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**To: Sean Tackley and Nathan Zorich, USACE**

**From: Chris Caudill, UI**

**Re: Request for access for installation of underwater video cameras, Bradford Island serpentine weirs, Bonneville Dam 2014.**

As part of USACE Portland District research, UI is interested in installing up to four video cameras into the Bradford Island Fishway serpentine weir section.

The aim of the observations will be to evaluate adult Pacific lamprey behavior at the serpentine weir slots because substantial proportions (25-30%) of adults reaching these areas fail to pass and permanently move downstream (Keefer et al. 2013a, 2013b). We hypothesize that lamprey have difficulty passing through some of the serpentine weir sections, particularly those that are relatively long. Individual weir slots vary in width from 21" to 28" and vary in length from 13" to 44". At Bradford Island, the longest four slots (44") are those with FDX-PIT antennas in place.

We propose to install paired video cameras at the upstream and downstream end of two serpentine weirs (four cameras total), one with a PIT antenna (long slot) and one without (short slot). The set up will be conceptually identical to that used by Beck (1995; Figure 1) and using equipment identical to our recent work at McNary and Snake River dams (Thompson et al. 2013). [Note, unfortunately the video collected during the Beck and other FFU studies is no longer available]. Example potential locations are given in Figure 2. Final locations will be determined by top-side access, coordination with BON Project Biologists, and coordination with PSMFC personnel to ensure cameras will not cause interference with FDX PIT readers. Past testing with similar set-ups at McNary Dam have indicated low potential for PIT interference issues.

In an effort to minimize potential impacts to fish, we plan to slightly modify our approach in comparison to past years, where an I-beam was mounted to a fishway wall and an instrument trolley was used to move cameras into place. At Bradford Island in 2014, we propose to mount cameras directly to a 3" i-beams, which will be deployed during observations by sliding the i-beam down a mounting channel attached to the fishway wall (Figure 3). The mounting channels will be installed during the 2013-2014 in-water work period. Total height of the mounting channel will be  $\sim 1 \frac{1}{8}$ ".

Observations will be made during  $\sim 2$  weeks in summer 2014 during the peak of the lamprey run. Efforts will be made to make observations when water clarity is high and when sockeye run numbers are low (e.g., mid-July-early August). I-beams and cameras will be removed after the observation period. Video will be reviewed to evaluate qualitative behavior and to quantify up- and downstream movement rates at the two locations.

