Final Report

Fiock Energy Cost and Pipeline

Fiock Dam prior to removal—summer 1993

Submitted By:
Great Northern Corp.
PO Box 20
Weed, Ca 96094
December 12, 2002

Submitted to:
US Fish and Wildlife Service
1829 So. Oregon St.
Yreka, CA 96097

Cooperative Agreement #14-48-11333-9-J029
Project Number 99-HR-06

Abstract:

Summer flashboard dams and their impoundments on the Shasta River are degrading water quality, reducing salmon and steelhead survival, and presenting passage problems for salmon and steelhead. This report describes a 6+ year process of "trials and tribulations" to remove one of those dams while continuing to meet the irrigation needs of the dam owner.

Funds secured from a variety of sources were used to accomplish the eventual removal of the dam and its replacement with a fish screen and pump system. Funds from this grant were used for electrical operating costs during the transition while problems with the new system were resolved.

Description of Study Area:

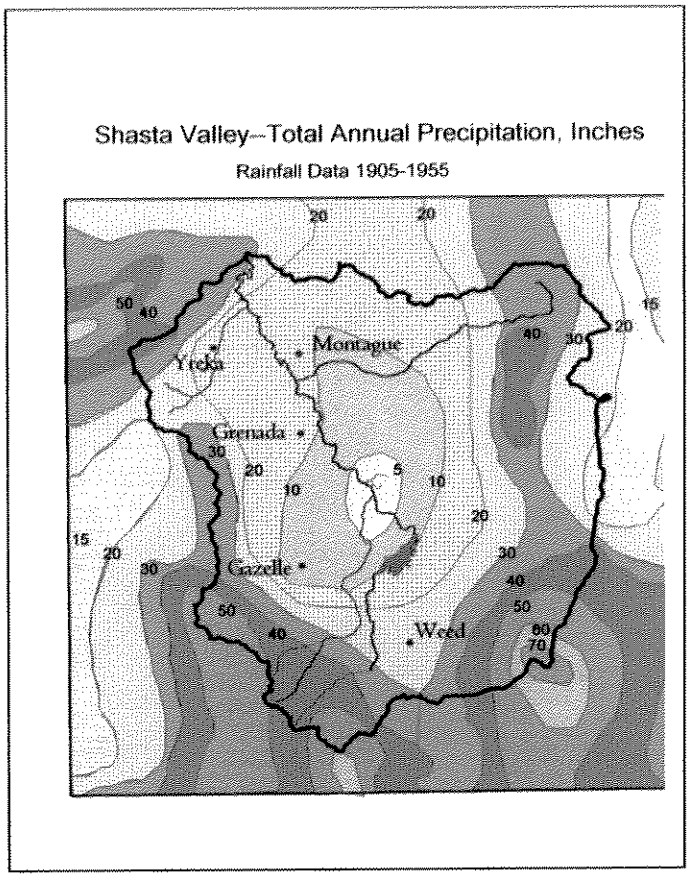
The Shasta River located in Siskiyou County, California flows out of the Eddy mountains and Mount Shasta northward into the Klamath River approximately twenty miles south of the Oregon border. The Shasta Basin area is approximately 800 square miles with a mean annual unimpaired runoff of approximately 162,300 acre-feet. The mainstem Shasta River is approximately 60 miles long, with a permanent winter storage reservoir at river mile 40. That reservoir limits the upstream range of salmon.

Key features of the Shasta River include significant spring flow in the upper reaches, increased water development in the middle reaches, river inflows and outflows of variable quantity and temperature, and various states of riparian vegetation throughout the system.

Elevated water temperature and reduced dissolved oxygen levels have placed Shasta River on the California 303 (d) list of impaired waterbodies.

Anadromous fish using the system include fall chinook salmon (Onchorynchus tshawytscha), coho salmon (Onchorynchus kisutch), and steelhead trout (Onchorynchus mykiss).

The climate of the Shasta Valley is extremely dry, with total precipitation ranging between 5 and 70 inches per year, depending on location. Temperatures on the valley floor range from below zero to over 100 degrees F.



Historically the Shasta River was the most productive salmon-bearing stream in the entire Klamath--Trinity Basin. Counts of Fall Chinook spawner returns begun in 1930 (after runs were described as insignificant in comparisons to their previous numbers) were as high as 81,000. The Shasta produced similar high numbers of steelhead, and unknown numbers of Spring Chinook and Coho. Spring Chinook are no longer found in the system.

Since the 1930's, Fall Chinook salmon numbers have dropped as low as 530 (in 1992), leading to concerns of extinction of the run, and precipitating the formation of the Shasta CRMP. By 1995, numbers had rebounded to as high as 13,000 demonstrating the continued resiliency of the Shasta system.

