencies similar responsibilities as were in effect before, and Reclamation would provide \$80,000 to fund USFWS activities.²⁰⁹ This was a continuation of funding levels, not a significant change. The fact that the funding for the Salvage project came from Reclamation's budget presented a fundamental problem for the project, as Reclamation constantly saw this as USFWS taking money away from them. This funding arrangement also gave Reclamation far more control of the project than the trained biologist working for USFWS.

The second week of March in 1942 was designated "California Conservation Week" by the California Conservation Council which invited Reclamation to participate. This event illustrates how the meaning of the word conservation has changed over time. Water conservation, in the literature provided by the California Conservation Council, was "for irrigation, power production, and other purposes..." not for fish, or the environment.²¹⁰ This is more of a progressive ideal of conservation: saving resources for human use. This type of conservation focused on management. Salmon were not mentioned in the program, though they were impacted by water use. This type of thinking was changing, but very slowly.

²⁰⁹"Agreement between the Bureau of Reclamation and the Fish and Wild Service covering cooperation for salvage of migratory fish involved in the Central Valley Project, California," May 7, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²¹⁰ Letter from R. S. Calland to Pearl Chase, February 9, 1942, The California Conservation Council and Cooperating Agencies "Eighth California Conservation Week," Box 100 file:Central Valley Clippings, Project correspondence, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

On May 23, 1942, the river was diverted into a spillway below the dam as part of the construction process for the Keswick Dam.²¹¹ At this time a fish ladder was constructed but quickly failed to function as intended. In late 1942 the War Production Board ordered a work stoppage at the dam but allowed work on the fish ladder to continue until it was completed on June 1, 1943. Thus fish were unable to cross the Keswick Dam site for nearly a year. This significantly harmed the sub-population that spawned that year.

While construction in the Shasta Division moved forward, other parts of the Central Valley Project did not fare so well in wartime. In May, construction on the Contra Costa Canal was suspended for lack of war priority, with 38 miles out of 47 of the canal completed and in service.²¹² This reflects the wartime focus on power over irrigation. The war also affected efforts to save the salmon by redirecting attention elsewhere.

In June 1942, Fred J Foster became the Director of Fisheries for the State of Washington, leaving the project. Gabrielson, the Director of USFWS, requested that Reclamation personnel correspond with Needham in the future.²¹³

On June 16, 1942, the initial concrete was poured at Friant Dam on the San Joaquin River.²¹⁴ This received little notice from the people working to save the Shasta salmon even

²¹¹ Needham, Hanson, and Parker, *Supplementary Report*, 10.

²¹² "Central Valley Project Studies" Box 99 Entry 7 File : 022.08 Central Valley Project Bibliographies 9, Project Correspondence 023, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²¹³ Gabrielson to Page, June 8, 1942, Box 126 file fish conservation March 42 to Oct 42, Project correspondence File 1930-1945 Central Valley 107.2 131, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

though Friant was to have a huge impact on the species. In general the San Joaquin salmon run received very little attention from those concerned about the environment. However the Central Valley Project would have a substantial impact on the salmon of the San Joaquin as it would cause the river to run completely dry in many years. Without water in the river the San Joaquin salmon runs were in trouble as the fish could not swim upstream. This population is the furthest south of any Chinook run, and is especially adapted for warmer temperatures. It was not until the 1950s that the fate of the river became apparent.²¹⁵

On June 23, 1942, war agencies demanded the tank trucks for transporting salmon be given to the war effort. These trucks were critical for the salvage plan. Salmon traveling upstream were supposed to be trapped and taken either to Deer Creek or to the hatchery; if stranded below the dam many salmon would fail to reproduce, some battering themselves against Keswick Dam.²¹⁶

To replace the confiscated trucks, Reclamation bought seven used trucks. However the tanks needed to be refitted to the new trucks and the trucks themselves refurbished—all of which took time and created a delay in transporting the salmon. It was not until August that the new trucks were even purchased and those trucks would not be ready for several months. In December of 1942 the work upgrading the refurbished trucks was completed and the trucks

²¹⁴ "Central Valley Project Studies," Box 99 Entry 7 File: 022.08 Central Valley Project Bibliographies 9, Project Correspondence 023, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²¹⁵ Philip Garone, *The Fall and Rise of the Wetlands of California's Great Central Valley*, (Berkeley: University of California Press: 2011), 185-195.

²¹⁶ Needham, Hanson, and Parker, *Supplementary Report*, 10

were ready to ship to Shasta.²¹⁷ This was after the main salmon runs of the year so the trucks were not useful in transporting the 1942 runs. Thus during the 1942 season no salmon were hauled; this omission was a major setback for the hauling program.²¹⁸ Since it is unclear if the hauling program ever had major impact on the fish, the salmon population may not have been affected.

Meanwhile, the construction of the dam was behind schedule. Reclamation telegraphed Needham asking him for salmon salvage scenarios involving closing the river to fish at a date later than the then planned October 1st, which was already several months later than had been planned for at the beginning of the year. Needham replied that if the dam could be kept open for three months longer—until December 31, then the expense of salvaging the fall run of salmon would mostly be spared. He also said that relatively few salmon migrate in December so a closure date of Nov. 30 would have a similar impact on the fish to Dec. 31. Needham goes on to say that he does not think that young salmon migrating downstream in the summer of 1943 will have much problem getting over the dam which would still be under construction and lower than its final height. Needham next noted that he thought March 31, which would be six months after the planned October 1 closing, would be the ideal date as far as salmon were concerned. This would give everyone time to finish the infrastructure for the salmon, such as

²¹⁷ Harper to Page, January 5, 1943, Box 126 file fish conservation Nov 1942 to Aug 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²¹⁸ Bashore to Allocation Section, Division of Motor Transport, Box 126 file fish conservation March 42 to Oct 42, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

fish traps and the Coleman Hatchery. Due to the war there was a shortage of material and labor for these structures.²¹⁹ Needham's answer here was based on only biological considerations, but due to the war, these types of considerations would be given low priorities giving Needham's advice even less weight with Reclamation personnel.

The situation with materials was such that Harper wrote that Reclamation would be able to supply only one of the three promised racks. He added, "Although the Fish and Wildlife Service has been notified that it would be expected to install the racks, this was on the assumption that all construction would be completed." Since bids for the Balls Ferry Rack had been received on August 15²²⁰, it was, by default, the rack to build.

Assistant Director of USFWS Jackson was concerned about all the delays in the Salmon Salvage Project. He expressed this in a letter to Page. Jackson requested that the closure of Shasta Dam, which was planned for Oct. 1, be delayed until March 31 as per Needham's preferred scenario. While Jackson acknowledged that the delays in constructing the salmon infrastructure were "unavoidable war conditions," he believed that if the river were blocked on Oct. 1, then the whole once-every-four-years cycle of fish could be lost or seriously impaired. To successfully salvage the fish with an October 1 closure, trapping would have to begin on September 24, using a temporary trap which he did not think would be ready in time. Jackson went on to say that, "In the event the demands of power production will not permit the

²¹⁹ Needham to Jackson, August 12, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

²²⁰ Needham, Hanson, and Parker, *Supplementary Report*, 11.

delaying of the closure ... The Fish and Wildlife Service obviously cannot assume the responsibility for the permanent destruction of an important element in the nation's food resources."²²¹ Note that Jackson is discussing the food value of salmon here; the importance of salmon as food was heightened due to the war.

On September 12 Harper wrote to Page about when to close the dam. Harper thought that closure would not be possible until March 31, 1943, due to "the flood season." This supported Needham and Jackson. He recommended that no changes be made to the plan.²²²

About a week later on September 18, 1942, Page sent a teletype to Construction Engineer Lowry requesting information on the salmon salvage project, including current actions and likelihood of completing the infrastructure.²²³ Possibly he needed this information to make a decision about when to block the river. Lowry replied the next day saying that about 100 salmon a day were currently passing the dam. Construction of the Balls Ferry trap had been started but the rack part of the structure was delayed. Construction of the middle rack was underway and Lowry thought it could be completed by October 20. He also thought the dam might be closed as early as October 15. The existing trap structure at Anderson Cottonwood Dam was adequate for handling 400 fish per day. Lowry implied that things were well under

²²¹ Jackson to Page, August 28, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131,

²²² Harper to Page, September 12, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

²²³ Page, to Lowry, teletype, September 18, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

control and that the temporary facilities were adequate for the job despite the fact that there were still no trucks to haul the fish caught in the traps.²²⁴

Page continued to be concerned about the salmon even after receiving Lowry's reply. He sent another teletype expressing his concern. This read in part, "Believe care of run this fall may be in danger. Best communications give no comprehensive story of condition and suggest possibility of bureau being placed in bad position between fish destruction or delay in power production....This situation serious and seems to require aggressive attention."²²⁵ He sent another teletype a few days later suggesting that more temporary structures might be needed. He ended with "detailed program needed badly."²²⁶ It is unclear what motivated Page's concern, but he seemed more worried about the salmon than anyone else at Reclamation.