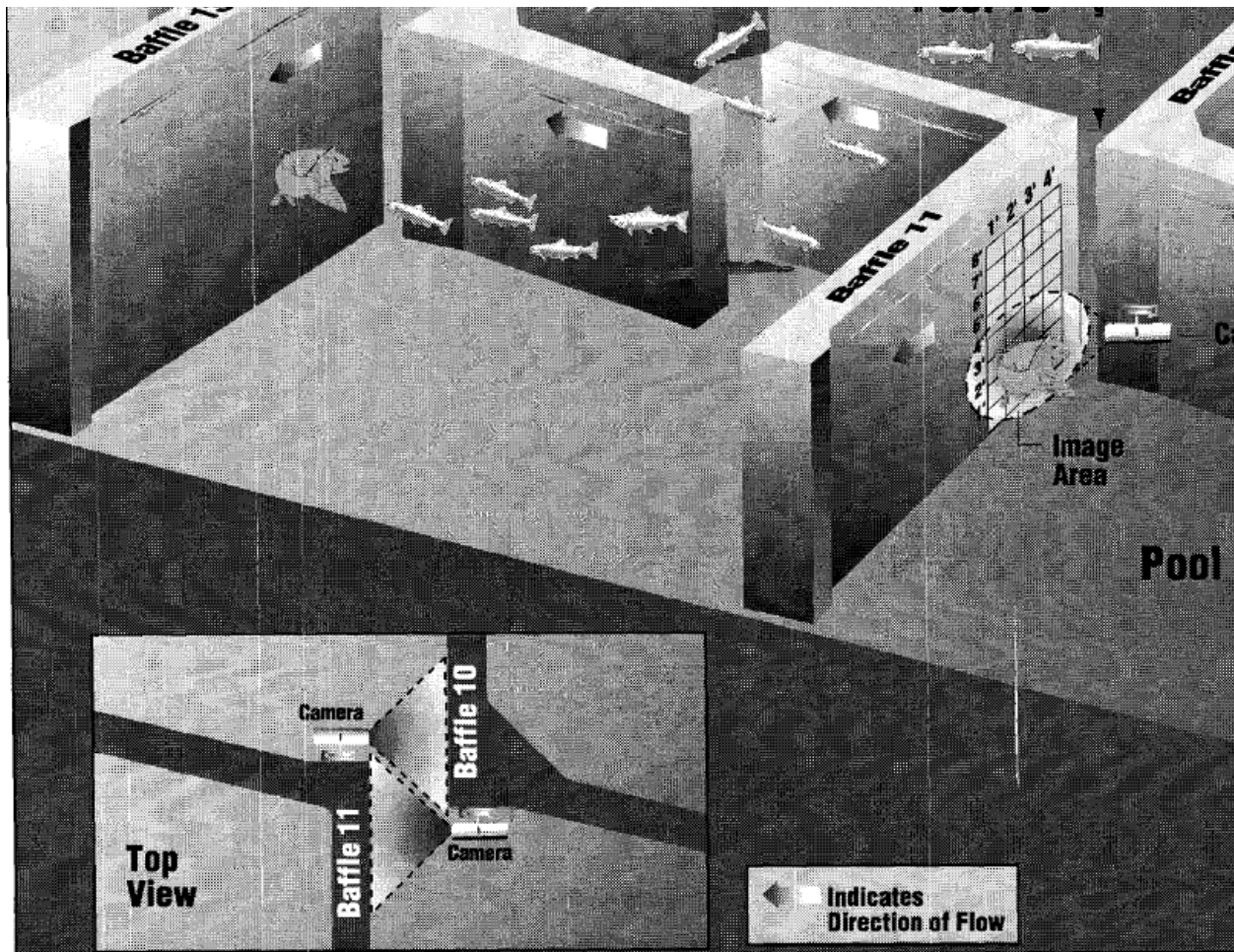


Figure 4. General view of the ladder showing locations of the cameras in the vertical slot at the Washington shore ladde

Figure 1. Video camera deployments from Beck (1995) depicting location of serpetine wier cameras used in that study. We propose near identical set-ups.

