

Final

LOCALLY BUILT FISH SCREENS

FUNDED BY

USFWS - JOBS IN THE WOODS PROGRAM

#14-48-0001-95625-JITW

95-JITW-C1

Sponsored by:

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INTRODUCTION:

The Siskiyou Resource Conservation District (RCD) is a special district directed by a board of property owners who have chosen to be proactive in addressing water quality and fishery issues within the Scott River watershed. The RCD focus is mainly on agricultural issues within the Scott River watershed. The Scott River is fed by high mountain (elevation exceeding 8,000 feet) runoff which encompass Scott Valley, a fertile valley dominated by agricultural use. The floor of Scott Valley and lower areas are partially irrigated via diversion ditches fed by the Scott River and its tributaries. The concern with diversion ditches is their capability to divert fish as well as water. The recent decline of fisheries has highlighted the concern related to fish loss through flood irrigation.

Juvenile salmon, steelhead and native trout hatch then migrate out of the upper portion of the watershed during the following spring and summer. During their down migration to the ocean or larger bodies of water, a juvenile can migrate down a diversion ditch where they are lost during irrigation. The RCD and the Scott River Coordinated Resource Management Planning committee (CRMP), a diverse 18 member consensus group also addressing water quality and fishery issues within the watershed, feel fish loss related to unprotected diversions is their top priority. Fish screens are a structure which allows water to be diverted from the stream yet prevents fish from entering the diversion ditch.

Although the concept of a fish screen is simple, the application is not. The Scott River is a system that produces high flood events which carries debris capable of destroying fish screens. Dozens of poorly designed and placed fish screens were destroyed by flood events in the 1930's and 1940's. The CDFG has learned that any type of permanent structure within the active channel requires extensive planning and design work. Therefore, the fabrication and installation of a fish screen can be very expensive due to the strength and durability required from the materials. The cost/benefit of a fish screen is well worth the fabrication cost when one views the saved net economic value which is discussed later.

BACKGROUND

While many of the ditches in Scott Valley were developed over one hundred years ago for mining and later used for irrigation purposes, screening to protect fish life didn't begin until the 1930's. An editorial from the March 9th, 1938 publication of Etna's newspaper, The Western Sentinel, stated: "The Scott River, widely famed as one of the finest fishing streams in the state, should become even more famed for its fishing when the fish screen program now underway is completed."

The U.S. Forest Service and the State Department of Natural Resources worked together to construct fish screens, with labor from the California Conservation Corps

during the Great Depression. Unfortunately, many of these original screens did not work well, were not maintained, and were washed out during the 1955 and 1964 floods. Improved screens are now available and are on some of the same diversions as the original screens and work much better.

A recent inventory of diversion ditches potentially affecting salmon and steelhead in the Scott River revealed that only 35 of about 155 diversion ditches are screened at present. Due to budgetary, staffing, and other restrictions, the California Department of Fish and Game (CDFG) Screen Fabrication and Maintenance Headquarters was only able to build two only screens per year until 1996, when screen fabrication abilities ceased. The proposed listing of steelhead under the Endangered Species Act (ESA) for the Klamath Province will increase the likelihood that juvenile steelhead and salmon lost into unscreened diversions could be considered a "taking " under the ESA and landowners are very concerned.

In order to protect the local economy as well as juvenile fish, the Scott River CRMP and the Siskiyou RCD developed the Scott River Watershed Fish Screening Program in April of 1995. The goal statement of the program is to "Pursue an accelerated Fish Screening Program which will adequately screen all diversion and pumps needing screening in the Scott River watershed." The screening program currently consists of two separate programs implemented by the RCD. The first program is co-sponsored by the Etna Union High School and the RCD. The Student Built Fish Screen Program provides students with the opportunity to design and build small "tube screens" for small diversion ditches (less than 2 cubic feet per second) while learning about watershed health and the importance of fisheries while in the field. The Locally Built Fish Screen Program focuses on using local contractors and fabricators to construct fish screens with assistance and construction specifications provided by the CDFG and Natural Resource Conservation Service (NRCS). The Locally Built Program is funded by fishery restoration grants, a contribution by the Dean Witter Foundation and in-kind contributions from diversion users.

