

Commentary**Commentary on “Rapture Facilitates Inexpensive and High-Throughput Parent-Based Tagging in Salmonids”****Michelle Y. Pepping***

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Description

Accurate methods for tracking individuals are crucial to the success of fisheries and aquaculture management. Management of migratory salmonid populations, which are important for the health of many economies, ecosystems, and indigenous cultures, is particularly dependent on data gathered from tagged fish. However, the physical tagging methods currently used have many challenges including cost, variable marker retention, and information limited to tagged individuals. Genetic tracking methods combat many of the problems associated with physical tags, but have their own challenges including high cost, potentially difficult marker design, and incompatibility of markers across species. Here we show the feasibility of a new genotyping method for Parent-Based Tagging (PBT), where individuals are tracked through the inherent genetic relationships with their parents. We found that Rapture sequencing, a combination of restriction-site associated DNA and capture sequencing, provides sufficient data for parentage assignment. Additionally, the same capture bait set, which targets specific restriction-site associated DNA loci, can be used for both Rainbow Trout *Oncorhynchus mykiss* and Chinook Salmon *Oncorhynchus tshawytscha*. We input 248 single nucleotide polymorphisms from 1,121

We input 248 single nucleotide polymorphisms from 1,121 samples to parentage assignment software and compared parent-offspring relationships of the spawning pairs recorded in a hatchery. Interestingly, our results suggest sperm contamination during hatchery spawning occurred in the production of 14% of offspring, further confirming the need for genetic tagging in accurately tracking individuals. PBT with Rapture successfully assigned progeny to parents with a 98.86% accuracy with sufficient genetic data. Cost for this pilot study was approximately \$3 USD per sample. As costs vary based on the number of markers used and individuals sequenced, we expect that when implemented at a large-scale, per sample costs could be further decreased. We conclude that Rapture PBT provides a cost-effective and accurate alternative to the physical coded wire tags, and other genetic-based methods.

We found that parent-based tagging was an accurate and inexpensive (approximately \$3 USD per sample) alternative to physical tags. Parent-based tagging uses genetic material from a close relative as a way to track highly mobile populations. In the case of the Chinook salmon studied here, the genetic material from one parent ‘tags’ its thousands of offspring. When future samples in that

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population are collected, the offspring would be identified by their genetic relationship to their parent. This method has the added benefit of not needing to rear individuals to a minimum size before tagging and never needing to handle young, delicate juveniles. We combined restriction site associated DNA and capture sequencing (Rapture) for genome sub-sampling with easily designed, targeted loci.

Conclusion

More specifically, one can easily design these tags without needing a comprehensive reference genome because the capture baits are selected from loci containing a restriction site, and Rapture allows for easily targeting the same loci in all individuals to greatly reduce sequencing cost and data

complexity. Incorporating the benefits of Rapture genome sub-sampling with those of parent-based tagging created an economical and effective method of tracking individuals of any species. Application of parent-based tagging with Rapture sequencing also has the added benefit of genetic information on all individuals studied, which can expand the results of research in a multitude of ways. I believe this is a powerful tool that should be applied to fisheries studies in the future.