

Little Shasta River Fish Passage Project Final Report

Cooperator: Resource Management
Cooperative Agreement #: 11333-1-J001
Vendor Agreement #: 2001-FishPass-01
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Abstract

The Little Shasta River is a tributary to the Shasta River and is a major producer of anadromous salmonids in the Klamath system.

Key features of the Little Shasta River include: stable, complex salmonid habitat in the upper reaches due to significant spring flow and abundant riparian vegetation contrasted by ephemeral habitat in the lower reaches. These features are created by decreased gradient, increased water development, sparse riparian canopy, and return flows of dubious quality. Agriculture and forestry are currently the dominant land uses within the Little Shasta River watershed. There are historical reports of abundant chinook salmon (Onchorynchus tshawytscha) and steelhead trout (Onchorynchus mykiss) runs in the river.

Currently, this section of the river supports steelhead trout, and chinook salmon have been documented spawning in this section of the river for the first time in many years.

Flow declines in summer and water diversions combine to absorb the entirety of the surface flow in the lower sections of this stream by mid-summer in most years. This represents a barrier for migration to the ocean and necessitates fish to seek cool water areas upstream or emigration to the ocean.

The diversion dam this project remedied currently diverts water from the Little Shasta River in the winter to a storage reservoir for use during the summer for irrigation. This was accomplished with the use of a permanent but porous pile of rocks in the stream channel to generate the head needed to divert water. This original structure provided no defined fish passage provisions or fish exclusion screens. The original structure impeded both the passage of adult spawners attempting to migrate upstream in the fall and juvenile fish seeking refugia or migrating downstream to the sea as water temperature rises during the summer. The original diversion has been in use since 1946, and is downstream of existing fish screens. Thus, increasing the importance for the upgrade of this particular diversion.

Introduction

The goal of this project was to improve the passage of all age class salmonids in the Little Shasta River and reduce the mortality of juvenile salmonids by improving and screening the diversion. The improvements included the removal of the rock dam and replacement with a concrete structure to allow fish passage. Additionally, a fish screen was installed in the adjoining irrigation ditch.



Old diversion before project. (upstream)

Study Area

The Little Shasta River is located in Siskiyou County, California and can be located on the following USGS quadrangles: Little Shasta, Solomon's Temple, Montague. It is one of the primary tributaries of the Shasta River. The Little Shasta River flows westward from the Cascade Range through a steep canyon section into a relatively low gradient plain prior to its confluence with the Shasta River. The project site is located on the Blair Smith Ranch Township 45N, Range 5W, Section 32.



Down valley from diversion

Methods and Materials

The existing rock irrigation dam that was an obstacle to fish passage for both juvenile salmonid out-migrants and adult spawners was removed and the rocks were used to protect and stabilize the adjacent stream banks.



Old diversion before project (upstream)

A dam was constructed that would supply the irrigation needs of the diverter and provide a defined fish passage facility and fish screen for the irrigation diversion.



New diversion (downstream)



Fish ladder new installation

The structure consists of a concrete base level with the stream bottom upon which steel "A" frames are attached. Boards are placed upon the steel frames to impound water and supply hydrostatic head to divert water down the ditch. The boards can be removed and the frames folded flat when the dam is not in use. The sides of the structure end in wing walls that isolate the structure from the bank and from the fish screen bay. The fish screen bay is designed so that water continuing down stream moves past the fish screen providing shear flow to carry debris away and keep the screen from plugging; this water continues on through a series of step pools providing fish passage.

Results and Discussion

The fish passage facility was installed and is designed to function properly through a full range of hydraulic conditions expected at this site during fish migration periods and accounts for debris and sedimentation occurrences.



New diversion (upstream)



New diversion (entire sight)

The fish screen adheres to California Dept. of Fish and Game and National Marine Fisheries Service criteria for a passively cleaned fish screen. The hole size is the specified 3/32 inch with a 47% open area, the approach velocity of water on the screen surface is substantially less than the 0.0833 ft./sec. Allowed (the approach velocity is calculated by the screen size relative to the amount of water diverted, this screen's surface area is 104 ft. and the maximum amount diverted is 6 cfs, thus the approach velocity =0.0577 ft/sec.)

Summary and Conclusions

The original rock dam was removed from the Little Shasta River and replaced with a concrete structure which allows fish passage. A fish screen was installed in the adjoining irrigation ditch. The fish screen excludes from the diversion ditch juvenile fish attempting to emigrate to the sea.

Before and after photos were taken of the project. Late fall 2002 through early spring 2003 monitoring has demonstrated the facility is functioning as planned. Based on monitoring to date, it appears that the primary goals of the project have been accomplished. The landowner is able to maintain the water diversion, the structure allows for fish passage and the adjoining ditch has a fish screen excluding juvenile fish. Juvenile fish have not been observed in the ditch since the screen has been installed.

Attachment 1a

**GRANT AGREEMENT
11333-1-J001
Project (2001-FishPass-01
SUMMARY OF EXPENDITURES
LITTLE SHASTA RIVER FISH PASSAGE AND SCREENING PROJECT**

a. Materials and Supplies	\$14,000.00
b. Administrative Overhead	<u>1,500.00</u>
TOTAL PROJECT COST TO USFWS	\$15,500.00
<u>In-kind contribution:</u>	
California Department of Fish and Game	\$4,000.00
TOTAL PROJECT COST WITH IN-KIND	\$19,500.00