SCREEN LOCATION

The first locally built fish screen was constructed by the RCD using local fabricators. Funding for the first screen came from the U.S. Fish and Wildlife Service (USFS) using funding from the Jobs in the Woods program, a contribution from the Dean Witter Foundation and landowner in-kind contributions. The Locally Built Program is looked upon favorably by the community and the diversion users. Currently 23 diversion users are on the waiting list for the installation of fish screens. The Locally Built Program is the only program which is actively installing screens in the larger diversion ditches within the Scott River watershed. Obtaining funding is difficult due to the lack of understanding related to the importance of installing fish screens. Therefore, the RCD and CRMP are working hard to further reduce costs while constructing quality screens.

The location of the first screen was chosen because it was the second to the last unscreened diversion on the main stem of the Scott River. The objective of the screening program is to begin screening diversions lowest in the system first and working up to unscreened diversions high in the watershed. The two unscreened diversions on the main stem are the lowest unscreened diversions in the watershed. This reach of the Scott is used for spawning and rearing by chinook salmon, coho salmon, steelhead and native trout. The screen was built on Rick Barnes' property, a proactive rancher who has been trying to get fish screens installed on diversions he uses for years. The Barnes' property is located in the upper portion of Scott Valley in a key rearing and spawning section of the Scott.

SCREEN CONSTRUCTION

The volume of water used by this diversion can be as high as 10 cfs and as low as 1.5 cfs. At this time, only the Vertical Plate Fish Screen design can properly operate at such a fluctuation in water usage (A diagram and photo are attached). The vertical plate screen was designed by the CDFG. It is a self cleaning device which uses a water driven paddle wheel to clean debris off the screen. The screen is a stainless steel perforated plate with holes not to exceed 5/32 of one inch. The screen and moving parts are protected by a solid concrete and re-bar framework which surrounds the device.

The RCD developed a bid package containing construction specifications and additional requirements. The packages were sent to eight parties interested in fabricating the screen. Based on ability and cost, Mark Johnson was chosen as the successful bidder and operated as a RCD subcontractor under the supervision of the CDFG and RCD project coordinator.

Rick Barnes and the other diversion user, the Tobias Ranch, donated their equipment to dig the foundation pad and place the culvert by-pass (fish-return to the river) for the screen. Screen material purchasing and fabrication were the responsibility of the sub-contractor while the permitting, quality control and construction decisions were the responsibility of the RCD project coordinator. Without getting technical, the construction of the first screen went extremely well. Ideas for improvements and cost reduction were gained for construction of later screens. The basis for construction cooperation and design was established which was the largest time consumer of time for the RCD and CDFG.

Actual construction of the screen was bid at \$10,400 or \$1,040 per cfs. Construction of vertical plate screens by the CDFG averages approximately \$1,600 per cfs. After coordination, administration, permitting, and replacement purchases of moving parts the RCDs total cost is \$1,400 per cfs compared to \$2,250 per cfs when constructed by the CDFG. The RCD feels vertical plate screen construction can be reduced to \$1,200 per cfs due to established coordination between parties and improved design. Two vertical plate screens are to be constructed this year by the RCD as well as three student

built screens. The RCD and CRMP are pleased the Screening Program has accelerated screen installation. In order to protect diversion users and fisheries, the program needs to increase several fold. Due to the high costs of material and design, screen construction cannot be fully paid for by most landowners as livestock prices remain just a few cents above cost. The RCD is actively pursuing funding sources in order to install more screens which protect fish and the local economy.

FISH SCREEN BENEFIT-COST ANALYSIS

In an effort to prove the cost effectiveness of the Screen Headquarters in Yreka, California, the CDFG hired a consultant to observe and develop a benefit-cost analysis for the fish screening and trapping program. Under the CDFG costs of construction and annual CDFG screen maintenance (cleaning), the conservative benefit-cost ratio was 3.02-1.0. The study assumed the net economic gain of an adult steelhead caught in the Klamath Basin via sport fishing is \$202.00 and \$93.00 for half-pound size steelhead. This was based on the worth of the 1988 dollar.

