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October 6, 2026

MEMORANDUM

TO: Council Members

FROM: Windy Schoby, Fish and Wildlife Policy Analyst- Idaho

SUBJECT: Update on Genetic Tools- Parentage Based Tagging (PBT), Genetic Stock Identification (GSI), and the broader genetic monitoring network supported by the Fish and Wildlife Program

BACKGROUND:

Presenters:

Matt Campbell, Fisheries Genetics Program Coordinator, Idaho Department of Fish and Game

Dr. Shawn Narum, Chief Scientist, Columbia River Inter-Tribal Fish Commission

Dr. Jon Hess, Senior Fishery Geneticist, Columbia River Inter-Tribal Fish Commission

Summary:

Matt Campbell, Shawn Narum, and Jon Hess will provide an update on genetic monitoring tools and applications that provide critical information to support fisheries management and conservation in the Columbia River Basin. The presentation will highlight how the region's investment in genetic monitoring has strengthened management by improving stock-specific and origin-specific (hatchery and natural) abundance estimates, enhancing evaluation of hatchery- and natural-origin fish populations, and providing information that can inform management decisions.

Relevance:

The three BPA-funded projects highlighted in this presentation implement measures in the Council's 2026 Columbia River Basin Fish and Wildlife Program. This work is generally aligned with the Program's strategy for Planning, Research, Monitoring, and Evaluation in Support of Multiple Strategies.

The **Program** continues to emphasize research, monitoring, and evaluation to inform adaptive management and improve the effectiveness of Program actions. This presentation provides an opportunity to consider how a long-term investment in genetic monitoring has matured into information that can support management decisions and future Program implementation.

Background:

Marking and tagging fish is one of the region's most important tools for understanding and managing salmon, steelhead, and other fish populations. Tagging and related monitoring allow managers and researchers to track fish from headwater rearing or hatchery release areas, through the mainstem hydrosystem and ocean, and back to spawning grounds and hatchery broodstock collection facilities. The resulting information supports estimates of survival, abundance, migration timing, harvest, hatchery performance, and progress toward conservation and recovery objectives.

Genetic monitoring expanded this toolbox by providing information about the stock, population, and parentage of individual fish. CRITFC and IDFG initially proposed using these approaches to address a fundamental fisheries management need: better information on stock-specific abundance, run timing, and harvest of Columbia Basin salmon and steelhead.

Three BPA-funded projects helped move that concept into implementation: CRITFC's **Genetic Assessment of Columbia River Stocks (2008-907-00)** and two IDFG projects focused on **Genetic Stock Identification (2010-026-00)** and **Parentage-Based Tagging (2010-031-00)**. Together, these investments supported development of genetic resources and methods to identify the origin of fish passing fixed locations, including Bonneville and Lower Granite dams, and fish intercepted in commercial, sport, and tribal mainstem fisheries.

As these genetic approaches were developing, the Council was also working more broadly with the region to improve the effectiveness and efficiency of fish tagging and monitoring. The presentation builds on the Council's role in helping the region improve the effectiveness and efficiency of fish tagging and monitoring. In 2011, the Council chartered the Fish Tagging Forum. The Forum brought together state, tribal, federal, BPA, and other regional experts to evaluate tagging activities, costs, efficiencies, overlaps, and gaps under the Fish and Wildlife Program. The Forum considered emerging tagging approaches and

opportunities to use more efficient technologies where appropriate. The Council's recommendations recognized genetic approaches as an emerging component of the Basin's monitoring toolbox, while associated cost-effectiveness work identified potential advantages as well as the need for continued development of sampling, laboratory, and data-management infrastructure.

More than a decade later, those genetic tools are providing information on stock-specific abundance, harvest, reproductive success, hatchery contributions, and natural-origin populations. Emerging applications, including grandparentage and the use of long-term datasets to examine changes in life-history characteristics, may further extend the value of these investments.

