

2021 Pacific Coast Steelhead Management Meeting

Single parent and grandparent genetic assignments, what is possible and what is not

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Parentage-based tagging (PBT) has been successfully demonstrated for steelhead and Chinook management in the Snake River basin over the past decade. This implementation of PBT is based on making dual-parent assignments (sire and dam for offspring). As such, to detect a hatchery-origin fish, both parents must be genotyped. The ability to assign single parents to offspring would have two main advantages over this approach. First, it would allow genetic tag rates to be very close or equal to 100%, even when some broodstock samples fail to genotype. Second, it would allow the use of PBT in a wider range of scenarios where sampling adults is more difficult than in a hatchery, such as estimating the contributions of residual males upstream of a weir. The ability to assign grandparents is also of interest and can be used to estimate the proportion of fish with a hatchery-origin parent in a naturally spawning population. Both single-parent and grandparent assignments require greater statistical power than dual-parent assignments. Over recent years, the genetic panels used for PBT in the Columbia River basin have been expanded to have more markers and greater statistical power. With these larger panels, single-parent assignments may become possible in select scenarios. As marker panels continue to increase in power, single-parent and grandparent-trio (two grandparents, one grandchild) assignments will be possible in a wider range of scenarios. False-positive and false-negative error rates for single-parent and grandparent-pair assignments should be estimated on a per-project basis to determine if such assignments are appropriate.