Using the same assumptions as the CDFG study and the differences between screening programs, we developed our own benefit-cost analysis for the screen installed on Rick Barnes' property:

- Total cost of screen construction and program development \$14,000.00
- Annual cost of maintenance is in-kind contribution by landowner \$ 0.00
- Total cost of Barnes' screen. \$14,000.00

-Average number of fish trapped in existing screen (Farmers Ditch) above Barnes' diversion from 1985 through 1996 is 3,798 juveniles. Trapping/transplanting is used when flow volumes get low and are a danger to fish. Trapping/transplanting occurs from July 1, to the end of August. An estimated 75% of juveniles have migrated down stream before trapping begins. Therefore, an assumed 15,192 fish pass through the Farmers Ditch fish screen in a season. Barnes diversion is four miles lower in the system and amid prime spawning habitat. In addition, a substantial creek enters the system between the Farmers Ditch and Barnes' Ditch. It is conservative to assume **17,000** juvenile fish pass through Barnes' diversion using the number of fish trapped from 1985 -1996.

Assumptions taken from CDFG Analysis:

Twenty year project life of screen

Annual net economic gain does not actually activate until four years after screen installation. Reason: It takes four years for a saved juvenile steelhead to be considered an adult. All adult steelhead are at least four years old.

100% of juveniles counted are steelhead. In actuality, CDFG estimates 5% of fish at Farmers ditch are salmon. More salmon juveniles are estimated to pass through screen at Barnes' diversion. Net economic gain of salmon sport fishing is comparable to an adult steelhead.

Assumed survival rate of a steelhead from a juvenile (sub-yearling) to adult is .4%.
Assumed survival rate of a juvenile to a half-pound steelhead is 1.0%

Meyer Resources' net economic value for an adult steelhead and a half-pound steelhead caught sport fishing is \$232.00 and \$111.00 respectively. Values relate to the 1996 dollar value.

Assumed catch rate within the Klamath Basin of both steelhead adults and half-pound sized steelhead is 33%.

Using the above figures:

- Number of juvenile steelhead to pass through Barnes' Screen in a season: 17,000
- Survival rate of steelhead from juvenile to adult (.4%)/ half-pounder (1%) X .4/1.
- SUBTOTAL 170 half-pounders saved/
68 adults saved

- Catch rates: **33% success**

Adult steelhead
68 adults saved
X .33 catch rate
22 adults caught

Half-pound size steelhead
170 half-pounders saved
X .33 catch rate
56 half-pounders caught

- Annual net economic gain

Adult steelhead
\$232 net economic gain per adult caught
X 22 adults caught
\$5,104.00

Half-pound size steelhead
\$111 net economic gain
X 56 half-pounders caught
\$6,216.00

-SUBTOTAL \$11,320.00

-Expected project life X 20 year project life

-SUBTOTAL \$226,400.00

-Assumed project benefit-cost ratio: \$226,400 - \$14,000 (screen cost) or 16.17 - 1.0