The Middle Sacramento Rack began operation October 10, 1942. It was known as the middle rack because it was the middle of three planned racks, with the upper rack upstream and the Balls Ferry Rack downstream. This rack was supposed to help keep the fish spread out

²²⁴ Lowry to Page, telegram, September 19, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²²⁵ Page, to Lowry, teletype, September 25, 1942, Box 126 file fish conservation March 1942 to Oct 1942, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²²⁶ Page, to Lowry, teletype, September 28, 1942, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

so they would use more of the river below the dam to spawn in.²²⁷ The source of the money and materials to build this rack is unclear.

On November 7, 1942, Lowry telegraphed Page and Bashore saying, “Hundreds of fish spawning in section of river adjacent to Redding. Needham and Holmes of Fish and Wildlife Service here and appear entirely satisfied with present conditions.”²²⁸ Thus despite the setbacks in building the racks and acquiring trucks, the project was succeeding in the eyes of at least one biologist.

Finally, on Nov 8, 1942, Shasta Dam became an impassable barrier to salmon migrating upstream.²²⁹ This was later than the October 1 that Reclamation had discussed but much earlier than Needham’s ideal date of March 1943 and somewhat earlier than Needham’s earliest date to block the river, November 30. This meant that the runs that year were unable to travel above the dam to spawn and had a much lower reproductive success than they would have if the river had been blocked later. A few days later on November 13, 1942, Lowry wrote to Needham, saying, that “a considerable number of salmon have accumulated just downstream from Keswick Dam” and that if Needham wanted to haul the fish somewhere else, his office was

²²⁷ Lowry to Page, telegram, November 7, 1942, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²²⁸ Lowry to Page and Bashore, telegram, November 7, 1942, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²²⁹ Needham, Hanson, and Parker, *Supplementary Report*,5.

willing to help move the fish.²³⁰ There is no record of Needham's response. Meanwhile, the newly completed middle rack did not operate smoothly. It was never fish tight, and storms in November brought down debris from the dam construction which washed out the rack.²³¹ Thus the rack was functional for only one season, and even then it worked poorly. The upper rack was never constructed.

In November and December of 1942, Fish and Wildlife personnel observed the fall-run salmon in the Sacramento River below Keswick both by boat and on foot. They found salmon spawning in all of the gravel that had been identified as suitable. The crew also recovered 499 dead salmon which they cut open to see how completely the fish had spawned and found that most these were "spawned out." Based on these observations, Needham concluded that the salmon had spawned successfully.²³²

December 2, 1942, marked the official launching of the Central Valley Project Studies. A wide variety of studies were to be conducted under this umbrella by government agencies as well as academic institutions. The theory was that this would help meet the needs of the war effort and the planned post-war expansion. However, of 24 problems to be studied related to the Central Valley Project, which were listed in a press release, not one was about salmon. Instead the problems focused on exploiting the water to the fullest primarily through irrigation

²³⁰ Lowry to Needham, November 13, 1942, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

²³¹ Needham, Hanson, and Parker, *Supplementary Report*, 16.

²³² Needham, Hanson, and Parker, *Supplementary Report*, 15.

and electric power. The questions were also very focused on financial issues such as funding for the project and prices for water and power.²³³

However, the scientists working on the project were still focused on salvaging the salmon. On December 28, 1942, Bashore wrote a letter to Harper outlining what he expected from the project in the next year. His summary included 6,000 spring run fish being hauled to Deer Creek and the rest of the run being taken to Battle Creek, the site of Coleman Hatchery. He also requested more information including a count of fish migrating upstream and their distribution in time, the number of fish to be hauled to Battle Creek, and verification of other aspects of the plan.²³⁴ Bashore's letter was in keeping with the overall plan as outlined by the Board of Consultants.

1943

In early 1943 the Fish and Wildlife personnel decided not to install the upper rack that year because the site selected had many flaws and the previous season had gone well even without the rack.²³⁵ Also at this time, winter flooding had damaged the Balls Ferry Rack, and its fish trap was no longer working.²³⁶ Since the middle rack had been washed out by storms, this

²³³ "Central Valley Project Studies," Box 99 Entry 7 File: 022.08 Central Valley Project Bibliographies 9, Project Correspondence 023, FY13, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²³⁴ Bashore to Harper, December 29, 1942, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²³⁵ Needham, Hanson, and Parker" *Supplementary Report*, 16.

²³⁶ Harper to Lowry, February 19, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the

meant that the Balls Ferry Rack was the only rack in operation. The plan to use three racks to spread out the spawning fish was not being effectively executed. This part of the plan was supposed to preserve the wild spawning fish, but this aspect of the overall plan was continually neglected.

On February 5, 1943, Joseph Kemmerich of the Portland office of the USFWS wrote to Laythe an engineer working for USFWS expressing concerns about the Shasta Salvage Program. At this point neither fish trap was operating. Kemmerich worried this could cause problems. He wrote:

“If the fish passed upstream beyond Keswick Dam, we believe that the problem of salvaging those fish at or near the base of Shasta Dam would be so great that rather than attempt to accomplish this, it would be less difficult to place the Balls Ferry trap into operation, regardless of the amount of work involved in placing this structure in a satisfactory operating condition.”

²³⁷

With the racks not working properly and both fish traps not working, there was a danger that fish would reach the dam and destroy themselves.

To address this, on February 17, 1943, Harper met with Higgins, Laythe and Needham to talk about the trapping problem. However, Keswick Dam would not be capable of stopping fish until “the raising of the spillway crest could be completed.”²³⁸ Even if repaired, the Balls Ferry

Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²³⁷Alphonse Kemmerich “Memorandum to regional Director, Leo L. Laythe,” February 5, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²³⁸ Harper to Lowry February 19, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the

Trap could not be operated when flows were above 15,000 cubic feet per second. Thus it seemed likely that many of the spring-run fish would not be caught.

By March three of the improvised trucks had been refurbished and were ready for service, and a fourth was almost ready.²³⁹ However, in May the Office of Defense Transportation released the original trucks back to the project.²⁴⁰ This meant the 1943 season would have full access to trucks and that the trapping and hauling could proceed.

There were still concerns about implementing the project so that the salmon could behave naturally and still be salvaged. On May 3, 1943, Gabrielson wrote to Page defending the natural spawning portion of the project. He stated that biologically he still believed in the three rack plan but that it would not work because the racks could not be made fish tight. At the time of the letter, neither the middle nor the upper rack was in place for the 1943 season.

Gabrielson relates that the original plan for the racks was for each to have fixed aprons on which they would be installed. The aprons would be patches of concrete permanently set into the river that would provide a smooth surface to attach the racks to as well as helping to anchor them. He requested that Page consider redesigning the racks with fixed aprons or some other way to make them fish tight for the 1944 season.²⁴¹

Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²³⁹ Lowry to Page, March 29, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁴⁰ Needham, Hanson, and Parker, *Supplementary Report*, 10.

²⁴¹ Gabrielson to Page, May 3, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the

Properly building the racks would be delayed because of financial concerns. Later that month (May 20, 1943) McConaughy sent a memo to Harper discussing the cost of the salmon project. Reclamation had already spent \$1,518,000 constructing the Keswick trap and other features of the salvage project. McConaughy contended that the annual cost of operating the project (including interests on capital costs) was much more than the commercial value of the salmon.²⁴²

Based on McConaughy's memo, Harper wrote to Page. Harper wanted USFWS to not only pay the costs going forward, but to reimburse Reclamation for capital costs. He went on to argue that the permanent aprons for the racks would be too expensive (estimated about \$100,000 each) and that anyway they couldn't get materials for them in time to build for the 1944 season. He suggested that, "...if this season's experience indicated that a change was necessary, the Bureau would be open to suggestions..." However, the racks were never rebuilt.²⁴³

By early summer of 1943, the Coleman Hatchery was ready for operation. The hatchery used a series of racks in Battle Creek to hold the fish before they spawned.²⁴⁴ It was a key part

Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁴² McConaughy to Harper, "Memorandum to the Chief Engineer," May 20, 1943. Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁴³ Harper to Page, May 25, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁴⁴ Needham, Hanson, and Parker, *Supplementary Report*, 11.

of the plan. Reclamation engineers and some biologist believed that the hatchery could result in more fish than would spawn without human intervention, thus replacing the lost habitat above the dam. Contemporary people who put great faith in technology frequently seemed to view it as superior to nature. For example Young, believed that his work as a Reclamation engineer was of great benefit to humanity. Even Needham, who was skeptical of hatcheries proposed plans that involved extensive engineering work, like the Stillwater plan.

