

## **Presentation Title: Migration and survival of juvenile winter steelhead above and below high-head dams**

Abstract for the 2021 Pacific Coast Steelhead Management Meeting

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Many salmonids *Oncorhynchus* spp. are listed as threatened or endangered under the U.S. Endangered Species Act (ESA). Habitat loss and alteration are among the key factors responsible for their decline and many recovery measures have relied heavily on reestablishing runs above dams to provide access to historic spawning and rearing habitat. However, offspring must then pass through the unnatural reservoir habitat and associated dams. Studies investigating downstream passage have often relied on hatchery-origin fish. In the Willamette basin (Oregon), there are no winter steelhead *O. mykiss* hatchery programs operating to provide juveniles for research, and if such a program existed, differences between hatchery-origin and wild fish could confound results. This quandary between having to conduct tests for the benefit of wild fish without the availability of wild fish for research led to the inception of the Wild Fish Surrogate Program at Oregon State University. We use alternative rearing tactics to produce more wild-like juvenile Chinook Salmon *O. tshawytscha* and steelhead by varying growth, diet, feeding, density, cover, and tank complexity. To assess how Detroit and Big Cliff dams in the North Santiam River affected outmigration and survival of winter steelhead, we PIT-tagged and released 27,784 juvenile wild fish surrogates at the head of Detroit Reservoir and 26,831 at or below the tailrace of Minto Fish collection facility over three years (2014-2016). We monitored their outmigration and the return of adults at tag interrogation sites throughout the system. Overall, the proportion of juveniles detected from the tailrace release location was significantly greater than the proportion of juveniles from the head of reservoir release. Travel time (km/d) to Willamette Falls was not significantly different between release groups across years, but fish detected at locations further downstream had faster travel rates. Adult returns were very low; only three adults have been detected across release years. Two adults detected were from the 2015 release in spring of 2019 (one from each release group). The third adult was detected in January 2020, from the 2016 tailrace release group. We concluded that the North Santiam River high head dams negatively influenced the detection probability of juvenile winter steelhead. However, other ecological factors may have led to low survival and adult returns. If moving adult steelhead above dams will be used as a long-term management tool, it will be critical to understand how wild juvenile fish move through the reservoirs, approach the dams, and how they attempt to pass requires research to develop safe and appropriate downstream passage to help in the recovery of these species.