Summary

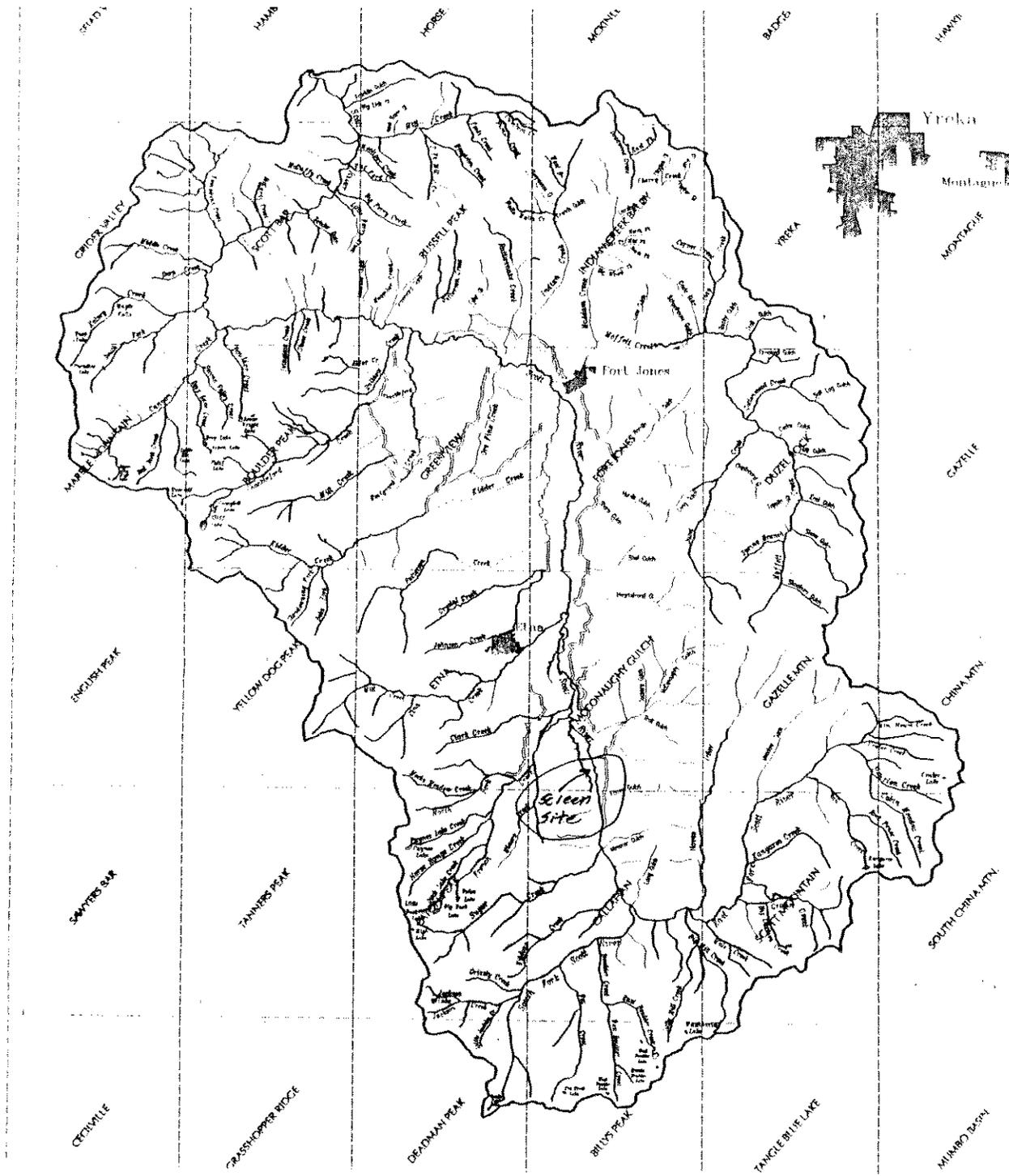
The Local Built Fish Screen Program is one the RCD and CRMP hope to expand. There is no doubt the screening program can dramatically increase the number of juveniles which migrate out of the Scott River. The secondary benefit of the screens is to protect the diversion user from a "taking" an Endangered Species Act should the steelhead or coho become listed. Diversion users are willing to take care of the general maintenance of the screens which eliminates an annual maintenance fee. Continued construction of screens will enable the RCD and sub-contractors to reduce fabrication costs. The limiting factor of a continued and expanded screening program is funding. The RCD will actively pursue all facets of funding in order to further protect fisheries and the community we live in.

LOCALLY BUILT SCREEN BUDGET

USFWS #14-48-0001-95625

<u>BUDGET SECTOR:</u>	<u>DEAN WITTER</u>	<u>USFWS/JITW</u>
ADMINISTRATION:	\$ 434.24	\$ 809.39
COORDINATION:	\$ -----	\$1,351.21
EQUIPMENT:	\$ 860.76	\$4,299.92
OPERATIONS:	\$3,505.00	\$2,442.90
TOTAL:	\$4,800.00	\$8,903.42

SCOTT RIVER HYDROLOGIC SUB-BASIN



Please indicate the location of the proposed project. Identify the project location by placing a colored point on the base map provided. For projects that are linear in nature, please highlight the stream reach of the proposed project.