Finally on June 1, 1943, the Keswick trap was completed and the trucks put into service. By this time much of the spring run had passed and many salmon had been stuck below the Keswick Dam for a long time. Some had so battered themselves against the dam that they died before the transfers began.²⁴⁵ In a later report Moffat wrote of the start of the program that "...many facilities were not completed and it was necessary to make improvisations and adaptations of inadequate equipment which at times threatened the very operation of the undertaking."²⁴⁶ Still USFWS continued their efforts.

Between June 1 and June 25, 5,245 Chinook salmon were transferred from the main stream of the Sacramento to Deer Creek. This project was much better equipped than the previous transfer. When the trucks reached the dump site "...the tank water was slowly tempered by pumping water from the creek into the truck tank. The fish were released when the water temperature in the tank was within two or three degrees of that in the creek."²⁴⁷ This protected the salmon from being shocked by a sudden change in temperature. Still, even with

²⁴⁵ Ibid., 10, 23

²⁴⁶ James W. Moffett, "First Four Years of King Salmon Maintenance Below Shasta Dam, Sacramento River, California," *California Fish and Game* 35 ,no 2 (1949): 80-81.

²⁴⁷ Needham, Hanson, and Parker, *Supplementary Report*, 22.

this improvement, the salmon mortality rate was high and 24.4 percent of the fish transferred died. This was only about five percent less than the mortality in 1941. Even the best available equipment was far from ideal. Still, some of the extra mortality was because the fish were damaged from being held below the dam for so long.

On June 1, 1943, Gabrielson sent Page an estimated budget for Fiscal Year 44 (the Fiscal Year ending in 1944). He estimated the cost of “biological control salmon salvage, Shasta dam” at \$24,320 and the total cost of all fish related work on the Central Valley Project at \$40,280.²⁴⁸ Though in previous years the USFWS had to fight for their budget, this year it was allocated without much fuss, though it is unclear why. The agreement between USFWS and Reclamation for Fiscal Year 1944 gave Fish and Wildlife \$120,000, which for once was more than they asked for.²⁴⁹ This included both the work at Shasta and the Trinity River project.

On June 15, 1943, Bashore wrote a letter to Gabrielson about making the racks fish tight. “All costs incurred by the project must eventually be repaid by the water users and other project beneficiaries and it is the policy of the Bureau of Reclamation to scrutinize all proposed expenditures carefully. Evidence now available does not furnish sufficient justification for

²⁴⁸ Ira Gabrielson, “Memorandum for Mr. John C. Page, Commissioner, Bureau of Reclamation,” June 1, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁴⁹ “Agreement date June 3, 1943 for the fiscal year ending June 30 1944, between the Bureau of Reclamation and the Fish and Wildlife Service covering biological investigation for salvage of migratory fish, and for the operation and maintenance of the Coleman Hatchery and holding ponds and other facilities on the Sacramento River, Deer Creek and the Battle Creek, involved in the Central Valley Program and interrelated investigations, California,” Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

additional construction.”²⁵⁰ So Bashore used monetary reasons to refuse to build aprons for the racks and stated that the needs of large farmers (the water users) were more important than the needs of the salmon.

Yet interest in salvaging salmon remained. On June 30 special scientific report No. 26 “Supplementary Report on Investigations of Fish-Salvage Problems in Relation to Shasta Dam” was published. This report was authored by Needham, Hanson and Lewis P. Parker. Despite the fact that the Sacramento Natural Spawning Plan had by this point mostly failed to have been implemented and that the fish transport was not going especially well (the equipment wasn’t always there, and many fish died in transit even with the state-of-the-art trucks in operation) the report was not nearly as pessimistic as the original 1940 report. The report discussed the middle and upper racks in the Sacramento River as though the setbacks were temporary and the racks would eventually be installed even though this turned out not to be the case.²⁵¹ Perhaps their optimism was based on unfulfilled expectations.

In July, 24% of the salmon transferred from below Keswick Dam to Deer Creek died—mostly from “severe injuries sustained by jumping against the rocks at the base of Keswick Dam”²⁵² This especially high mortality and damage to the fish was caused by the delay in starting the transfer program. A sizeable number also died in the transfer tanks, which was blamed partly on “trash fish” getting into the tank with the salmon and depleting the oxygen.

²⁵⁰ Bashore to Gabrielson, June 15, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²⁵¹ Needham, Hanson, and Parker, *Supplementary Report*, 12.

²⁵² Needham, Hanson, and Parker, *Supplementary Report*, 23

On May 3, 1943, Harry W. Bashore was appointed Commissioner of the Bureau of Reclamation replacing Page. Bashore was a career Reclamation engineer who had worked on the North Platte project as well as many West Coast projects.²⁵³ He had been acting commissioner for a few months before. Bashore was less fond of the Shasta Salmon Salvage project than Page was. Harper continued on as Chief Engineer. On July 6, 1943, Harper wrote to Bashore "... you express the view that the building up of the Sacramento River run is not a proper function of the Bureau and should not be financed by it. I concur."²⁵⁴ Both men opposed using Reclamation funds to restore the salmon run to pre-1938 levels. This meant the top officials of Reclamation were now even more hostile to the project. Page had expressed at least some sympathy for the plight of the salmon.

On September 20 the Balls Ferry Rack was installed for the year. The rack was also used as a counting station to keep track of how many fish reached that far up river each year. The rack was left in place until December 17th.²⁵⁵ On September 29, 1943, Jackson sent an estimate of costs for 1945 to Bashore. This included the Coleman Hatchery as a separate estimate from the Shasta Salmon Salvage Program. The former was estimated to cost \$99,916.40 and the latter \$23,311.39 for a total of \$123,227.79.²⁵⁶ At this point the hatchery was much more

²⁵³ Bureau of Reclamation, *Harry W. Bashore, Commissioner, Bureau of Reclamation, 1943-1945*, 2009, RG 115, accessed 2014, <http://www.usbr.gov/history/CommissBios/bashore.html>.

²⁵⁴ Harper to Bashore, July 6, 1943, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁵⁵ Moffett, "First Four Years of King Salmon Maintenance Below Shasta Dam, Sacramento River, California," 81.

²⁵⁶ Chares E. Jackson to Bashore, "Memorandum for the Commissioner of Reclamation," August 29, 1943, Box 126 file fish conservation November 1942 to August 1944, Project

expensive than the racks and fish hauling but also much less questioned. However, the hatchery was not without problems, such as disease and failure to produce salmon with skills to thrive in the wild. In the 1930's scientists including Needham had questioned the efficiency of hatcheries.²⁵⁷ Needham had even challenged Foster on this point in planning the Shasta Salvage effort. But once the plan was finalized no one suggested that Coleman Hatchery might be a bad idea.

In fact scientists had been questioning the usefulness of hatcheries since the early 1900's. Due to experiments that showed that hatcheries didn't work, all hatcheries in Canada and Alaska were shut down by 1936. However no other US state shut down hatcheries²⁵⁸ Taylor argues that the failure was due to structural problems, but Lichatowich sees the problem as ideological.²⁵⁹

correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

²⁵⁷ Lichatowich, *Salmon Without Rivers*: 147.

²⁵⁸ Taylor, *Making Salmon*, 213-218.

²⁵⁹ Taylor, *Making Salmon*, 219-225; Lichatowich, *Salmon Without Rivers*, 148-150.

CHAPTER 4. ACTIVISTS AND FINAL REPORTS

Telegram campaign

Mid December 1943 saw one of the more dramatic periods of the Shasta Salmon Project. Ordinary people expressed their concern about the salmon to government officials and were listened to. This was an early example of environmental activism and showed that people articulating their values could bring about at least limited change.

