FPOM: 20 December, 2012

Ice Harbor Tailrace Tracking 2012 update

Noise measurements taken at various locations (Figure 1). Sites shown as “possible hydrophone locations” may all be tested in the spring, 2013, to provide estimates of tracking accuracy in the immediate vicinity of the powerhouse. These locations were proposed prior to awarding the contract and noise measurements have been collected at some point in time at all of them. The south fishway entrance was checked to determine if JSATS tags may be detected in these locations and will be further tested in 2013.

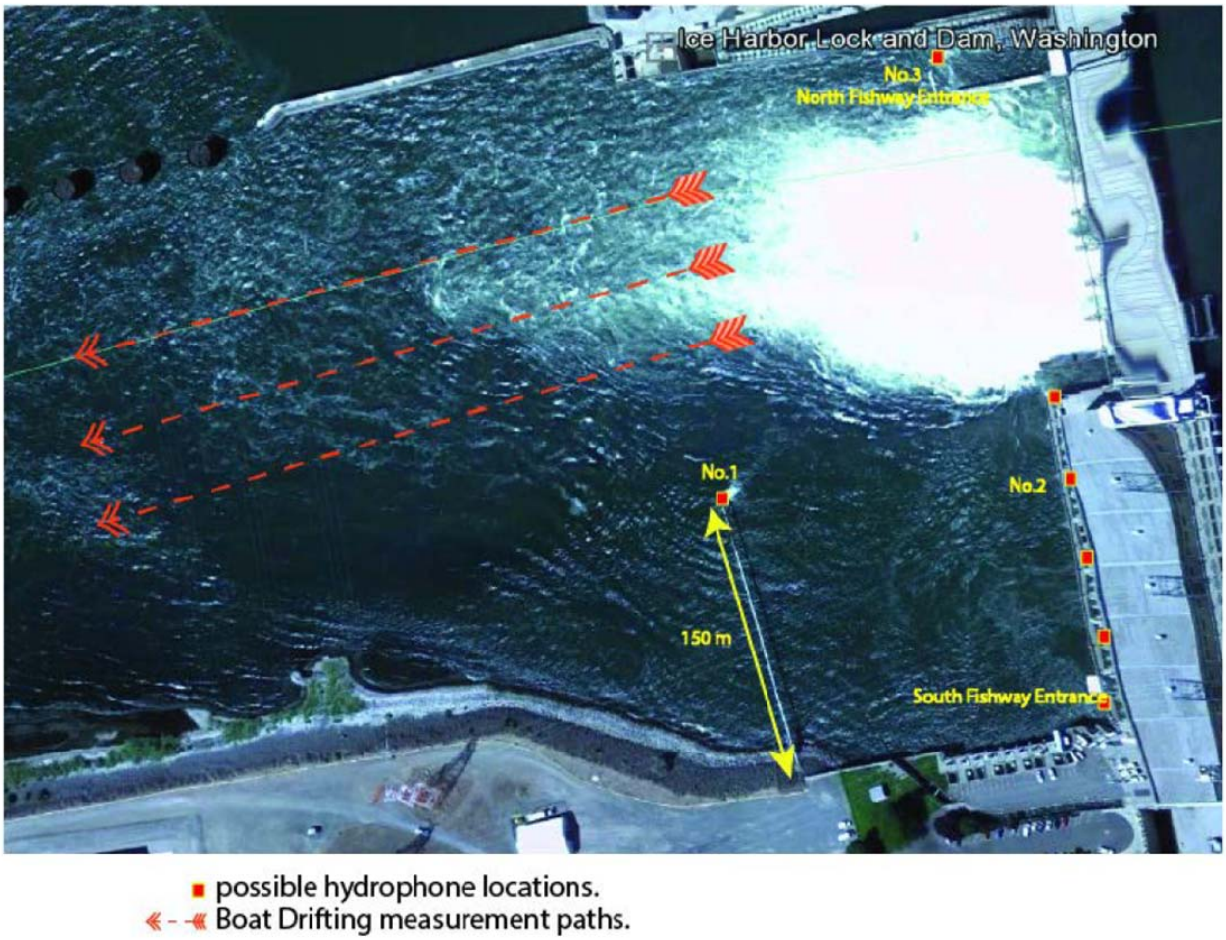

Figure 1. Data collection locations.

Location 1: The JFB outflow pipe extends 150 meters from the south shore into the tail race. It was not safe to deploy the hydrophones until spill stopped at the end of August. Hydrophones were deployed on the outflow pipe on 5 September 2012 until 14 November 2012.Three hydrophones were deployed at the end out outflow pipe.

Location 2: There are several points along the powerhouse deck where hydrophones were deployed and noise measurements taken. The south side of the powerhouse deck was busier with project employees so measurements were usually taken at the north end. The hydrophones were deployed in two pairs to cover two different points along the powerhouse deck simultaneously. The hydrophones were often moved during the day to take measurements at different points.