USEPA Project Number: 14-45-0001-95625 J1TW

CEFCO Project Number: _____

Project Proposer: Siskiyou RCD

Project Title: Locally Built Fish Screen

Fiscal Year: 1996

Stream Name: Scott River

Tributary To: Klamath River

USGS Quad Name (1:24,000): McManis Gulch

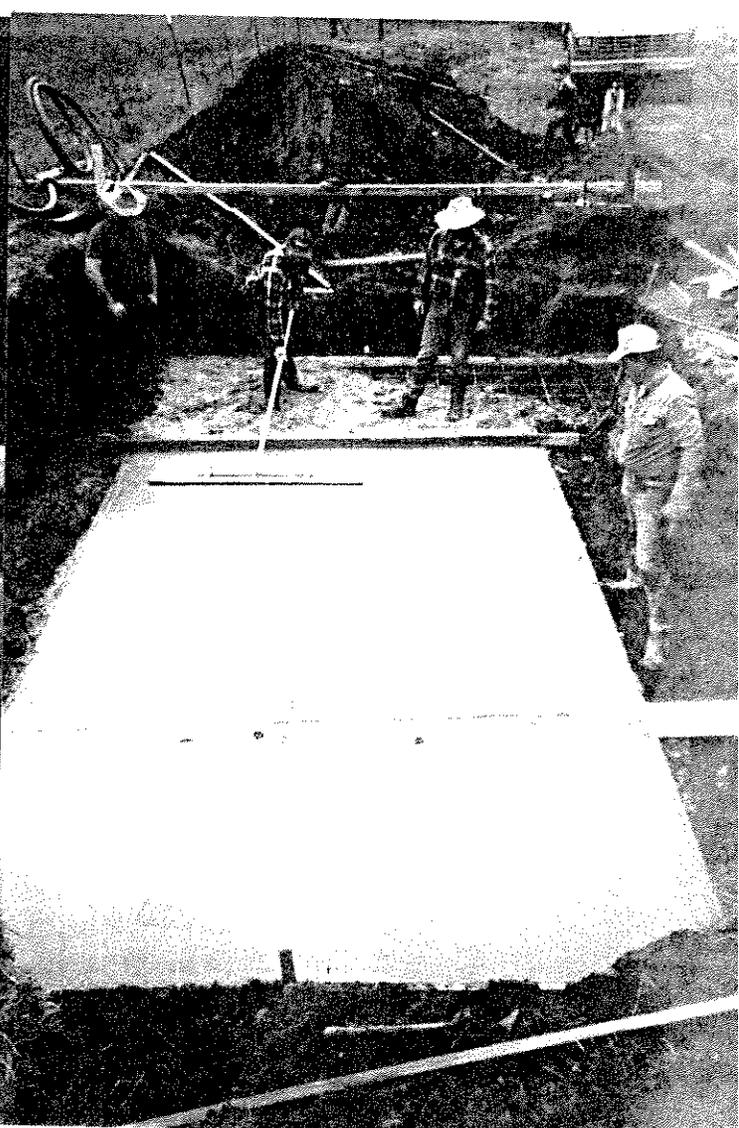
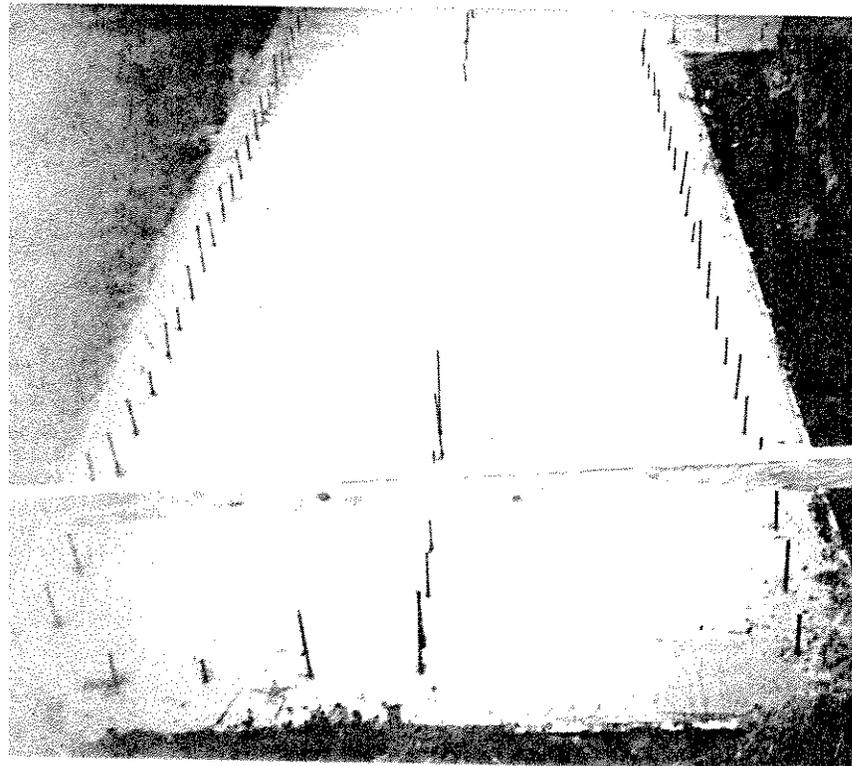
Township/Range: T41N R9W

