CENWP-OD-B **21 April 2015**

MEMORANDUM FOR THE RECORD

SUBJECT: 15BON03 MFR – Emergency dewater and fish salvage of the Cascades Island fish valve pit.

On 21 April, a Project Biologist observed a rapid vibration at FV5-4. An operator and mechanic were called to investigate, and the vibration continued during through all valve openings, including the closed position. The mechanics stated that if the vibration continued, the valve could be seriously damaged, if not already. The decision was made by BON Fisheries to immediately dewater the greater valve pit, which is fed from the forebay and in turn feeds both FV5-4 and FV5-3, in an attempt to either repair the valve or determine the seriousness of the problem. The conduit running from FV5-4 to the southern diffusers sits at a negative elevation. Therefore, after the greater valve pit was dewatered, the water level inside the FV5-4 shaft remained at tailwater due to back-filling from the southern diffusers at Cascades Island (FG6-16 through 20). The valve mechanism and hardware remained below water level.

An ROV was sent down into the FV5-4 shaft to examine the trunnion pins which anchor the valve mechanism to the shaft wall. There are two brackets that serve as the anchors, with four bolts per bracket which bolt to a plate and then the wall. Upon examination, three of the six bolts that could be viewed by the ROV had been sheared off (pictures 1 a&b), one had the bolt but no nut (picture 2), and two had the nut attached (picture 3). In addition, the plate had moved (picture 3) and had space between it and the wall (picture 4).

Pictures 1 a & b:

Picture 2:

Picture 3:

Picture 4:

Picture 5:

The greater valve pit cannot be watered up without causing water to refill the FV5-4 pit and cause the vibration to reinitiate. The fear is that further vibration will cause the valve to fail completely. Currently, the greater fish valve pit remains dewatered. An attempt is being made to place bulkheads into the FV5-4 bulkhead slot, which prevents water moving from the greater valve pit area (forebay) into the FV5-4 valve pit. These bulkheads have not been used in recent times and so far this effort has been unsuccessful. The back-fill from tailwater means that the entire FV5-4 shaft cannot be dewatered, and therefore the FV5-4 valve and hardware cannot be repaired, without dewatering the Cascades Island fish ladder.

Roughly 12 juvenile salmonids were recovered from the Cascades Island valve pit. These fish were returned to the forebay in good condition.

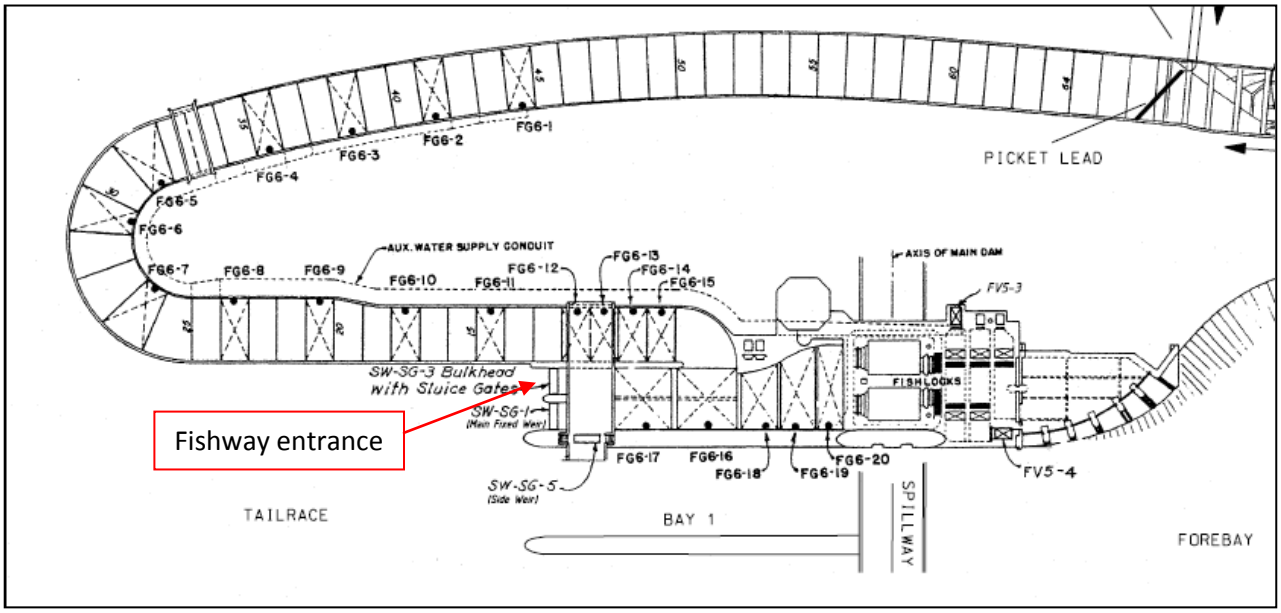
Available information is provided below:

A. Varied salmonids species
B. Origin – Unknown
C. Length – Unknown
D. Marks and tags – Unknown
E. Marks and Injuries found on carcass – None
F. Cause and Time of Death – No fish died during this salvage.
G. Future and Preventative Measures – Currently the project is attempting to install the FV5-4 bulkhead which would isolate that valve from the greater valve pit and allow operation of FV5-3. Coordination with FPOM will be necessary to determine whether the Cascades Island ladder continues operating in this fashion throughout the fish passage season, without the south ladder diffusers FG6-16 through 20, or whether the Cascades Island fishway is dewatered in order to repair FV5-4. The repairs are estimated to take roughly two weeks, however the exact amount of time is dependent on what's found once the valve pit is dewatered and could take as long as three to four weeks.

Update 5/5/15: A bulkhead at FV5-4 was installed in the afternoon of 22 April after a concerted effort by the maintenance crews. This bulkhead isolates FV5-4 from the greater valve pit, allowing FV5-3 to operate without sending water into FV5-4 and causing further damage. FV5-4 is closed and in manual, which means no water is currently supplying the southern diffusers at the Cascades Island fish entrance (FG3-16 through 20, Figure 1). FV5-3 is currently operating in automatic so that the valve can change with fluctuating forebay elevations, which can cause excessive entrance differentials and potentially blow diffuser grating if left in manual. FV5-3 feeds the northern diffusers (FG6-5 through 15) which run up the Cascades Island fishway (Figure 1). Currently all diffusers from FG6-9 through 15 are in manual and open to allow extra water to enter the entrance area. In addition, FV5-9, which controls water levels in the upper fishway, has been set to 'shad mode', which has increased the water level at the UMT staff gauge to 1.1 ft. These

measures currently result in a Cascades Island fish entrance differential that ranges from 0.8 to 1.2 ft.

Figure 1. Diagram of the Cascades Island lower fishway, showing FV5-3, FV5-4, and the fishway diffusers FG6-5 through 20. (Diffusers FG6-1 through 4 are removed.)



Future and preventative measures – During a special FPOM call on 27 April, a fishway dewatering was coordinated for 12 October, with orifice flow starting 8 October. This dewatering is required in order to completely dewater the FV5-4 shaft and allow personnel to access the failed trunnion pins and hardware. Repairs are estimated to take up to three weeks, though an exact duration isn't possible until the dewatering occurs. The project will pre-fabricate and pre-order the necessary parts to have on hand by October.

Sincerely,
Bonneville Fisheries

Comments from others:
A conference call occurred at 1400 on 27 April. In attendance were: Bettin, Bonneville Project (Hausmann, D. Smith, B. Smith, MacKinnon, Snyder), Eppard, Fredricks, Kiefer, Mackey, Van Dyke.

BON needs a couple weeks lead time to order and prepare the parts for fixing FV5-4. The group preferred waiting until mid-October to dewater CI if possible. November did not work with the Project schedule. Earlier than October is likely to impact more salmonids. The cost for repair is roughly $20-$30K per valve.

Mackey and Hausmann will work on the MOC for a mid-October dewatering. Mackey will contact CRITFC, USFWS, and WDFW to discuss the proposed plan of action.