BUREAU OF RECLAMATION
Technical Service Center
Denver, Colorado

TRAVEL REPORT

Code: 86-68560 **Date:** June 16, 2006

To: Manager, Water Resources Research Laboratory

From: Tony L. Wahl

Subject: Travel to Idaho Falls, Idaho and vicinity

1. Travel period: June 6-7, 2006

2. Places or offices visited: Fish screening and passage projects in the Bear River and Snake River basins

3. Purpose of trip: To provide technical assistance on fish screening and passage issues to Jim Capurso, Fisheries Biologist, Caribou-Targhee National Forest.

4. Synopsis of trip: I traveled to Idaho Falls on the afternoon of Tuesday June 6. Jim Capurso picked me up at my hotel at 7 a.m. Wednesday morning. We spent the day visiting numerous fish screening and fish passage projects in southeastern Idaho. These included recently constructed fish screens and fish passes and several potential new projects for which Jim is seeking USBR assistance with design and/or construction activities. Details on the structures we visited are provided below. We returned to Idaho Falls in the evening and I flew back to Denver Wednesday night.

The thrust of the work on small diversions in the Snake and Bear River systems is to improve the reproduction of large-river fish by reconnecting fish access to headwater spawning areas on Forest Service lands. The species of primary interest are the native Yellowstone cutthroat trout (Snake River) and Bonneville cutthroat trout (Bear River). In many cases, small tributaries to the Snake and Bear Rivers cross short tracts of private land where water diversions and highway culverts present upstream passage barriers and the danger of fish diversion into irrigation canals and onto fields, either during upstream migration for spawning, or during downstream migration of juveniles. By reconnecting these streams during the spring spawning and down-migration periods, significant increases in reproduction can be achieved, since headwaters are often in pristine condition. The Forest Service is able to pursue these projects as the result of legislation authorizing cooperation with private landowners to achieve resource objectives on forest lands.
The first area we visited was Skinner Creek in the Bear River drainage. We visited three sites, beginning at the most downstream impediment to fish passage. These three sites are distributed

along the height of a well-vegetated alluvial fan connecting the headwater basin to the valley floor below. Figure 1 shows the existing diversion works on Skinner Creek at the bottom of this slope, located immediately downstream from a culvert that carries the creek beneath a county road. This diversion dam is established each year in the early summer by the landowner. Flow is diverted to the left side of the channel (right side of photo). A second temporary diversion (Fig. 2) to the right side of the stream is established later in the season at about the location from which the photo in Fig. 1 was taken. The check dam is actually located in the highway right-of-way. The amount of flow diverted varies; late in the summer the entire creek may be diverted. Downstream from this location the stream channel is incised for about 100 yards (Fig. 2). The riparian area immediately upstream from the road has already been improved through the relocation of a cattle feeding operation to get it away from the stream.

Figure 1. Temporary diversion dam on Skinner Creek.

Jim's intention for this location is to use a series of rock weir grade stabilization structures to bring the channel back up to grade in the incised section. This should eliminate the need for the temporary check dam. Flow could then be diverted out both sides of the stream from a single diversion pool that would be located downstream on the landowner's property. A fish screen structure could then be installed in the head of each diversion, with bypasses that returned fish to Skinner Creek, a short distance downstream. I suggested that overflow Coanda-effect screens could be effective here and would have minimal maintenance requirements. Another alternative would to use a single diversion and fish screen and pipe the screened flow across the stream to supply the second irrigation channel. Jim has already made arrangements for the upstream culvert to be replaced with a larger, bottomless half-pipe culvert that will better accommodate fish passage.

Figure 2. Location of 2nd temporary diversion dam (T-posts in stream). The diversion in Fig. 1 is visible just upstream. Note the channel incision that has taken place in this reach.

The middle diversion from Skinner Creek is located about a half-mile upstream (Fig. 3) on private property. Flow is diverted to the left side of the creek through a concrete division structure in which stoplogs can be used to adjust the flow split, although none were installed during our visit. The diverted flow is used to irrigate local hay meadows. The drop exiting at this structure into Skinner Creek presents a

barrier to upstream fish migration. This could be corrected with the addition of one or more rock weirs below the structure to raise the stream grade. A Coanda-effect screen could be added to screen the diverted flow and return fish and debris back to Skinner Creek.

Figure 3. Middle diversion from Skinner Creek.