Section Number: 24

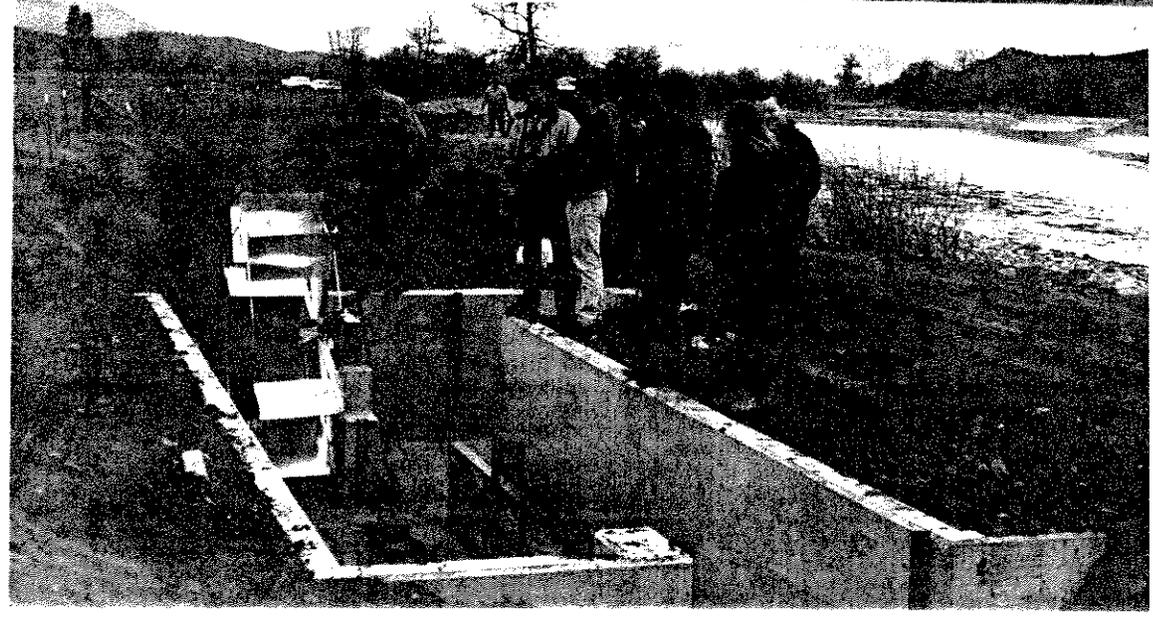
- Perennial Stream
- Intermittent Stream
- Ditch or Canal
- 1:24,000 USGS Quad