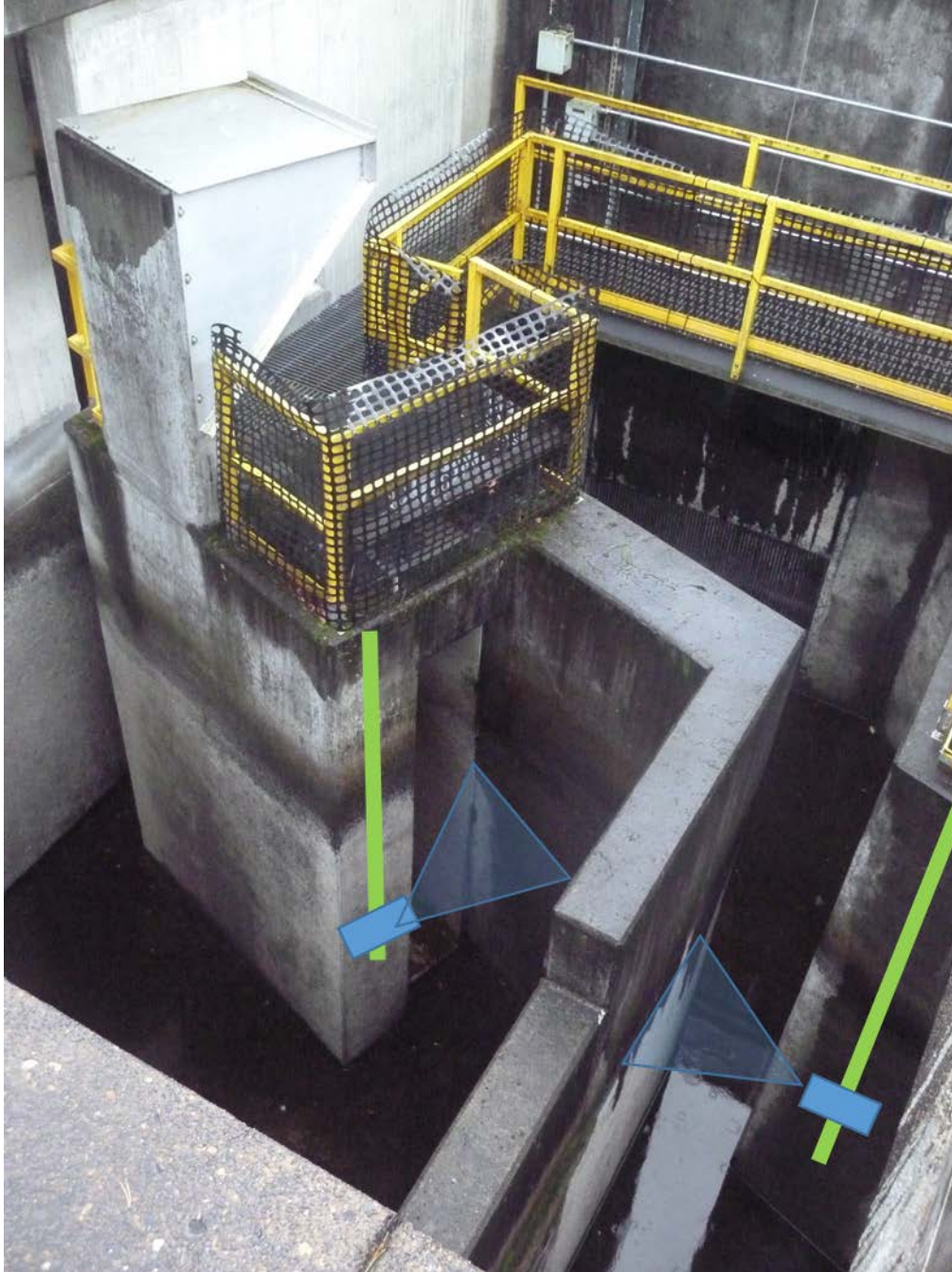


Figure 2: Representative (cartoon) depiction of camera rail and camera deployments in Bradford Island Serpentine Weir section. I-beams sliding in a mounting bracket (green) will support camera and IR light assemblies (blue) during deployment; I-beams and cameras will be removed during non-observational periods.

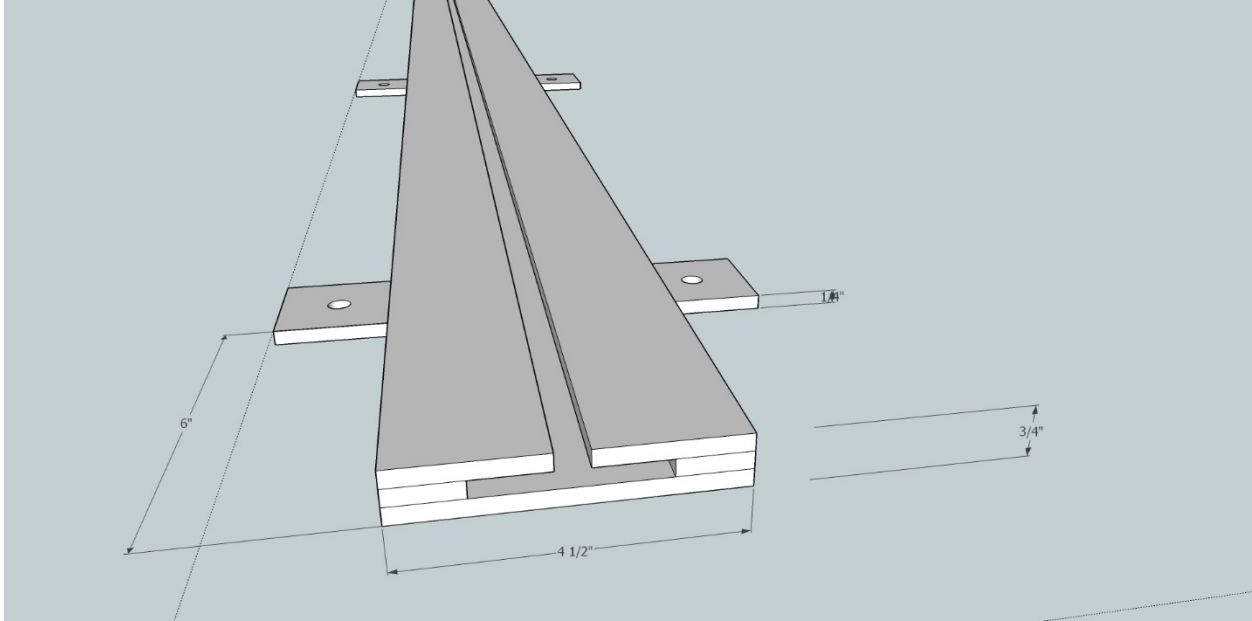


Figure 3: Detail of mounting channel showing slot for camera I-beam. The channel will be constructed from  $\frac{1}{4}$ " sheet aluminum welded into a laminate. The channel will be mounted at least one foot above the fishway floor. A stop will prevent the i-beam from extending below the channel (not shown). Mounting tabs will be a minimum 24" O.C. and rails will be anchored with  $\frac{1}{4}$ " SS Hilti bolts with an embedded depth of  $\sim 2$ " each. I-beams will be placed in area out of the direct flow as shown in Figures 1 and 2.