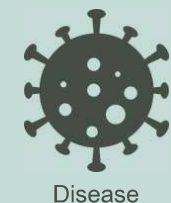
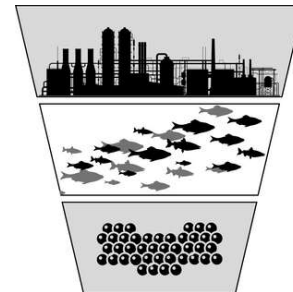


Developing a proactive, modernized, holistic approach to ensure optimal health and condition of Hatchery Production



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Two modern molecular-based approaches have been successfully applied to assess shifts in holistic health of hatchery cohorts: 1) Salmon Fit-Chips applied to gill biopsy samples to assess stress, infection, disease, and smolt readiness, and 2) environmental RNA (eRNA) applied to source water coming into the hatchery and culture tanks/ponds to monitor presence and abundance of dozens of pathogens and parasites. After two years of validation at two enhancement hatcheries, these technologies are deployment-ready for non-lethal application in hatcheries culturing stocks of conservation concern.

In 2022-2024, enhancement stock cohorts at Nitinat and Robertson Creek hatcheries were sampled bi-weekly/monthly over two years of production. Fit-Chip data revealed shifting levels of thermal and oxygen stress across hatchery cohorts in the first year, and no apparent stress in the second year. Viral disease associated with Pacific Salmon, Nidovirus infection, in gill tissue was associated with hypoxia stress and morbidity at one hatchery. Altering source water resulted in a shift in pathogen profiles in fish across hatcheries. In 2023, Fit-Chip classifiers revealed that only 50% of Chinook reached full smolt status at the time of release, whereas over 90% of fish

Take-aways

- A proactive holistic health monitoring approach based on high throughput molecular technologies has been validated for utility in two salmon enhancement hatcheries, and is now ready for minimally invasive application in hatcheries culturing conservation stocks.
- The technical approach revealed annual shifts in stress, infection, and timing of smolt readiness.
- Future monitoring of pathogens in hatchery source water is crucial to minimize infection potential and maximize post-release survival in stocks of conservation concern.

were full smolts at release in 2024 across both hatcheries.

In 2025-2026, A minimally invasive approach will be applied to Conservation Hatchery Stocks. Gill biopsies from all moribund fish and bi-weekly collection of water filters for eRNA to be collected by hatchery staff, with preserved samples mailed bi-weekly to PBS. Molecular analyses of gill and water samples would be processed simultaneously for all participating hatcheries upon receipt, and bi-weekly reports sent back to hatcheries. Hatchery managers can use this information to address husbandry needs that minimize infection/stress and guide release timing to optimize post-release survival.

Timeline

- ✓ Apr–Aug 2023: Co-developed approach with hatchery staff, sample and laboratory analysis, developed database and reporting scripts; final report by end of summer 2023
- ✓ Jan–Jul 2024: Repeated with monthly reporting
- ✓ Mar 2024: Presentation to PSSI-SEP Fish Health research committee
- 🔄 Jan–Jul 2025 and Jan–Mar 2026: Repeat for 6-8 conservation stocks; bi-weekly reporting

DFO Science Division

**Aquatic Diagnostics,
Genomics and
Technology**

DFO Science Section

Molecular Genetics

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Locations

**West Coast
Vancouver Island,
Robertson Creek,
Nitinat**

Species

Chinook

Project ID

2448

