Investigation of Avian Predation Upon Salmonid Smolts With the Use of an Active / PIT Combination

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In an effort to better understand the impacts of avian predation throughout the Priest Rapids Project of the Columbia River, Grant PUD implanted smolts with a PIT tag (*Biomark© RFID Model TXP148511B PIT tag, 8.5 mm x 2.12 mm, 0.067 g in air*) embedded into an acoustic tag (*Hydroacoustic Technology, Inc. Model 795 acoustic tag series*). In 2008 and 2009, approximately 4,300 steelhead smolts (2,200 in 2008 and 2,100 in 2009) were implanted with the composite tag and released into the Columbia River at one of three dam's tailraces, Rock Island, Wanapum, and Priest Rapids dams. Yearling Chinook (approximately 1,000) were also tagged with PIT/acoustic tags in 2008 and released upstream of Wanapum Dam for behavioral studies, were also monitored for avian predation. In 2010, similar studies were repeated with PIT/acoustic tags implanted into steelhead and sockeye salmon smolts (approximately 2,500 and 2,000, respectively).

With a composite tag, Grant PUD was able to make use of the "best of both worlds," where the detailed smolt passage behavior information was achieved with the acoustic tag along with the identifying abilities of the PIT tag, long after the battery of the active tag has died and no longer able to be uniquely indentified. When the smolt tags were recovered at nesting sites on the Plateau, primarily a Caspian tern colony at Potholes Reservoir approximately 30 miles from the Columbia River, the PIT tag indentified its acoustic tag counter-part. With the paired acoustic tag indentified, the detection history was queried to estimate the areas of highest avian predation, (forebay, tailrace, and/or mid-reservoir) and whether fish that passed through the different passage routes, such as powerhouse versus surface bypass structures, were more susceptible to avian predation. Grant PUD is also using this information to evaluate the effectiveness of its bird hazing program and recently installed "bird-wires" in the tailraces of Wanapum and Priest Rapids dams.

Smolts experienced varying degrees of predation as they traveled from Rock Island Dam, through the Wanapum and Priest Rapids reservoirs and dams to Vernita Bridge and

downstream to the Hanford Reach. In 2008, few yearling Chinook tags were recovered from the avian colonies. In 2008 and 2009, a minimum of 4.3% and 6.4%, respectively, released steelhead were taken by Caspian terns. At this time, the 2010 PIT data is being collected but only a handful of sockeye avian predation events have been recovered and it appears that a minimum of 3.4% of the release steelhead were taken by Caspian terns. The areas of highest take in 2008 and 2009 occurred in the Wanapum Reservoir and downstream of Priest Rapids Dam.

At the time of presentation, additional avian predation impacts as they relate to reach and project survival in the Priest Rapids Project will be provided from tagged and released smolts during the spring of 2008 through 2010.