It started quietly on December 13, 1943, when Lowry wrote to Needham to explain his plan to start storing water behind Shasta Dam on January 1, 1944. This plan would involve reducing the flow of the Sacramento River over the dam to only 500 CFS between January 1 and April 1, 1944.²⁶⁰ Such an action could have a large impact on the salmon eggs that were maturing below the dam. Lowry wrote a similar letter to the California Department of Fish and Game.²⁶¹

²⁶⁰ Lowry to Needham, December 13, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁶¹ Lowry to California Fish and Game Commission, December 13, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

Miller, then the head of California Department of Fish and Game, responded immediately. He sent a long telegram to Ickes, the Secretary of the Interior, complaining about the unilateral action of Reclamation, explaining that such a plan would endanger salmon eggs—because they would likely dry out. He ended by writing, “respectfully request reopening of this whole subject before positive order is issued that you may weigh all factors before accepting responsibility for an irreplaceable loss of one of our natural resources.”²⁶² Miller also wrote a longer letter the same day saying much the same thing.²⁶³

A few days later on December 21, there was a flurry of commentary between Reclamation and USFWS. First Carey suggested to Bashore that they should obtain an order from the War Production Board directing the impounding of water according to their present schedule.²⁶⁴ Meanwhile, Jackson and Needham also complained to Bashore and recommended that 4,000 CFS be released in the month of January.²⁶⁵

²⁶² George P Miller, telegram to Harold Ickes, December 20, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²⁶³ Miller, letter to Ickes, December 20, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²⁶⁴ Carey to Bashore, telegram, December 21, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²⁶⁵ Jackson and Needham to Bashore, December 21, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

On December 23, 1943, Bashore replied to Miller saying, "Am obtaining report from field and discussing matter with Fish and Wildlife Service. Will advise you when have determined most suitable operation plan to fit all conditions."²⁶⁶ He also telegraphed Lowry and Carey "do not reduce flow as contemplated until action approved by this office."²⁶⁷ Thus he agreed to consider doing as the biologists asked rather than agreeing with his own engineering staff. However, Carey had already moved forward with the original plan and sent notices to water users of the intended reduction in the Sacramento River flow.²⁶⁸

The next day, December 24, Reclamation put out a press release about the start of the water storage at Shasta Dam that explained the original plan emphasizing the importance of the stored water to the war effort.²⁶⁹ That day Harold L. Ickes received telegrams from The San Francisco Tyee club, a sports fishing club, which read in part, "The San Francisco Tyee Club the largest salmon fishing club on the pacific coast organized for the sole purpose of propagation and conservation of salmon protest reclamations proposal to reduce the flow from Shasta

²⁶⁶ Bashore to Miller December 23, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁶⁷ Bashore, telegram to Carey, December 23, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁶⁸ Carey to R. K. Malcolm, December 23, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁶⁹ Bureau of Reclamation, "Storage to Start at Shasta Dam," December 24, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

reservoir...”²⁷⁰ Robert Lorentz of the Tye Club later wrote that his organization had been contacted by Needham about the issue, and it seems that Needham had a close relationship with this group.²⁷¹ It is likely that Needham contacted other groups as well. Ickes also received another telegram from A. Paldini Inc., a commercial fishing company, which read “...such an action will result in the loss of salmon spawn in the river we wish to call your attention to the seriousness of this action which will destroy a large percentage of the salmon population in the river ...”²⁷² These telegrams were the first of many, as concern for the salmon spread.

Both Carey and Lowry telegraphed Bashore protesting any change to their plan such as greater flow releases. They argued that it would be a dry year and that if not enough water was stored during the wet season, power production might be reduced.²⁷³ Power supply had been contracted to PG&E, and Carey and Lowry wanted to make sure they met that obligation. Additionally the power was being used for war industries.

²⁷⁰ Dr Robert Lorentz, Telegram to Ickes, December 24, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁷¹ Robert Lorentz to Robert Moon, (1956), *Needham, Paul Robert Papers*, The Bancroft Library, University of California, Berkeley.

²⁷² A Paldini Inc Telegram to Ickes, December 24, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁷³ Carey to Bashore, telegram, December 24, 1943, (91 5/1); Lowry to Bashore, telegram December 24, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

Although the next day was Christmas, Dr. Robert Lorentz, president of the San Francisco Tyee Club, wrote a long letter to Ickes detailing the protest. He cited the extinction of the passenger pigeon and the commercial extinction of the Atlantic salmon as reasons for caution. Here he invoked a romantic image of America's past. This type of image would become common in the environmental movement which was influenced by earlier Romantic ideas about nature. He also argued that there was not a power shortage.²⁷⁴

Ickes continued to receive telegrams protesting Reclamation's plan. On December 26, 1943, he got one from the Associated Sportsmen of California which expressed concern about the salmon stating, "...this reduction would result in the irreparable loss of one of the remaining cycles of salmon." The telegram asked for the flow to be maintained at 4000 second feet until the fish reached maturity.²⁷⁵ The next day he received a similar telegram from PPC Famine [sic], presumably a fishing company. As well as requesting a continued flow of at least 4000 CFS the company as said, "... no doubt you are familiar with the salmon propagation and the salmon salvage program being conducted on the Sacramento River which will also be seriously threatened by this action at a time when the commercial fisheries of California are putting forth

²⁷⁴ Lorentz to Ickes, December 25, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

²⁷⁵ W. A. Rainey, Jr., telegram to Ickes, December 26, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

every effort to produce as much fish for food as possible..."²⁷⁶ The protestors argued the merits of both extrinsic and intrinsic values of salmon.

Bashore continued to work on the issues raised by the telegram campaign. On December 27, 1943, he requested Lowry to air mail the daily flows of the Sacramento River for December 1943.²⁷⁷ Presumably this was to get a sense of the numbers as both sides were making somewhat contrary claims about how much water was available.

December 28 saw a major influx of telegrams and letters protesting the reduced flow out of concern for the salmon. Ickes received telegrams from the Livermore Pleasanton Sportsman club, "to save the salmon will not seriously effect power output,"²⁷⁸ San Francisco Local Fisherman's and Allied Workers of America²⁷⁹, as well as letters from the Meredith Fish Company,²⁸⁰ and the Santa Cruz Rod and Gun Club.²⁸¹ Meanwhile Leroy Johnson, U.S.

²⁷⁶ L. H. Hubbard, telegram to Ickes, December 27, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁷⁷ Bashore to Lowry, December 27, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁷⁸ Livermore Pleasanton Sportxan[sic] club, telegram to Ickes, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁷⁹ Dave Tomas, telegram to Ickes, December 27, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁸⁰ Lloyd Turnacliff to Ickes, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley

Representative from California, received two telegrams from farmers protesting the reduced river flow.

Young weighed in that day as well. He noted that in 1941 the USFWS had suggested that 3,000 CFS between Oct 20 and Jan 15, followed by 1000 CFS until April 15 would be adequate for the fish. Young thought that if this schedule of releases was followed, the dam would still be able to generate an adequate power but was firmly against releasing more water than suggested in 1941. He wrote, "Recommend that in any event we not make any compromise more liberal than the 1941 schedule." Young cited concerns about low rainfall and not being able to meet quotas for the War Production Board. But he also seemed to feel that the fish were unimportant and called releasing water for them a "compromise"²⁸²

That same day Bashore telegraphed A. Paldini Inc. informing them that Reclamation would release 4000 second feet while they worked out the best plan.²⁸³ Bashore decided to release more water than originally planned and more water than Young recommended due to the protests. Although Bashore had decided to release water for the fish, he had no easy way to

301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁸¹ Harold E Richey, letter to Ickes, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁸² Young, telegram re: Shasta Storage, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁸³ Bashore to A. Paldini, Inc., December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

tell concerned groups about this decision. Therefore telegrams advocating for the salmon continued to be sent to Ickes. On December 29 Ickes' office received at least sixteen telegrams. These were primarily from sports fishing organizations but also from concerned legislators, fishing companies, the Redding Chamber of Commerce, and labor groups. In one telegram, Emil J. N. Ott, Jr., the president of the Mt. Ralston Fish Planting Club, wrote, "...imperative that a 4000 second feet [CFS] of flow be maintained until February 1 or will lose our fall 1943 salmon run thereby losing one of our 4 cycles of salmon runs and seriously impairing the future salmon runs in California."²⁸⁴ Thomas Doyle, a member of the California legislature, wrote, "salmon fishery important natural resource in California and should not be jeopardized without due consideration."²⁸⁵ A wide variety of groups were concerned about the well-being of the fish.