Factors limiting salmonid production of the Shasta range from poor ocean conditions, to over-harvest to loss of habitat. Within the Shasta Valley, substantial efforts have been underway since 1991 to improve habitat conditions for cold water fish. The removal of summer flashboard dams is one of the goals of the Shasta CRMP, part of an ongoing effort to improve water quality and improve fish passage.

There were six summer-use flashboard dams in the Shasta, ranging from four to six feet tall. All except the Fiock dam are shared by several water users and/or irrigation districts, making their removal particularly difficult. As the oldest dam (built in 1889), the lowest dam in the system (RM 12), the highest dam (6 feet), the site of the worst water quality (DO below 4 mg/l at times in bad years), the Fiock Dam was selected as the highest priority for removal. It was hoped that it would serve as a demonstration project for the future removal of other dams in the system.

Introduction:

The Fiock family has been ranching in the Shasta Valley since the 1850's. Among the many improvements they have built during that time was a flashboard dam in the Shasta River about 4 miles east of Yreka. That dam allowed them to raise the summer level of the river approximately six feet, high enough to cause a portion of the river to flow into a ditch for irrigation use in fields near the river.

That dam has been identified in Calif. Department of Fish and Game reports since at least the 1950's as being a fish passage problem for salmon. More recently it and several similar impoundments were recognized as significant sources of increased temperature and lowered dissolved oxygen, both of which are identified water quality impairments in the Shasta River.

In 1991, farmers and ranchers in the Shasta Valley formed a Coordinated Resources Management and Planning committee (CRMP) focused on finding and implementing measures to increase the productivity of the Shasta River for salmon and steelhead. Among their recommendations was the goal of removing the flashboard dams found in the Shasta in order to partially address the above mentioned problems. The Fiock Dam removal project was their first opportunity to attempt to do that.

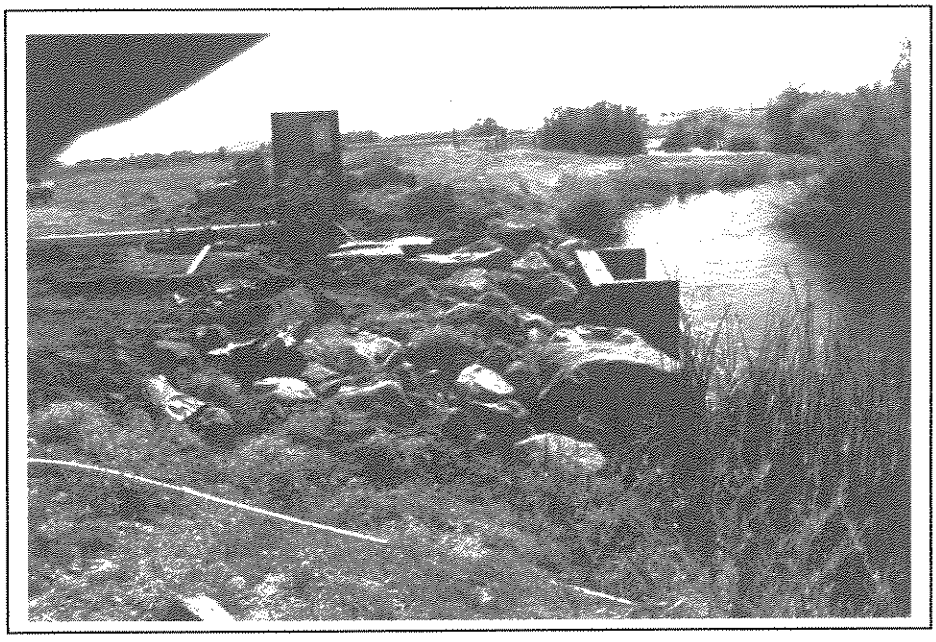
Funds secured from a variety of sources were used to accomplish the eventual removal of the dam and its replacement with a fish screen and pump system. Funds from this grant were used for electrical operating costs during the transition while problems with the new system were resolved.

A complete accounting of the removal project is included as an appendix to this report.

Methods and Materials:

Since this grant covered only the purchase of electrical power for operation of the pump and fish screen, little of interest can be said about methods and materials. See attached comprehensive report for details on the entire project, most portions of which were funded by other grants.