Locally Built Fish Screen, 1996

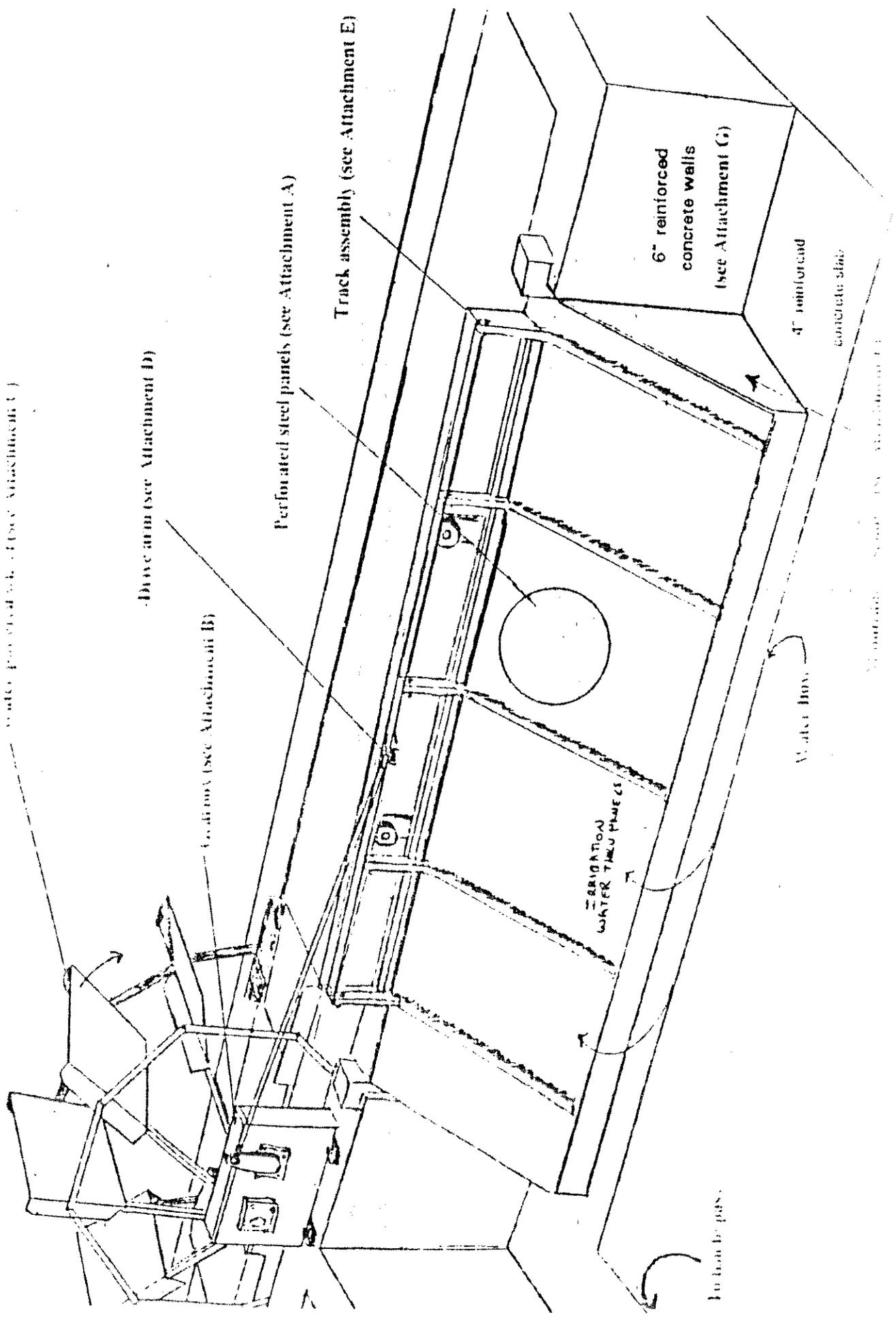


Fish Screen Under Construction



Fish Screen now complete. Being shown to Wildlife Conservation Board employees & local members of Scott River CRMP.

Vertical diagonal Sloping Plate Fish Screen



Attachment A - See Attachment F