There were several common themes in the many telegrams sent. One was the fate of the passenger pigeon and the buffalo suggesting a wider environmental awareness and an intrinsic valuation of salmon. Many of the telegrams also mentioned the scientific basis for the protest. For example many knew that 4000 cubic feet of water per second (sometimes referred to as second feet) was the amount of water a biologist had recommended. The four-year cycle of the salmon spawning was also mentioned frequently. This suggests that these protesters were contacted by someone in the know like Needham. There is no clear evidence showing

²⁸⁴ Emil J. N. Ott, Jr., telegram to Ickes, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁸⁵ Tomas Doyle , telegram to Ickes, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

how the telegram campaign was organized. But given some of the recurrent phrases in the telegrams and the fact that Needham helped mobilize the Tyee club, it is likely that he contacted other groups as well. This suggests Needham had a deep commitment to the salmon that went beyond their commercial value.

Meanwhile, Miller wrote a telegram raising further concerns including the possibility that reduced flow could increase copper in the water and prove fatal to the fish.²⁸⁶ He also seems not to have known that Bashore had decided to release more water. Communication between agencies was generally ineffective—especially between state and federal agencies.

On December 29, 1943, Bashore telegraphed several concerned groups including the San Francisco Tyee club, “matter under discussion with war production board and fish and Wildlife Service. Water will be stored only above 4000 second feet [CFS] discharge at Shasta until have determined most suitable operating plan to fit all conditions”.²⁸⁷ He also sent a copy of this message to Lowry and Carey. Carey replied “suggest you revise telegram to those listed to read in effect that water will be stored about 4000 second feet [CFS] natural flow at Shasta etc. Storage once caught would not be released to maintain the 4000 second feet estimate

²⁸⁶ Miller to Bashore, telegram, nd, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

²⁸⁷ Bashore to Miller, telegram, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

present natural flow about 300 [CFS].”²⁸⁸ He seems to have accepted Bashore’s decision but wanted to keep water for power if it was already stored.

December 30 saw still more telegrams for Ickes supporting water for the salmon. He received 11 including one from a San José sportswomen’s club, another one from the San Francisco Tyee club, and four from private individuals.

On December 30, 1943, Bashore finalized the revised operating procedures for storing water behind Shasta Dam. He wired this new plan to Carey, Lowry and Young asking for comments. He took into account the biologists’ views much more than the engineers’ views despite the fact that he was an engineer. Under the new plan 4000 second feet would be released during January and stored water would be used to make sure that the minimum necessary was released. Starting in February releases would be restricted until April when the water was needed for irrigation.²⁸⁹ The telegram campaign had achieved its goal and enough water for salmon eggs was released.

The Secretary of the Interior’s office continued to receive telegrams on December 31, totaling nine from a similar variety of groups as on previous days. Lowry, Carey and Young were not entirely pleased with the revised plan. Lowry wired that he had already reduced the flow of the Sacramento River to 3300 second feet and that he believed that the flow could be reduced

²⁸⁸ Carey to Bashore, telegram, December 28, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁸⁹ Bashore to Carey, December 30, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

to 2500 without harming the fish.²⁹⁰ It is unclear where he got those numbers, but it seems unlikely that they had any biological basis. Carey wrote that a predetermined plan was unlikely to work and that the water might be needed in the dry season for the war effort. He said that his office had “all the relevant facts” and requested Bashore “delegate full authority on this office to handle whole situation.”²⁹¹ Young wrote that with the planned release schedule the reservoir would not be full enough to generate power until the end of March assuming a 1931 (a year of low rainfall) rainfall pattern. He finished by recommending that Reclamation “hold out for absolute minimum release possible.”²⁹² Bashore was not getting much support for reducing storage at Shasta to help the fish from within Reclamation. The engineers were focused on other goals.

On December 31, 1943, Bashore wrote to B. J. Sickler, the Director of the Power Division for the War Production Board, explaining the situation. He cited the large number of telegrams received from salmon supporters as impacting his decision making. He also wrote that Reclamation had spent a lot of money on protecting the salmon industry, and they had to think

²⁹⁰ Lowry to Bashore, telegram, December 31, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁹¹ Carey to Bashore, telegram, December 31, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁹² Young to Bashore, January 1, 1944, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Jan. 1944 to June 1944, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

about the four year cycle in the future.²⁹³ This shows the impact of the campaign. Bashore was working on changing the operation of the dam because of the telegrams.

On January 4, 1944, Bashore telegraphed Carey granting him authority to handle the situation along the lines of the outline of December 30 which required water be released for fish. This was less than the full control that Carey wanted. Bashore also wrote “we should recognize that water should be stored as rapidly as possible and releases regulated to provide maximum power production but we must prevent damage to agricultural, fish and vital war industries.” He had trouble balancing all of these competing needs but nonetheless was trying hard.²⁹⁴ On that same day Bashore sent a form letter with the revised salmon-friendly plan to everyone who had sent telegrams including Miller. This was the same plan that was sent to Carey, Lowry and Young.²⁹⁵ More of these letters were sent on the eighth.²⁹⁶

²⁹³ Bashore to B. J. Sickler, December 31, 1943, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Dec 1943, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁹⁴ Bashore to Carey, telegram, January 4, 1944, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Jan. 1944 to June 1944, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁹⁵ Bashore to Miller, January 4, 1944, (5/17 176), Bashore “identical letters to:” (181-182), Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Jan. 1944 to June 1944, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁹⁶ Bashore to Leroy Johnson, January 8, 1944; Bashore to A. Paldini, Inc., January 8, 1944; Bashore, list, January 8, 1944, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Jan. 1944 to June 1944, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

Also on January 4, 1944, Bashore began receiving daily reports of the Shasta water level.²⁹⁷ He was keeping a close eye on the project which was important since he did not see eye to eye with the people operating Shasta. This meant that he would know and could intervene if necessary if not enough water was released although it does not seem to have come to that. The daily updates also let Bashore keep an eye on how fast Lake Shasta was filling up.

The telegram campaign showed how important public opinion could be in shaping Reclamation policy. Dozens of telegrams were sent from a variety of different organizations, including sports fishing clubs, commercial fishing companies, unions, politicians, and individuals. This outpouring of support came from the broader community not agency officials. The telegrams expressed a variety of ways of valuing the salmon.

Early 1944

On February 19, 1944, The *Sacramento Bee* published an article called "Saving of Salmon Was Problem of Dam Builders," which stated that "one of the problems arising from the construction of the Shasta Dam and now believed solved is the care of salmon which normally spawn above the 602 foot structure."²⁹⁸ The article mentioned the Coleman Hatchery and the fish hauling program but not the racks across the river. At this time many people seemed to

²⁹⁷ Report on Shasta water level, January 4, 1944, Box 164 Entry 7 File 301.1 central valley Dams and reservoirs Shasta Dam Jan. 1944 to June 1944, Project Correspondence File 1930-1945 central valley 301.1, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

²⁹⁸ *Sacramento Bee*, "Saving OF Salmon Was Problem of Dam Builders," February 19, 1944.

think that the problem was solved and salmon began receiving less attention by biologists and the public.

In February of 1944 water storage behind Shasta Dam to create the current Lake Shasta began. A major part of the Central Valley Project was now complete, though the Central Valley Project itself would take six more years to finish; the remaining work included Friant Dam and several canals.

As the war was coming to a close, on April 14, 1944, Ickes made a speech at the Commonwealth Club of San Francisco entitled "America's Post-War Frontier" about development in the West after the end of the war. The speech was about how irrigation would help create an agrarian society and did not mention the salmon.²⁹⁹ The image of the frontier continued to have power in the American imagination, as people continued to see the idea of the frontier as fundamentally American. This view was also tied to valuing land and water in terms of their value for humans. This was not the only that time the post-war West was called a frontier.

On September 9, 1944, William E. Warne, the Regional Director of Reclamation in California, gave a speech as part of a "Shasta, Unlimited" radio broadcast. He said, "...our frontier still exists..." and "...only one thing [is needed] to transform them into places of beauty and fecundity, wealth and security. That thing is water."³⁰⁰ This says a lot about how Warne

²⁹⁹ Bureau of Reclamation, news release, April 14, 1944, Box 103 File 023.6 Central Valley Press Releases Jan 1942-July 1944, FY12, Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

³⁰⁰ "Shasta, Unlimited," September 7, 1944, Bureau of Reclamation New Release, September 9, 1944, Box 103 File 023.6 Central Valley Press Releases Jan 1942-July 1944, FY12, Department of

valued the natural world. The most important thing in this world view is human wellbeing, and other creatures are not valued. Warne typified the views of Reclamation personnel on this matter.

