

Final Report

Small Tributary Restoration: Middle Creek



Swasey Sediment Basin Before 2000 Cleanout

Swasey Sediment Basin Cleanout

Cooperative Agreement #97-NCV-02
Agreement No. 1448-11330-97-J075

Funded by the U. S. Fish & Wildlife Service
Anadromous Fish Restoration Program:
Central Valley Wide Action 11



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Grant Term: 3-15-97 to 12-15-00**

ABSTRACT

Middle Creek is a tributary to the Sacramento River, approximately 5 miles west of Redding, California. Middle Creek supports spawning runs of rainbow trout, steelhead and salmon. Due to accelerated erosion within the watershed, the Coordinated Resource Management Planning (CRMP) group, Western Shasta Resource Conservation District (WSRCD), and the Natural Resources Conservation Service jointly recommend implementation of a project to address the fine sediment input in Middle Creek. The result was the Swasey Sediment Dam Cleanout Project to remove fine sediment that accumulated behind a small concrete dam on Middle Creek. Sediment accumulation had been increasing due to housing and road development projects. The fine sediment would potentially negatively impact steelhead/rainbow trout and salmon habitat in Middle Creek, and ultimately the Upper Sacramento River. A Technical Team was formed to examine the proposed plan and review and approve each sediment removal activity. Fish and Wildlife Service provided a grant for dredging the Swasey Sediment Basin on Middle Creek as frequently as necessary, in order to provide additional storage capacity for future sediment capture.

This program supports the objectives of the Anadromous Fish Restoration Program plan to “improve habitat for all life stages of anadromous fish through improved flows, water quality, and physical structure” and “involve partners in the implementation and evaluation of restoration actions.” WSRCD set up sediment monitoring in the reservoir and obtained the necessary permits. The sediment basin was cleaned out in 1997, 1998, and 2000, with 150, 208 and 240 cubic yards removed consecutively.

Fine sediment continues to accrue at the Swasey Sediment Dam site, so further cleanouts will be necessary into the future.

INTRODUCTION

As part of a plan to increase the natural production of anadromous fish in the Central Valley, the Western Shasta Resource Conservation District works with agencies, landowners and stakeholders to identify problems, develop solutions, and implement actions to address small-scale restoration of Middle Creek, a tributary that enters the Sacramento River about 5 miles west of Redding, California. Middle Creek supports spawning runs of rainbow trout, steelhead and salmon. A reconnaissance survey conducted by the USDA Soil Conservation Service (now NRCS) in November, 1990, estimated over 2,000 cubic yards of sediment present in the north fork, south fork, and main stem of Middle Creek. At that time the sediment was largely confined

to the upper watershed, but without mitigation, the sediment was expected to move downstream during high rainfall events into principal spawning habitat.

The survey showed two major sources of erosion: 1) soil erosion from unsurfaced roads, cut and fill (side-cast) banks, and 2) erosion from housepads at various stages of completion. Poorly compacted side-cast material showed the most severe erosion with high densities of rills and some gullies present. Most of the development occurred, and continues to occur, on steep terrain and on highly erosive decomposed granitic soils.



Middle Creek in the early 90's.

Site in Middle Creek displaying the highly erosive decomposed granitic soil common throughout the watershed.

Federal, state, and local agencies initiated emergency actions to capture and remove sediment from the creek. A private developer and the Shasta County Public Works Department cooperated on the repair of a large sediment catchment basin near Swasey Drive, upstream of prime spawning habitat. California Conservation Corps workers also constructed smaller rock dams to capture additional sediment in the channel. The overall solution required a coordinated effort of source control and sediment capture/removal, from which the Swasey Sediment Dam cleanout program was implemented.

Swasey Sediment Dam was not designed to be a sediment basin. The dam is approximately 4 feet high and is made of rock and mortar. It is a historic wagon trail pathway and due to its historic nature, the dam could not be modified or altered to make it more efficient for trapping sediment. The existence of the basin does allow for the capture of sediment that previously existed in the stream above the catchment basin and the capture of sediment still being produced in the watershed. The efficiency of the basin to trap sediment declines considerably as it fills with sediment.

NRCS and WSRCDC worked with landowners, residents and interested stakeholders to form a Coordinated Resource Management Planning (CRMP) group to address solutions to the sediment impacts on fisheries habitat. The Middle Creek CRMP group identified the local watershed's resource issues and documented their findings in the *Middle Creek Local Implementation Plan* (add year, author).

In 1993 the district signed Agreement No. 93-0643 with the Department of Fish and Game (DFG) for permission to "alter a streambed" for the purpose of removing decomposed granite from Middle Creek at Swasey Dam. In 1994, funding from Section 319(h) of the Clean Water Act was used to implement erosion control projects in the Middle Creek watershed.

The DFG agreement was renewed on October 2, 1997 for the period August 25, 1997 through October 31, 2001. Coordinated Environmental Documentation was done with USFWS and BLM. A Categorical Exclusion was approved on September 22, 1994.

DESCRIPTION OF STUDY AREA

Middle Creek, a tributary to the Sacramento River, is an intermittent stream draining 2,193 acres of mixed conifer forest and brushland. The lower reach of Middle Creek supports spawning runs of rainbow trout, steelhead and salmon from the Sacramento River.

METHODS AND MATERIALS

The initial plan was to conduct sediment removal operations twice yearly, as needed, to maintain adequate sediment storage capacity at the Swasey dam site. Sediment would be excavated with a front end loader and hauled off site with dump trucks. During wet weather excavating, flows in Middle Creek would be diverted through a culvert to be placed approximately 200 feet upstream from the dam to dewater the sediment storage basin. This project became a cooperative effort with the Bureau of Land Management, California Department of Fish & Game and Shasta County Public Works.

