

Overview of the Performance of PIT-Tag Interrogation Systems for Adult Salmonids

Sandra L. Downing* and Earl F. Prentice
NWFSC, NOAA-Fisheries

In 2001, ISO-based equipment for detection of returning PIT-tagged adult salmonids was installed into the first fish ladder. Since then, more interrogations systems have been installed at federal and PUD hydroelectric dams; for 2003, there were seven dams with systems. We analyzed how well the systems detected tagged fish by using fish that we tagged at Bonneville Dam and using fish that were detected at the most upstream dams (Lower Granite and Wells Dams). We also compared the different interrogation system designs: orifice-based, counting-window, and orifice-slot combinations.

Direct tagging of fish in the Bonneville Washington Shore Ladder indicated that the orifice-based system detected spring chinook and steelhead at or above the 95% level, but fall chinook and coho salmon were consistently being detected at levels below the 95% goal. Video evidence helped to confirm that if fish swam through the orifices, they were detected (99.9%). Video evidence and analyses of the percentages of fish that predominately used the orifices showed that fall chinook and coho salmon populations used the weir overflows much more than did the other salmonid populations. In other words, fish behavior explained the differences in detection rates.

Analyses of the salmonid populations detected at Lower Granite Dam showed that there were differences in detection rates at downstream dams among year classes and populations – again because of differences in fish behavior. Adult steelhead, spring and summer chinook populations were detected above 95% at all of the downstream dams. However, 1-year old jacks were detected at levels below 90% at McNary and Bonneville Dams (summer chinook jacks were only detected at 75% at Bonneville Dam). All year classes of fall chinook salmon were detected at around 80% at Bonneville Dam. Detection was also below 95% at McNary and Bonneville Dams for all summer chinook year classes that had been detected at Wells Dam. Analyses showed that high percentages of these Columbia River summer chinook salmon were only detected by the counting-window system at McNary Dam. This fact combined with the higher percentage using the McNary Washington Ladder than was true for the Snake River populations means that most likely 10-30% of tagged fish went undetected because this ladder does not have a counting-window system. These results support the need for the vertical slot system planned for Bonneville Dam and support the need for another counting-window system at McNary Dam.

Because most salmonid populations tended to use the orifices in the McNary Oregon Ladder, detection rates were comparable for the counting-window and orifice-based systems. Analyses also demonstrated that the flume-based and orifice-slot systems at Lower Granite Dam yielded comparable detection rates.