1944 trapping season

The 1944 trapping and hauling did not go completely smoothly. Things were going well until June 5 when the power to the traps at Keswick Dam was shut off. The Fish and Wildlife Service personnel had been catching about 40 fish a day before the power was cut. Without the trapping facilities, fish quickly began to pile up below Keswick Dam and many injured themselves trying to jump over the dam. Needham said that in previous years there were as many as 1,000 fish per day and estimated that there were 1,000 to 1,500 salmon waiting to be trapped and hauled away below the dam on June 14.³⁰¹ This severely endangered not just those fish, but also the population as a whole. Needham objected quite strongly not only to the power cut off but to the way his personnel were not informed of this in advance and the way Reclamation ran the salvage program generally. Needham said that Reclamation had been uncooperative and was not following the plan laid out by the Board of Consultants.

On June 27, 1944, Jackson sent a memo to Bashore stating that he had spoken with Needham and that for fiscal year 1946 Reclamation should seek funding for the project rather than USFWS though they were discussing transferring part of the equivalent Grand Coulee

the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

³⁰¹ Needham to Carey, June 14, 1944, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

project to the USFWS as well.³⁰² Reclamation continued to see caring for salmon as not part of their job and thus tried to move the funding to USFWS. However, it is unclear if the USFWS would have been able to get funding without help from Reclamation.

The focus for Reclamation's public relations was still on electricity. The official Bureau of Reclamation timeline for the Central Valley Project records that, "Shasta Dam Power Plant first delivers power for war industry" on July 14.³⁰³ At this point the dam was not fully completed but at least some of the power generation was. In 1942 two of Shasta's generators had been transferred to the Grand Coulee Dam, which was able use them to produce power sooner.³⁰⁴ This slowed down the start of power production at Shasta. Shasta's first power output was therefore less than the full capacity of the dam.

Still, the plight of the fish was not given much attention. On September 23, 1944, Needham wrote to Martin H. Blote, the Chief Water Master, who worked for Reclamation in Sacramento, about the water released from Shasta. It seems that despite the previous year's outcry, Reclamation was still planning to release far less water than biologists believed necessary for successful spawning. Needham wrote, "...1,000 cubic feet per second as minimum

³⁰² Bashore to Jackson, June 27, 1944, Box 126 file fish conservation November 1942 to August 1944, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

³⁰³ Bureau of Reclamation, news release, October, 19, 1944, Box 102, Entry 7 023 Central Valley – Press Releases Aug 1944, Project Correspondence File 1930-1945 Central Valley 023-023.6, FY13 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

³⁰⁴ "Central Valley Project Studies," Box 99 Entry 7 File : 022.08 Central Valley Project Bibliographies 9, Project Correspondence 023, 1930-1945, FY13 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

release during spawning is far too low. Extremely serious harm would result to fish life if flows are reduced to this amount during the fall spawning, incubation and migration periods.”³⁰⁵

Later, on October 7, 1944, Senator Downey held a meeting in Fresno to discuss water for fish and wildlife. Downey had run on a somewhat populist platform. However, he would later argue against laws requiring land owners served by the Central Valley Project to own only 160 acres. Downey did not invite representatives of the Bureau of Reclamation to attend the meeting. Instead, the meeting was attended by sportsmen and local landowners. At the meeting Downey pledged to support legislation that would guarantee water for wetlands used by migrating birds in the San Joaquin Valley. Salmon were not mentioned at the meeting; this omission is an example of the fragmented nature of conservation movements related to the Central Valley Project.³⁰⁶

In the next important conversation, on Oct 21 McConaughy arrived in Sacramento having left Denver two days before. In Sacramento he met with Carey, Calland and McGuiness at the Reclamation regional office. Then McConaughy, McGuiness, Gardern, Personen, and Merrian drove to Redding. They spent October 22, 23 and part of 24 “in an inspection of existing work for migratory fish control and discussion of the various changes and which the

³⁰⁵ Needham to Martin H. Blote, September 23, 1944, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA—Rocky Mountain Region (Denver).

³⁰⁶ “Downey Pledge Aid in move for west side water,” *Fresno Bee*, October 8, 1944.

Fish and Wildlife Service requested...."³⁰⁷ They were joined by Needham, Hansen and Pelnar for Fish and Wildlife as well as Lowry.

McConaughy reported that USFWS had revised upward the number of fish that Deer Creek could support from 9,000 to 12,000. Therefore they intended to transfer more salmon to Deer Creek. They also wanted to dump the fish in the creek farther upstream requiring four miles of additional road. This was so the fish could be placed above the diversion used for agriculture. McConaughy suggested dumping the fish in an irrigation canal instead, less than an ideal habitat. Fortunately, McConaughy's suggestion was not acted upon.

USFWS members also reported that they were having trouble keeping the spring run salmon in Battle Creek, the site of Coleman Hatchery. The biologists wanted to transfer these fish to Deer Creek instead and pump water from the Sacramento for the fish. McConaughy did not find the arguments of USFWS personnel in favor of this expensive operation convincing and instead thought existing facilities should be used. McConaughy does not explain how this approach would work. At the time of McConaughy's visit Coleman was not being used to its full capacity.

McConaughy also discussed the concrete aprons needed to make the fish racks fish tight. However, he thought that the makeshift measures that USFWS were using to make the racks fish tight, such as dumping gravel along the bottoms, were sufficient and that the cost of

³⁰⁷ D. C. McConaughy "Memorandum to K. B. Keener," October 31, 1944, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA-Rocky Mountain Region (Denver).

concrete aprons would be too much to be worthwhile. The aprons were never poured, and the racks continued not to be fish tight reducing their effectiveness.

Another important meeting occurred on October 26-27 when the Regional Water Master met with Needham and Moffett to discuss the problem of water releases from Shasta during spawning season. "As a result of these investigations, it was mutually agreed that on November 1 the releases would be increased from 2,500 c.f.s. to 3,000 c.f.s. This flow to be maintained through the spawning season and not decreased until December 15 at which time the flow would be again reduced to 2,500 c.f.s."³⁰⁸ Thus Needham and Moffett were able to protect the spawning fish with much less effort than the previous year. It is likely that the 1943 telegram campaign helped give them leverage to achieve this result.

On November 9, 1944, the Balls Ferry Rack was damaged by flooding. A storm came in so rapidly that there was not time to get a crew together to remove the rack. The storm surge carrying debris caused major damage to the rack even washing away some of the pilings.³⁰⁹ The Fish and Wildlife Service salvaged what they could of the rack, but only 10 sections of about 30 were recovered in good condition. The flood was not anticipated because most of the upstream water was trapped by Shasta Dam; the flooding occurred due to a heavy rain fall in the Cow Creek watershed. In a letter dated Dec. 7, Lowry suggested that in light of the proposed Table

³⁰⁸ Carey to Bashore, December 9, 1944, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

³⁰⁹ John Pelnar to Regional Director, Fish and Wildlife Service, November 10, 1944, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

Mountain Dam, it was not worth properly fixing the fish rack.³¹⁰ In a report detailing the incident, Pelnar, the district supervisor of USFWS, wrote the rack was necessary for the salmon salvage and that the rack should be replaced by September 9, 1945, at the very latest.³¹¹ This rack was the only one in operation of the three river racks planned and also acted as a fish trap.

The Balls Ferry Rack was never replaced. This was the end of the rack-based plan which focused on river based spawning. The plan was doubtful from the beginning but was never really given a chance to work as the upper rack was never built, the middle rack operated for only one season, and the Balls Ferry Rack for only for two years. Even when the racks were in place, they were not fish tight, which made them less effective.

1945

On January 4, 1945, Calland wrote to Moffett that due to war conditions and the possibility of building the Table Mountain Dam, he didn't intend to make more than minimal repairs of the washed out Balls Ferry Rack and asked Moffett what the minimum repairs needed for the 1945 season would be.³¹²

³¹⁰ Lowry to Regional Director, December 7, 1944, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

³¹¹ Pelnar quoted in Construction Engineer to Denver Office, December 26, 1944, RG 115 Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

³¹² Calland to Moffett, January 4, 1945, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

On January 29, 1945, Gabrielson issued a policy change so that personnel from Reclamation were directed to contact the Portland Regional Office rather than Needham or Moffet. This was because the investigations led by Needham and later Moffet were now taking second place to the operation of the Coleman Hatchery which was seen as the center of the salvage program.³¹³ The operators of Coleman were also less concerned about the river based spawning aspects of the plan. This most likely reduced the influence of any new science and concentrated the program on the hatchery rather than on wild Chinook. This meant that the effectiveness of the hatchery and its effects on the genetic makeup of the salmon population were not questioned.

