

New PIT-Tag Detection at the Rocky Reach Dam Juvenile Fish Bypass

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Douglas County Public Utility District (DCPUD) is in the process of performing a “check-in” study required as part of their Federal Energy Regulatory Commission (FERC) license for the operation of Wells Hydroelectric Project. To support this and future studies, DCPUD installed a PIT-tag detection system within the floating surface collector (FSC) located at Chelan County PUD’s Rocky Reach Dam. The juvenile bypass at Rocky Reach Dam provides the first opportunity to detect reasonable numbers of PIT-tagged fish below the study release site(s). The system is designed to 134.2 kHz PIT tags in juvenile salmon and steelhead using the fish bypass at Rocky Reach Dam.

Prior to antenna development, Biomark conducted a noise listening evaluation to gather general information about potential emitted and conducted noise sources at the site. This information was critical for determining antenna design and to potentially mitigate on-site electrical noise. The original “flow spreaders” within the bypass system were replaced with PIT-tag antenna specific flow spreaders; integrating fiber reinforced plastic and steel components. Critical design considerations were maintaining the operational and hydraulic characteristics of the existing flow spreaders. Biomark managed the design, construction, and installation of the new flow spreaders and designed, fabricated, and installed two pass-through antennas within the North and South bypass channel flow spreaders.

The system was designed to operate each pair of antennas independently or operate all four antennas using a single FS1001M Destron Fearing multiplexing transceiver. Preliminary testing indicated that the increase in ‘noise’ using two independent readers resulted in an unacceptable decrease in tag readability. Therefore, all four antennas were connected to a single FS1001M.

Detection efficiency of the PIT-tag detection system in the FSC was evaluated on 16 March 2010. The system was evaluated by releasing PIT-tagged juvenile yearling Chinook salmon *Oncorhynchus tshawytscha* approximately 25 ft upstream from the vertical control gate in the North and South FSC channels. Overall, fish released as individuals were detected at a higher rate than fish released in groups. This is likely due to ‘collisions’ between tags and the speed the fish are traveling. Detection efficiency of single fish releases ranged from 86 to 100%. Detection efficiency of groups of five fish ranged from 80 to 100%. Detection efficiency of groups of 10 or 15 fish was highly variable, ranging from 33 to 80%. Behavioral differences were observed between release groups with one group passing en masse and other groups being more spread out and essentially passing as individuals.