The upstream diversion from Skinner Creek is located about 150 yards further upstream, again on private property (Fig. 4 and 5). Flow is diverted to the right side of the creek through a similar concrete division structure as the middle diversion. The main flow of the creek actually passes through the left side of the division box (looking downstream), and the diverted flow passes straight through the structure. Stoplogs were installed at the time of our visit to limit the diverted flow. The geometry of the structure probably causes significant numbers of downstream-migrating fish to enter the diversion, since they must turn a 90° corner to stay in the main channel of Skinner Creek. The flow that is diverted here enters remnant stream channels that may have once contained the main flow of Skinner Creek as it wandered back and forth through the years across this alluvial fan. Flow is further diverted from these channels at numerous temporary diversions established each summer to irrigate different sections of the meadows. Drainage flows eventually recombine and flow into the adjacent Stauffer Creek to the south of Skinner Creek.

Figure 4. Upper diversion from Skinner Creek. The main flow of Skinner Creek is on the right side of the photo, and the diverted flow is coming toward the camera. Check boards in the diversion side of the structure and a drop below the Skinner Creek side are barriers to upstream fish passage.

There are unresolved intermittent fish passage barriers in Stauffer Creek upstream from the point at which the diverted Skinner Creek flows reach lower Stauffer Creek. This makes the upper Skinner Creek diversion to Stauffer Creek potentially valuable as an alternative upstream migration route for fish stymied in their attempts to spawn in Stauffer Creek (although there is presently an undersized road culvert near the bottom of the slope that is an impediment to upstream migration along this route). It would thus be desirable to leave this diversion unscreened, to allow for upstream passage from Stauffer Creek into Skinner Creek. However, the numerous temporary diversions along the way into the hay meadows

probably cause significant mortality of downstream-migrating juvenile fish. Thus, it would be desirable to modify the upper diversion works to reduce diversion of down-migrants into the remnant channels of Skinner Creek.

Jim asked if the Bureau of Reclamation would have an interest in assisting the Forest Service with the redesign of these structures to meet fish passage and screening needs. I told him that I would be interested in doing the design work, since these could all be worthwhile demonstrations of the potential for fish and debris screening with low-head Coanda-effect screens. Jim was also interested in having Reclamation perform or manage the construction work itself, but I explained that this would probably be difficult for us to do and that it would most likely be best for the Forest Service or NRCS to lead the construction effort. Some Forest Service funds are available this year to support any work by Reclamation.

After leaving the Skinner Creek area we visited three recently completed fish screening structures on the Thomas Fork. The first (Fig. 5) was a drum screen just installed about a week ago. Unfortunately, the structure was set too low in the channel and was completely submerged when we arrived. The local landowner had also installed all stoplogs in the fish bypass entrance, thereby shutting down the bypass and exacerbating the submergence problem. This structure will need to be adjusted to sit at a higher elevation, and the landowner needs to be educated about proper operation of the bypass.

Figure 5. Drum screen fully submerged. The drum is rotated for cleaning by an electric motor powered by a gas generator.

The other two structures we visited on the Thomas Fork were inclined flat-plate screens with a V-shaped layout. Each is equipped with a water-wheel driven brush system to clean the screens. The first structure (Fig. 6) is operating for the first time this spring and is working well. The second structure (Fig. 7) is in its second season of operation. This structure appears to have been installed somewhat high compared to the local water levels, causing the depth of flow against the screens to be relatively low and thereby producing higher screen approach velocities than would be experienced at a deeper setting. However, the structure has been working well thus far. On each of these structures, the center bypass channel also serves as the upstream fish pass. Stoplogs are installed in the bypass channel to produce a stepped-pool fish ladder.

Figure 6. Fish screen structure on Thomas Fork, installed in early 2006.

Figure 7. Upstream fish screen structure on Thomas Fork. This structure is set relatively high, limiting the utilized screen area and increasing approach velocities to the screens.

5. Conclusions: Small Coanda-effect screen structures could be used to screen the diversions on Skinner Creek. The uppermost structure should probably remain unscreened to allow for upstream fish passage from the lower reach of Stauffer Creek, but the diversion structure could be replaced with a new structure that would reduce loss of downstream-migrating juvenile fish. The middle diversion can be retrofitted with a Coanda-effect screen. The lower diversion (which presently utilizes temporary farmer-constructed check dams) can be improved with stream grade stabilization and permanent diversion structures utilizing Coanda-effect screens.

6. Action correspondence initiated or required: Tony Wahl will investigate options for Reclamation to assist the Forest Service with design of the Skinner Creek structures, and possibly also provide construction assistance.

cc: 86-68560 (Mefford), UC-723 (Barnett), PRO-105 (Rhees)

bc: 86-68560 (*Travel Report file*)

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SIGNATURES AND SURNAMES FOR:

Travel to:

Date or Dates of Travel:

Names and Codes of Travelers:

Traveler: _____ _____
Date

Traveler: _____ _____
Date

Noted and Dated By:

_____ _____
Clifford A. Pugh, Manager **Date**
Water Resources Research Laboratory