Between Nov 4 and 26, 1946, 7,536 fall run salmon were transferred to the Coleman Hatchery due to crowding at Keswick Dam. It is unclear why they were taken to the hatchery and not to Deer Creek but this shows the growing dominance of the hatchery. These salmon had much higher survival rates than previously, with only 2.8% of the females dying before spawning. The salmon fry these fish produced were held "until they had been feeding for some time." They were all released into Battle Creek before April 15th.³¹⁴

The fate of the salmon hauling program

Spring run salmon were hauled from below Keswick Dam, nine miles downstream of Shasta to Deer Creek about 60 miles away. They were first hauled in 1941; due to the war no

³¹³ Gabrielson, "Memorandum for the Commissioner, Bureau of Reclamation," January 29, 1945, Box 126 file fish conservation September 1944 to May 1945, Project correspondence File 1930-1945 Central Valley 107.2 131, FY10 Department of the Interior, Records of the Bureau of Reclamation, RG 115, NARA–Rocky Mountain Region (Denver).

³¹⁴ Moffett, "First Four Years of King Salmon Maintenance Below Shasta Dam, Sacramento River, California," 186.

fish were transferred in 1942, but the hauling program resumed in 1943 and operated until 1946. In total 15,802 fish were transferred but 18% either died in transit or soon after. Overall the program was not considered a success, not because of the high death rate of the fish, but because the condition of Deer Creek was poor. Too much water was diverted for irrigation making the water too warm and shallow. There were also several dams in the creek which the salmon had difficulty crossing, and many unscreened irrigation diversions which were a hazard to young salmon.³¹⁵

After the completion of Shasta Dam

In April 1949, Dr. James W. Moffett's report on the first four years of the Salvage Project was published. The report is surprisingly optimistic about the fate of Sacramento River salmon given earlier reports, although it still points out potential problems. Moffett described the effect of construction thus: "The Sacramento River below Shasta Dam has undergone rather radical changes since the operation of Shasta Reservoir began. The most obvious of these changes are: (1) reduction in water temperature during summer and increase in water temperature in winter; (2) alteration of run-off patterns; and (3) removal of much silt from the water," and noted that the dam cut off fifty percent of the spawning ground of the Sacramento River Chinook.³¹⁶ These factors would suggest that Shasta had not been kind to the salmon. However he went on to say:

³¹⁵ Fredrick K. Cramer and David F. Hammak, *Salmon Research at Deer Creek California* Washington, D.C.: United States Department of the Interior, 1952.

³¹⁶ Moffett, "First Four Years of King Salmon Maintenance Below Shasta Dam, Sacramento River, California," 93.

“The higher water temperature existing during November and December as a result of the stored heat in Shasta Reservoir has unquestionably accelerated the development of eggs and advanced the time of migration seaward. This change is a distinct advantage as far as the river life of the young salmon is concerned because it affords a greater time for migration before dangers from irrigation diversions mount.”³¹⁷

It is hard to imagine a present day ecologist writing so positively about the modification of a species' lifecycle. They would more likely be gravely concerned about such a change. Moffett concludes his report by stating, “Present ecological conditions in the Sacramento River below Shasta Dam are greatly improved for natural production of salmonoid fishes....The improvement in river conditions has compensated, as nearly as can be determined at present, for the loss of spawning ground above Shasta Dam.”³¹⁸ This upbeat report is surprising after how pessimistic other scientists were about Shasta's impact on the fish. This is especially true since ultimately Shasta Dam had a major negative impact on the salmon.

The map printed with Moffet's paper on the facilities used in the project includes all three river racks, even though by 1949 none of them were in operation, and the upper rack had never even been built.

Moffet thought that transferring salmon to Deer Creek was unlikely to increase the salmon population in that stream unless more was done to improve the habitat.³¹⁹ He wanted less water to be taken from the creek for irrigation, the stream to be channelized, and for obstructions to fish passage to be removed. Moffet's optimism, however, was tempered. He wrote, “The possibility of materially reducing, if not entirely eliminating the salmon crop by

³¹⁷ Ibid.

³¹⁸ Ibid., 102.

³¹⁹ Ibid.

using water required for its maintenance for other purposes is not as remote as might be supposed.”³²⁰

Moffet used more ecological language than other reports about the Chinook. He used the words *ecology* and *ecological*, and he discussed population dynamics. This suggests a shift in the way scientists were contextualizing the salmon. Moffet was more aware of the fish’s role as a piece of a whole system than earlier writers.

It is now thought that the loss of habitat, changes in the river seasonal cycles and reduced flow all had an extremely negative impact on the Central Valley’s salmon runs. It is unclear if most contemporary biologists supported Moffett’s conclusions. No reports about the impact of Shasta Dam on salmon were published by the California Department of Fish and Game in the early fifties, so the problem seems to have become one of lesser concern after the dam was finished.

It was not until 1950 that the five hydro electric generators at Shasta Dam came online.³²¹ In June of that year a dedication ceremony, complete with a historical pageant, was held for the dam.³²²

August 1, 1951, saw the start of “integrated workings of California’s Central Valley Project.”³²³ Finally all the components of the vast project would work together. A ten-day celebration was staged starting at Shasta Dam. The water released from the dam was dyed

³²⁰ *Ibid.*, 100

³²¹ Billington and Jackson, *Big Dams of the New Deal Era*, 283.

³²² Lawrence E Davies, “Shasta Dedication Hailed By Truman,” *New York Times*, June 18, 1950.

³²³ Lawrence E Davies “Waters Of Shasta Begin Run To South,” *New York Times*, August 2, 1951.

bright green so it could be traced on its route south. Even as officials spoke at the opening, they discussed the need for more dams and more irrigated land but did not discuss salmon or other wildlife.³²⁴

³²⁴ "New Waters Flow On Tracts In West," *New York Times*, August 5, 1951.

CHAPTER 5. CONCLUSION

In 1933 the California legislature passed the Central Valley Project Act, which authorized the construction of Shasta Dam, along with other water infrastructure. The Central Valley Project would move water from northern to southern California and also provide electric power and help control flooding. However, work on Shasta Dam did not begin until 1938. That same year USBF personal began a biological investigation into what would be necessary to salvage the salmon, whose life cycle would be affected by the dam. This schedule did not give biologists enough time to plan. In April of 1940 Hanson, Smith and Needham published the results of the investigation. They proposed three possible plans. In their report they talked about the monetary value of the fish but not the intrinsic value.

The Bureau of Reclamation convened a Board of Consultants consisting of a biologist, an economist, and an engineer to read the report and decide on the best plan. The Board chose a plan close to the cheapest plan, involving a hatchery and three racks across the river to spread out the naturally spawning fish. The hatchery part of the plan was executed, and Coleman Hatchery is still in operation. However, the racks based on the natural river spawning part of the plan were never fully implemented and were quickly abandoned entirely.

In December 1943, the reservoir behind Shasta Dam began to fill. Reclamation engineers sought to drastically reduce outflows, which would negatively impact the salmon eggs laid that season. Sports fishers, commercial fishers and others sent telegrams to Secretary of the Interior Ickes to protest. This campaign was successful, and more water was released.

In April of 1949 Dr James W. Moffet published "The First Four years of King Salmon Maintenance below Shasta Dam, Sacramento River, California" in *California Fish and Game*, the journal of the state Department of Fish and Game. In this article Moffet used more ecological concepts than previous reports. He was also quite optimistic about the effect of the dam on the salmon.

After the completion of the Central Valley Project, the state of California began construction of the State Water Project in 1952. This project brought water from Shasta to the Los Angeles area, thus increasing the demand for water from the north. California continued to build large water projects until 1982 when plans to build a Peripheral Canal around the Delta were defeated at the ballot box. The idea of routing water around the Delta has not gone away, however, and the current governor of the state, Jerry Brown, is promoting a ballot measure in the November 2014 elections which would fund a tunnel pumping water through the Delta. The Central Valley Project forms the backbone of California's water system today, and Shasta Dam remains important for water storage as well as for power generation.

