

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA

PROJECT NUMBER: F-46-R-3
JOB NUMBER: VI-E

PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATION
STATE TITLE: STATEWIDE SURVEYS AND INVENTORIES
JOB TITLE: ALTERNATIVE IRRIGATION STRUCTURES
PERIOD COVERED: JULY 1, 1989 to JUNE 30, 1990

ABSTRACT

Grant funding was provided to six conservation districts to purchase alternative irrigation diversion structures for demonstration purposes. These structures were developed by Region Two fishery personnel. Funding was also provided to Region Four fishery personnel to purchase these diversions for demonstration and particular problem areas. Agreements were also made with the Bitterroot Chapter of Trout Unlimited and the Park County Conservation District to assist with funding for other types of alternative irrigation diversions.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To engineer and design irrigation diversion structures that will have minimal physical effects on stream channels and fish habitat. Designs and funding were approved for nine projects.
2. To evaluate cost, maintenance and effects on stream channel stability of diversion projects for demonstration purposes. Structures were constructed, purchased and installed, but information required by this objective is not yet available.

PROCEDURES

Landowners with water rights or water use permits may divert water from rivers and streams for beneficial purposes. A common practice throughout Montana is to construct diversion dams by bulldozing up streambed material. This practice disrupts the armoring in the streambed and often causes stream channel instability resulting in erosion and sedimentation, thus adversely affecting fish habitat.

The Natural Streambed and Land Preservation Act (SB 310) administered by County Conservation Districts states that a permit is required on all activities undertaken by private individuals that affect the streambed and banks of perennial streams. Irrigation diversion structures that alter the streambed are no exceptions. However, many streambed material diversions are permitted because of a lack of less damaging alternatives.

Over the past few years, Region 2 fisheries personnel experimentally developed a portable irrigation diversion structure that appeared to be a satisfactory alternative to diking up streambed materials. The structure consists of a 4 x 8 foot, 1/4 inch steel plate with a 10 or 12 inch wide flange on the front that serves to anchor and prevent underscoring of the plate when in the stream (Figure 1). The plates are placed side by side in the stream and topped with jacklegs to hold boards in place. Boards can be easily placed or removed from the structure to control water levels. A tractor with a front end loader is used to place and remove the plates from the stream.

Conservation districts were contacted throughout the state to sponsor these alternative irrigation diversions for demonstration purposes. A Memorandum of Understanding was signed by the conservation district board chairman and the Department Director outlining terms of agreement for the financing of the structures.

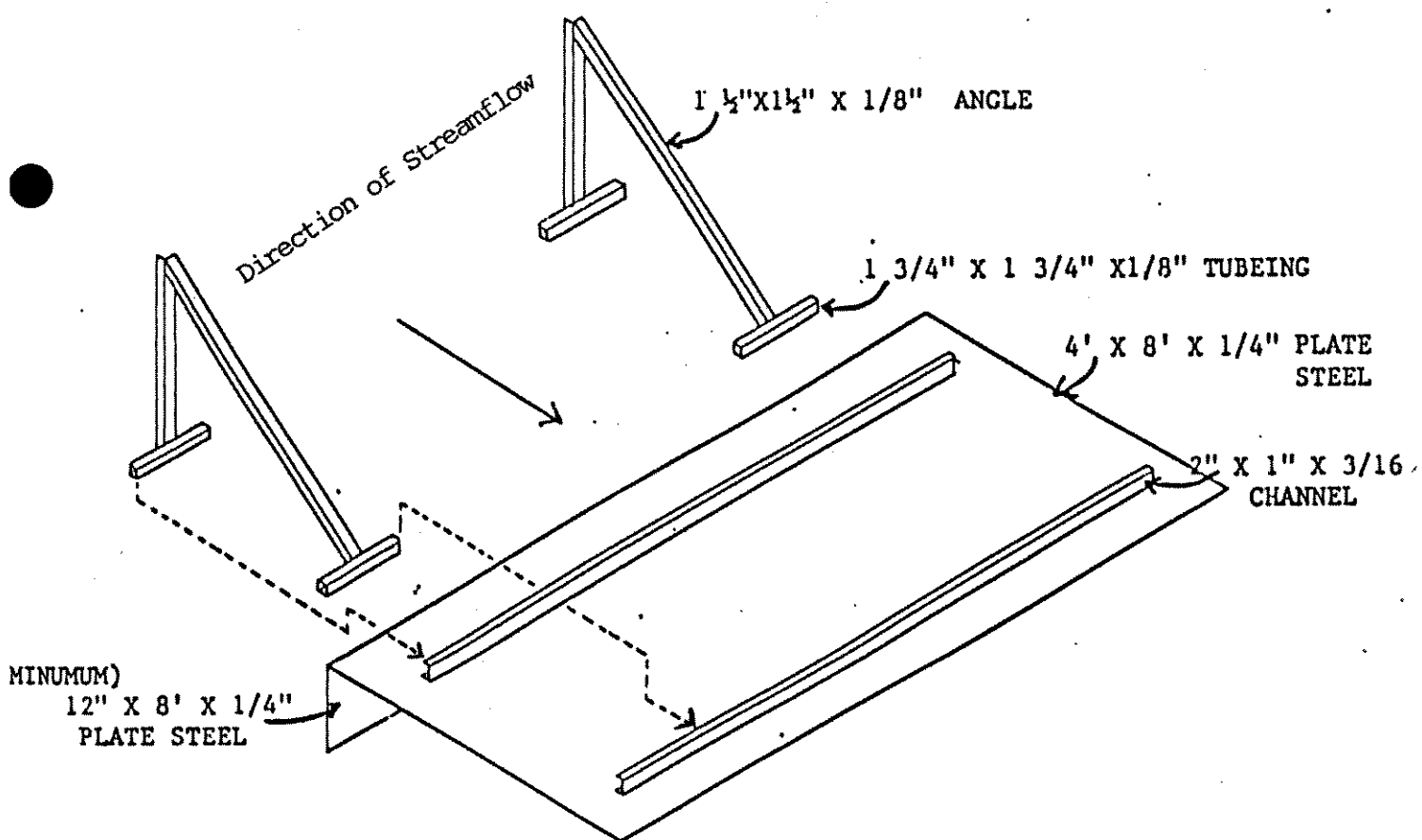
Two other agreements were consummated with a Trout Unlimited Chapter and a conservation district on other diversion ideas. One involved an infiltration pipeline gallery and the other a series of deflector vanes. The deflector vanes are designed to prevent sediment deposition at the throat of a side channel that serves as the diversion for a large canal. Both these projects will be constructed in the fall of 1990.

