

Development and Testing of a Mobile PIT-Tag Separation by Code and Interrogation System

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We installed a Passive Integrated Transponder (PIT) tag separation by code system on a pontoon barge to selectively divert individual PIT-tagged fish or untagged fish to holding. The system was designed to sample juvenile salmonids concentrated by our surface pair trawl in the upper Columbia River estuary (kilometer 75). Key components of the system were a fish pump designed for fish hatchery and commercial fish transfer operations and an electronically controlled gate as originally developed for diversion of fish at hydroelectric dams. We utilized an underwater 0.9-m diameter fish collection chamber deployed from the bow of the barge and a 25-hp fish pump to lift fish to the surface through 14 m of 15-25 cm diameter smooth bore plastic pipe. The system included two independent PIT-tag interrogation coils and associated detection equipment. A switch gate enabled fish to be diverted to a holding tank and non-diverted fish returned to the river at the stern of the vessel. Electronic controls allowed operators to divert all fish or only those with PIT-tags. Initial testing of the system occurred in the Snake River in October 2009 using hatchery fish released directly into the fish collection chamber (no pair-trawl). In these tests, few if any physiological impacts were observed for fish either diverted or returned-to-river. Deployment of the system occurred in the estuary behind the pair trawl on sixteen occasions (53 total hours) through the 2010 outmigration season. Our initial goal was to develop safe logistical procedures for sampling in the river. Subsequent goals were to evaluate impacts to fish diverted by the system and effectiveness. Excluding occasionally numerous sticklebacks, we diverted 1,052 fish of various salmonid species in 6.3 h of diversion time during 16 deployments. In the remaining 46.7 h of operation, the system was set to divert only fish bearing PIT tags (n=67). We evaluated descaling and injury and measured lengths of all fish diverted to the sample tank. Growth rates during migration to the estuary were estimated for PIT-tagged fish based on lengths recorded at time of tagging. The mean growth rates for non-transported Chinook salmon traveling to the estuary (n=17) averaged 0.5 mm/d from their respective release sites and 0.6 mm/d for Chinook salmon tagged and transported from Lower Granite Dam and released downstream from Bonneville Dam (n=18). The growth rate for non-transported diverted steelhead was 1.1 mm/d (n=3).