Coleman Hatchery remains in operation. The young fry are now held for months in pools with a current to better simulate their natural environment. However, very little of the hauling,

trapping and natural spawning parts of the Shasta Salvage Plan remain. In 1949, the hatchery was transferred to the Fish and Wildlife Service.³²⁵

Red Bluff Diversion Dam, completed in 1964, had a major negative impact on fish because it blocked their passage upstream.³²⁶ The dam was located on the Sacramento River near the town of Red Bluff, and diverted water from the river for irrigation. After many years the dam's removal is now currently in process.³²⁷ This change is predicted be good for salmon, as it will allow them to more easily reach their remaining habitat; the fish are the main reason the dam is being removed.

It was not until the 1980s that the USFWS and the Bureau of Reclamation recognized that the Shasta Salvage Plan was not working.³²⁸ Before that time, elevated egg takes and high salmon catches convinced many that the effort was succeeding.³²⁹ Under the Endangered Species Act, the Sacramento winter-run salmon population was listed as threatened in 1989 and endangered in 1994.³³⁰ The Central Valley spring run, which includes all naturally spawning populations of salmon in the Sacramento, was listed as endangered in 1999.³³¹

³²⁵ California Department of Fish and Game, "Shasta Salmon Salvage Efforts: Coleman National Fish Hatchery on Battle Creek 1895-1992," Michael Black, *Fish Bulletin 179 - Contributions to the Biology of Central Valley Salmonids*, ed. Randall L. Brown, 2001, accessed 2014 http://www.dfg.ca.gov/fish/REsources/Reports/Bulletin179_V1.asp 211.

³²⁶ Black, *Shasta Salmon Salvage Efforts*, 224-227.

³²⁷ US Bureau of Reclamation "Reclamation Awards Contract to Decommission Red Bluff Diversion Dam on the Sacramento River," News release September 27, 2013. Accessed 2014 <http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=44704>).

³²⁸ Black, *Shasta Salmon Salvage Efforts*, 238-239.

³²⁹ *Ibid.*, 211-212.

³³⁰ Lichatowich, *Salmon Without Rivers*, 202.

³³¹ US Fish and Wildlife Service, "Species Profile for Chinook Salmon," accessed 2014. <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E06D>.

The 1992 Central Valley Improvement Act provided for the protection, restoration and enhancement of fish in the whole Central Valley watershed including the Delta and the Bay. This law brought the focus of restoration efforts back towards natural river spawning and focused on habitat restoration and removing barriers.³³² In a time with much stronger environmental values, the new laws reflected a major change in public opinion.

In the 1990s Shasta Dam was reworked so that water is at the correct temperature for salmon downstream. A secondary structure that allows monitoring the temperature and moving the depth of the intake was put in so that water entering the power plant would be the correct temperature. This was a problem that was known when the dam was built, but it was not addressed until many years later, following a broader change in environmental values in the United States.

In 2006 environmental groups settled a lawsuit against the Bureau of Reclamation; this decision means that more water will be returned to the San Joaquin River, which was often dry due to irrigation demands.³³³ However, since that time progress has been slow. With the current drought in California, this settlement is being challenged. Today, the Central Valley's salmon population remains in poor shape. The population has declined since the Central Valley Project was completed. The current drought could also damage the fish. Low water levels in 2013 mean that recent hatches of smolts may have trouble reaching the sea.

³³² Black, *Shasta Salmon Salvage Efforts*, 249.

³³³ US District Court, eastern district of California, "Memorandum of Understanding between Settling Parties and State," September 2006, accessed 2014 http://restoresjr.net/program_library/02-Program_Docs/MOU_Final_as_Filed_091306.pdf see also <http://www.restoresjr.net/background.html>

Shasta Dam was built during a transition period between the Hetch Hetchy and Echo Park dams (moving towards a more intrinsic idea of nature's values). Needham may have valued salmon intrinsically, but he never explicitly said so. No clear congruence emerged between engineers and biologists on these issues. Both biologists and engineers talked about monetary values of the fish. Only Hedgpeth came out and claimed he valued the fish for their own sake.

The 1930s and 1940s were a time when environmental activism focused more on bureaucratic reform than on creating new laws. We see this in the Central Valley Project where many people worked from within the system to try and help the salmon. The telegram campaign composed primarily of sports fishers focused on changing the choices of regulators, so that they would release enough water for the salmon, rather than creating new regulations.

Willingness to rearrange natural systems was common in both engineers working for human benefits and biologists working for the benefit of fish. The engineers wanted to change the watershed to irrigate more land, control flooding and generate power. However the biologists were also willing to rearrange natural systems to meet their goals. For example, the Stillwater plan required building a canal to supply water to a stream that was dry in the summer, and Coleman Hatchery was ready to accept an extensive rearrangement of the salmon's lifecycle.

What we see here is that there is not a watershed moment, no clear turning point along the way to a new view of the Sacramento River salmon. We can see the beginnings of the environmental movement in Hedgpeth's activism and the telegram campaign to release water

from Shasta for the fish. We also see it in the concern other scientists displayed for the salmon. Needham was not required by his job to create a publicity campaign, and his doing so suggests a deep sense of ethical obligation regarding the fish. Historical movements such as the environmental movement are made in small steps, incremental changes in how people think. The story of the Sacramento River salmon reveals the incremental shifts in an industrialized society's understanding of wildlife, of human uses of the landscape, and in policy. Important themes that emerged from this study of the Shasta Salvage Project include, incrementalism, an understanding of how ecology influenced New Deal era planning, and how people's environmental values affect the outcomes of projects.

Planning happens on many scales. While most planners and planning historians focus on planning cities, large scale infrastructure projects like the Central Valley Project are also part of planning and have significant impact on the landscape. The New Deal, which funded the Central Valley Project, was typical of Federal Planning, which significantly built up dams used for power and irrigation in the western U.S. The Central Valley Project moved California toward a more input intensive agriculture, focusing on irrigated fruit and vegetable crops.

The Central Valley Project is also relevant to planning because it reminds us that plans are not just written documents. The Shasta Salmon Salvage Plan was written using the best biological data available at the time. Yet the plan was not executed as written, and many pieces of it were never put into practice. Once plans are written, other factors such as time, money and values can affect how well they are implemented.

As we look at the Shasta Salmon Salvage Project, we see the beginnings of a transition in people's thinking from conservation to environmentalism. In this thesis I have closely examined people whose viewpoints fit into a continuum between these styles of viewing nature. Page, Bashore, and some reclamation engineers tended towards the conservation viewpoint focused on the needs of humans; when they think salmon should be saved, it is because of their extrinsic values. Hedgpeth was a biologist but also an environmentalist who valued salmon intrinsically. Needham and the other biologists mostly fell between these two ways of seeing. They clearly valued the salmon, but only expressed this value in monetary terms. Nonetheless, I believe they also intrinsically valued the salmon to some extent, but did not feel that they could say so in a professional context. These biologists wanted the fish to have the best chance. Smith talked about how saving them was an "obvious" course of action. Needham helped organize the telegram campaign, which successfully fought for more water. These men constantly put forth more effort than was justified by the monetary value of the fish.

While I believe that history proceeds in a process of incremental changes, no one in this story changed their mind. Instead, we see change happening because younger people have somewhat different values than older people, for example, Hedgpeth's strong activism or Moffet's more ecological viewpoint. Hedgpeth wrote many articles in defense of the salmon, and believed in and clearly stated their intrinsic value. Moffet was less of an activist, but his 1949 report uses ecological language, and seems like a shift in paradigm from earlier reports on the salmon. We also see change as biologists become better at explaining their views to the public. In fact the public having a more direct say, and in some cases overriding the expert opinion, also represents major change. The telegram campaign in December 1943, waged by

sports fishing organizations and others concerned about the salmon, was an early example of environmental activism.

Overall, how people valued salmon significantly impacted the outcome of the Shasta Salmon Salvage Project. The fact that the fish were seen as primarily of commercial importance led to them being overlooked. Much more could have been done for the salmon. Even the salvage plan as written was never fully tried, though it is unclear that it would have worked. Had Reclamation taken a more holistic view of salmon and the dam, the fish might be in much better shape today.

Change does happen, but slowly, with long periods building up to what can seem like watershed moments. Peoples' values and ways of looking at nature can have real consequences for the natural world. In this story economic values and people who saw nature as a means to an end mostly controlled the fate of the salmon. Nonetheless, there are still salmon in the Great Central Valley. Over time, those who value the fish intrinsically have gained more say in what happens to salmon. Though the population has declined, perhaps if such values continue to be articulated we can reverse their decline.

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