What began as development and proof-of-concept work has evolved into a broadly implemented genetic monitoring program. Parentage-Based Tagging (PBT) uses hatchery broodstock genotypes to identify hatchery-origin offspring, while Genetic Stock Identification (GSI) uses genetic baselines to identify the stock or population of origin of natural-origin fish.

Improvements in genetic baselines, assignment accuracy, analytical methods, and cost efficiency, coupled with more than 15 years of sampling, have expanded the management value of these tools. The program has progressed from asking whether genetic tools could provide information unavailable through conventional monitoring to asking how that information can improve management decisions and biological outcomes.

More information:

[Fish Tagging Forum](#)

[Project #2008-907-00- Genetic Assessment of Columbia River Stocks](#)

[Project #2010-031-00- IDFG Genetic Monitoring of Snake River Salmon and Steelhead Stocks](#)

[Project #2010-026-00-Chinook and Steelhead Genotyping for Genetic Stock Identification \(GSI\) at Lower Granite Dam](#)

[2009 Presentation to the Council- Use of Genetic Data to Estimate Salmonid Stock Composition and Migration Patterns](#)

[2010 Presentation to the Council- New Genetic Tools and the Management of Columbia River Salmon and Steelhead](#)

[2018 Presentation to the Council-Update on Genetic Monitoring Program](#)

[2022 Presentation to the FWL Committee- Update on Genetic Monitoring Tools](#)

Recent Publications:

Coykendall, D. K., T. A. Delomas, M. Belnap, and M. R. Campbell. 2022. Improving abundance estimates of spring–summer Snake River Chinook Salmon for fisheries management. *North American Journal of Fisheries Management* 42:1454–1464. <https://doi.org/10.1002/nafm.10823>

- Delomas, T. A., A. C. Harris, J. S. Hargrove, S. R. Narum, J. E. Hess, R. L. Horn, and M. R. Campbell. 2026. Empirical validation of grandparent inference to quantify reproduction of hatchery-origin fish in the wild. *North American Journal of Fisheries Management* 00:1–16. <https://doi.org/10.1093/najfmt/vqag051>
- Hargrove, J. S., M. R. Campbell, A. C. Harris, S. R. Narum, R. L. Horn, and J. E. Hess. 2025. Genetic methods for informing conservation and management of salmonids in the Pacific Northwest, USA. *Journal of Fish Biology*. <https://doi.org/10.1111/jfb.70143>
- Hargrove, J. S., C. A. Camacho, W. C. Schrader, J. H. Powell, T. A. Delomas, J. E. Hess, S. R. Narum, and M. R. Campbell. 2021. Parentage-based tagging improves escapement estimates for ESA-listed adult Chinook salmon and steelhead in the Snake River basin. *Canadian Journal of Fisheries and Aquatic Sciences* 78:349–360. <https://doi.org/10.1139/cjfas-2020-0152>
- Hess, J. E., T. A. Delomas, A. D. Jackson, M. J. Kosinski, M. L. Moser, L. L. Porter, G. Silver, T. Sween, L. A. Weitkamp, and S. R. Narum. 2022. Pacific Lamprey translocations to the Snake River boost abundance of all life stages. *Transactions of the American Fisheries Society* 151:263–296. <https://doi.org/10.1002/tafs.10359>
- Hess, J. E., B. M. Deacy, M. W. Rub, D. M. Van Doornik, J. M. Whiteaker, J. K. Fryer, and S. R. Narum. 2024. Visual and genetic stock identification of a test fishery to forecast Columbia River spring Chinook Salmon stocks 2 weeks into the future. *Evolutionary Applications* 17:e13667. <https://doi.org/10.1111/eva.13667>
- Lewis, D., R. Horn, S. Narum, J. Stephenson, J. McCane, A. C. Harris, M. Campbell, F. Bohlen, and J. Hess. 2026. Utility of parentage-based tagging for research, monitoring, and evaluation of hatchery programs within the Columbia River Basin. Poster presented at the Oregon Chapter of the American Fisheries Society Annual Meeting. critfc.org [Poster PDF](#)