Location 3: Acoustic noise measurements were taken from the north fish ladder. Three hydrophones were mounted on the same rope and deployed into the fish ladder.

Boat: Most of the tailrace is inaccessible from land. Acoustic noise measurements were taken from a boat to cover more area. (Figure 1) The setup in the figure 6 was used in the boat and was powered by a 12 VDC lead acid battery.

There were 18 different treatments planned consisting of three spill levels (high, low, and no spill), three powerhouse operations (typical, high, and low), and two tailrace water surface elevations (high and low). The spill level is considered high when the spill rate is higher than average (56,160 CFS) and the spill level is considered low when the spill rate is less than average. The power house operation is considered typical when the power house flow rate is between 22,050 CFS and 54,570 CFS. It is considered low when it is below this range and high when it is above this range. The tailrace elevation is high when the water elevation in the tailrace is above the typical elevation (339 feet above mean sea level) and low when it is below the typical elevation. Treatments under which noise measurements have been collected thus far are summarized in Tables 1-4.

Spill	Turbine Outflow	Elevation
No Spill	Low	Low
No Spill	Low	High
No Spill	Typical	High
Low	Low	Low
Low	Low	High
Low	Typical	Low

Table 1: Location 1 treatments

The sound pressure level (SPL) of a JSATS tag is approximately 156 dB. Preliminary noise measurements suggest that the SPL of the noise environment in the tailrace at Ice Harbor is below the 156 dB level (≤ 115 dB) for all locations and treatments so far.

Beacons were used to project sound at each of the locations in the JSATS frequency at the 156 dB SPL. Signals detected by the hydrophones at all locations were approximately ≥ 136 dB. In many cases, the beacon was fairly close to the hydrophone (~ 12m or closer); however, the strong SPL detected by the hydrophones provides promising evidence that detection, and possibly 3-D tracking will be feasible and accurate in the tailrace. This should hold true particularly for areas of interest such as the fishway entrances where fish will pass closer to the hydrophones when migrating upstream into the fishways.

Date	Spill	Turbine Outflow	Elevation
6/7/2012	High (45.2 kCFS)	High (65.5 kCFS)	High (346.8 fmsl)
6/19/2012	High (50.5 kCFS)	Typical (52.5 kCFS)	High (346.3 fmsl)
7/6/2012	Low (36.75 kCFS)	Low (9.8 kCFS)	High (341.6 fmsl)
7/12/2012	Low (20.6 kCFS)	Typical (48 kCFS)	Low (343.5 fmsl)
8/10/2012	Low (20.1 kCFS)	Low (9.3 kCFS)	Low (340.5 fmsl)
10/19/2012	None	Typical (25.1 kCFS)	High (340.3 fmsl)
10/29/2012	Low (8.7 kCFS)	Low (18.2 kCFS)	High (339.8 fmsl)
11/5/2012	Low (10 kCFS)	Low (14.3 kCFS)	Low (338.9 fmsl)
11/6/2012	Low (10 kCFS)	Typical (22.9 kCFS)	High (339.6 fmsl)
11/7/2012	Low (10 kCFS)	Low (19.5 kCFS)	High (339.3 fmsl)

Table 2: Location 2 treatments

Date	Spill	Turbine Outflow	Elevation
8/13/2012	Low (15.1 kCFS)	Low (9.3 kCFS)	Low (340.1 fmsl)
10/19/2012	None	Typical (25.1 kCFS)	High (340.3 fmsl)
10/29/2012	Low (8.7 kCFS)	Low (18.2 kCFS)	High (339.8 fmsl)
11/5/2012	Low (10 kCFS)	Low (14.3 kCFS)	Low (338.9 fmsl)
11/6/2012	Low (10 kCFS)	Typical (22.9 kCFS)	High (339.6 fmsl)
11/7/2012	Low (10 kCFS)	Low (19.5 kCFS)	High (339.3 fmsl)

Table 3: Location 3 treatments

Date	Spill	Turbine Outflow	Elevation
8/15/2012	Low (17.8 kCFS)	Low (9.3 kCFS)	Low (340.6 fmsl)
8/22/2012	Low (18.3 kCFS)	Low (9.6 kCFS)	Low (340.6 fmsl)
10/19/2012	No Spill	Typical (25.1 kCFS)	High (340.3 fmsl)
10/29/2012	Low (8.7 kCFS)	Low (18.2 kCFS)	High (339.8 fmsl)
11/5/2012	Low (10 kCFS)	Low (14.3 kCFS)	Low (338.9 fmsl)
11/6/2012	Low (10 kCFS)	Typical (22.9 kCFS)	High (339.6 fmsl)
11/7/2012	Low (10 kCFS)	Low (19.5 kCFS)	Low (339.3 fmsl)

Table 4: Boat treatments