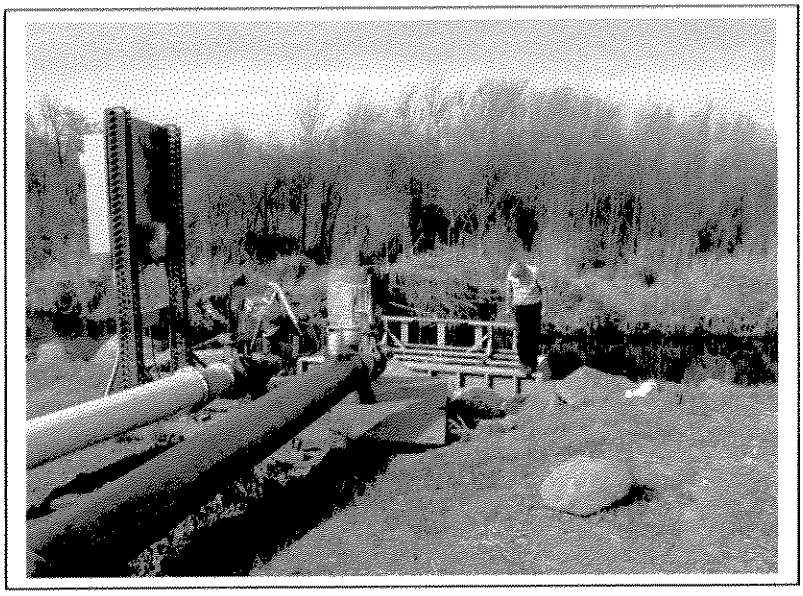
Results and discussion of accomplishments:



Fiock Pump and fish screen housing nearing completion. Old dam site in background.

Dams and impoundments substantially change the nature of any river. Yet at the same time, they have important functions. In the case of the Fiock Dam, it had been a critical element in supplying irrigation water, which in turn allowed the production of hay and late summer pasture. Without that production, much of ranch's feed base would have been lost, and the cattle would have had little to eat between late August and early March. To successfully remove the dam and its impoundment we had to provide an alternate method to meet the Fiock's ongoing need for irrigation water, without substantially increasing their costs of production.

Over the course of nearly seven years, we were first able to supply water on a temporary basis with a stand-alone lift pump and fish screen. This met the Fiock's water needs (more or less), but added $300/month in electrical costs. We met those costs with grant funding from this and other grants, but granting agencies made it clear that was not going to go on forever. Eventually, by re-locating one of the Fiock's existing irrigation pumps to nearer to the river, we were able to eliminate most of the excess costs, making it feasible to transfer the ongoing electrical costs to the Fiocks. Designing and building a fish screen suitable for the site was the other critical step.



Ron Dotson, Calif. DFG inspecting nearly completed screen and pump installation.

Funding provided through this grant paid several years cost of pumping to offset the increase in delivered water cost necessitated by removing the dam and adding several feet of lift. The Fiocks had initially agreed to stop installing their dam as long as we could provide the water to them, the same as the dam had done. With funding for pumping costs in hand, we were able to design, install, test and re-work several approaches to meeting their water needs before we needed to transfer a successfully operating system to the Fiocks.

Funding from this grant was critical in minimizing costs to the Fiocks during the transition while we worked out all the problems associated with changing an irrigation system that had been working well for them for 150 years.

Summary and Conclusions:

Successfully changing any agricultural practice is probably never easy (if it were it would already be done). Never the less, many normal agricultural activities can have unplanned and undesirable side effects, and as increasing emphasis is placed on minimizing environmental costs, ways to change must be found. The key in this case was to make certain that through the entire process the benefits of the irrigation dam—low cost water delivery—continued to be met. Eventual success necessitated that overall costs be lowered to compensate for the additional pumping costs. We were largely able to meet that goal, although in truth the Fiocks are continuing to have reduced production in some of their fields because of the loss of sub-irrigation that was occurring in fields adjacent to the river as a result of the higher water table all summer behind the dam. On the other hand, their water supply is more reliable, particularly during periods of very low flow, they do not have to face the prospect of replacing their dam in a river with state and federally listed species present, and they are no longer a potential target for claims of degraded water quality or impaired fish passage. Unfortunately, most of the benefits cannot be taken to the bank, even though they are real.

Summary of Expenditures

See attached summary sheet

Attachments:

Complete Fiock Dam Removal Report covering all sources of funding utilized in this project.

U.S. Fish & Wildlife - 1829 S. Oregon St., Yreka, CA 96097				3047	
Fiock Energy (99-HR-06)					
REPORT MONTH: Summary of Grant Expenses					
CURRENT DATE:					
	Contract Budget	Monthly Expenses	Cumulative Expenses	Contract Balance	
Personnel Costs	$60.00	$0.00	$60.00	$0.00	
Non-Expendable Equipment	$0.00	$0.00	$0.00	$0.00	
Expendable Equipment	$45.00	$0.00	$45.00	$0.00	
Operating Expense	$7,500.00	$0.00	$7,500.00	$0.00	
General Administration	$380.00	$0.00	$380.00	$0.00	
Annual Totals					
Contract Totals	$7,985.00	$0.00	$7,985.00	$0.00	
	$7,985.00		$7,985.00	$0.00	
Monthly Billing		**$0.00**			
Total Current Balance Due		**$0.00**			
Paul F. Wagner, Ex. Director					
(I certify that above expenses were incurred for program.)					