RESULTS AND DISCUSSION

Memoranda of Understanding were signed with six conservation districts to demonstrate the portable irrigation diversion structures. The structures were constructed by local businesses contracted by the conservation districts. The districts loaned the structures to landowners to operate at their diversions. The following table lists those districts and funding allowed:

<u>Conservation District</u>	<u>Invoice Date</u>	<u>Funding Spent</u>
Beaverhead	4-19-90	\$ 1,855
Carbon County	5-03-90	2,362
Lewis & Clark	6-27-90	2,500
Ruby Valley	10-10-89	1,836
Stillwater	3-22-90	1,793
Sweetgrass	5-15-90	<u>1,721</u>
TOTAL		\$12,167

FIGURE 1. ALTERNATIVE DIVERSION STRUCTURE



At the end of the 1990 irrigation season, the structures should be removed from the stream and stored for the winter. Each district will be asked for an evaluation as to the performance of the structures, problems, maintenance, etc. The districts will maintain possession of the structures and loan them to different operators each year. It is hopeful that successful operation at diversion sites will motivate irrigators to purchase or construct their own diversion plates. Individual homemade plates can be constructed for about \$200 apiece, while contracted prices will range from \$250 to \$300.

Region 4 fishery personnel requested funding to purchase several diversion plates. Three of the plates were given to a rancher that diverted from a very important spawning tributary to the Missouri River. On low water years, a gravel dam was constructed across the stream channel and the complete flow of the stream was diverted. Successful operation of the plates at this site will provide an excellent demonstration area for other operators to view.

Funding was provided to the Bitterroot Chapter of Trout Unlimited to install a pipeline infiltration gallery in the West Fork of the Bitterroot River. Considerable disturbance to the streambed is anticipated during installation of the gallery, however, the advantages of this diversion is that it will eliminate a visible structure in the stream and require little maintenance if successful. The Chapter is providing about half the funding for this project. It will be installed in the fall of 1990.

The Park Branch Irrigation Group on the Yellowstone River, south of Livingston has had a chronic problem with water diversion for several years. The Park Branch canal diverts from a side channel of the river. Each high flow period causes gravel deposition at the entrance to the side channel and maintenance has involved bulldozing the gravel out of the channel. An engineering firm designed a system consisting of deflector vanes which will be placed in the main river channel near the throat of the side channel. Apparently this design has worked on slower silty streams elsewhere in the country but have not been tested on higher gradient gravelly streams. The vanes will act as a shield to prevent sediments from depositing in the side channel.

It is estimated that the total cost of engineering and construction of the vanes will be \$60,000. Several sources of funding will be used to complete the project. The Department granted \$5,000 through a cooperative agreement with the Park County Conservation District to help fund the project. Construction is scheduled for the fall of 1990.

Since the diversions funded under this project are just being evaluated or have not been constructed, information is not available on their performance. This will be done in next year's report.

RECOMMENDATIONS

It is recommended this project continue another year. Some funding should be used for more demonstration projects, including existing designs and new innovative ideas. Funding should also be used to employ a consultant to research and prepare a report on diversion methods that currently are environmentally acceptable and cost effective.

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