A meeting with several resource agencies was held in 1997 to identify the overall sediment monitoring needs and habitat restoration needs for the Middle Creek watershed. The meeting was also held to determine if sediment removal was necessary and warranted. It was decided at that meeting that sediment removal should occur in 1997 but another sieve analysis should be conducted the following year to determine if trapping sediment was getting courser over time. The sediment removal was completed on September 30, 1997, when approximately 208 cubic yards of sediment was removed from the site.



Swasey Sediment Dam prior to cleanout, 1997.



Phil Garbutt, WSRCD, at Swasey Sediment Dam after cleanout of 1997.

NRCS AND WSRCD presented design options for a diversion structure around the dam to enable sediment cleanout throughout the year, to the CRMP group. The CRMP agreed upon a design that would divert stream flow around the basin into a temporary plastic pipe while heavy equipment worked to remove the sediment. An attempt was made to use the stream diversion around the Swasey Dam site, but several complications made it clear the task was not feasible. A side tributary that enters the reservoir below the diversion caused the reservoir to stay wet, which could have caused water quality problems. Therefore, the diversion idea was scrapped and the group concluded only dry weather clean outs would be conducted.

A sieve analysis was conducted in 1997 and again in 1998, which showed that sediment trapped behind Swasey Dam was finer in 1997 (see table on page 5). Because the California Regional Water Quality Control Board (RWQCB) had previously shown concern regarding whether sediment removal was necessary, they were consulted prior to holding another meeting. Upon conducting a site visit, Dennis Heiman (RWQCB) indicated that he agreed that the material was finer than the prior year and concurred that a clean-out was warranted.

In October of 1998, WSRCD implemented a spawning gravel injection project approximately one mile upstream from the mouth of Middle Creek and the Sacramento River. This project was

funded by the Cantara Trustee Council, and NORCAL Guides and Sportman's Association. NORCAL Guides is funding another spawning gravel injection project for the summer of 2000 that the WSRCD will again implement.

The Swasey Dam Technical Team includes:

Dennis Heiman	RWQCB
Jane Vorpapel	DFG
Phil Warner	DFG
Francis Berg	BLM
Bob Bailey	NRCS
Tricia Parker	USFWS
Jeff Souza	WSRCD

By monitoring the site, the Technical Team concluded no sediment needed to be removed in the summer of 1999, since the reservoir wasn't full. When it was approximately 80% full the team met on July 12, 2000 and agreed a cleanout was needed that season. WSRCD completed the task on August 25, 2000, removing approximately 240 cubic yards.



Heavy equipment working to remove sediment from the Swasey Sediment Dam, August 24, 2000.

The average particle size distribution of sediment as determined by sieve analysis show:

Size	1997	1998	1999	2000
<0.25"	71.6%	84.5%	69.5%	80.7%
0.25"- 0.5"	5.2%	4.25%	12.0%	6.8%
0.5"-1.0"	5.2%	5.5%	8.05	4.6%
>1.00"	18%	5.75%	10.5%	7.9%

Cubic Yards removed 150 208 -0- 240

SUMMARY AND CONCLUSIONS

The removal of sediment from Swasey sediment basin has been instrumental in keeping decomposed granitic sediment from settling in spawning beds and area fish habitat. Recent sediment samples indicate that the percentage of fines less than 0.25” remains high in the sediment fraction, which is detrimental to salmonid embryo incubation (Bjornn & Reiser, 1979).

The reduction in total volume of sediment removed at Swasey can be attributed to better erosion control practices in the watershed. Although the original plan was to remove sediment twice yearly, no cleanout was needed during 1999. The original plan also included the diversion of Middle Creek through a culvert so cleanout could be done in wet weather, but this proved impractical, so cleanouts have continued only during the dry season. Sieve analysis shows the sediment is getting finer over time, therefore additional funding to continue the periodic cleanout of the basin is important for the continued protection of spawning beds and fish habitat in Middle Creek.

SUMMARY OF EXPENDITURES

The budget for this project from 3-15-97 to 12-15-00 was \$20,000. Expenditures are as follows:

Payroll	6,964.45
Supplies	2,832.66
Professional Services	5,840.85
Rent & Leased Equipment	3,140.00
Transportation	318.32
Total	19,096.28

APPENDICES

1. Information on the construction of a temporary diversion structure above Swasey dam to facilitate wet weather cleanout.
2. Letter from Dennis Heiman on Sediment Monitoring, 1-5-96
3. Notes from Technical Team Meeting on 8-20-97
4. Sieve Analysis 9-11-97.
5. Letter from Dennis Heiman on Sediment Sampling, 1-13-98
6. Technical Team Meeting Notice for 2-6-98.
7. Sediment Sample 7-27-99
8. Letter to Technical Team on 5-30-2000.
9. Sediment Sample 7-26-00
10. Letter to Technical Team with results of 1999 Sieve Analysis
11. Habitat Requirements of Anadromous Salmonids, D.W. Reiser, T.C. Bjornn, 1979.
12. Map of Upper Sacramento River Restoration Sites Worked in 1990 and 1991

LITERATURE CITATIONS

1. Middle Creek Local Implementation Plan, April 1995, Natural Resources Conservation Service.
2. Middle Creek Watershed Best Management Practices Intermediate Conclusions, June 1994, Western Shasta Resource Conservation District
3. 1997 Revised Draft Anadromous Fish Restoration Program Plan (Adopted as Final January 9, 2001) U. S. Fish and Wildlife Service.
4. 1993 Erosion and Sediment Control Study: Middle Creek Watershed, USDA, Soil Conservation Service.