

Completion Report to: Oregon Watershed Enhancement Board  
775 Summer Street NE, Ste 366  
Salem OR 97301-1290

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**Banks Genetic Pedigree – Nonpareil Dam Adult Trap  
PROGRESS REPORT Contract 209-904**

Total amount requested:  
\$ 265,384

Term:  
Jan 01, 2009-Oct 31, 2011

Principal Investigator:

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## OSU Component for Nonpareil Dam Adult Trap and Genetic Pedigree Jan 2009 through Dec 2009

Contract 209-904 is a follow-up on the CHIP proposal (Conservation Hatchery Incentive Project) focusing on the following 5 primary tasks of the original grant proposal:

**Task 2.** What is the relative success of unfed fry releases compared to smolt releases in producing returning adults?

**Task 3.** What is the reproductive success in the wild of adult fish from the following treatments:

- a. First-generation hatchery fish from unfed fry releases;
- b. First-generation hatchery fish from smolt releases;
- c. Multi-generation hatchery fish from unfed fry releases;
- d. Multi-generation hatchery fish from smolt releases; and
- e. Wild fish.

**Task 6:** What is the incidence of natural crossing between adults from the different treatment groups while on the natural spawning grounds and the consequences of mate choice to the relative production of offspring by individuals;

**Task 7:** What differences in reproductive success occur by treatment by age (males), by gender, by adult run time, and by adult body size (length)?

**Task 8:** Does the size of the naturally-produced population increase due to successful natural reproduction by hatchery fish? Does the contribution to this increase vary by treatment group?

Post Doctorate Véronique Thériault focused in the last year on analyzing data related to the first estimate of reproductive success in the wild of hatchery versus wild fish (F2 returns, 2 cohorts completely genotyped). A manuscript has been submitted to Molecular Ecology in January 2010 presenting these findings (abstract attached). In summary, we found:

- Coho salmon that spent very little time in captivity (released as unfed fry, age 0), as well as fish raised for one year in the hatchery (released as smolts, age 1), both experienced lower lifetime reproductive success in the wild than wild fish.
- Hatchery males appeared to be more severely affected than hatchery females (average 59% versus 77% lower reproductive success, respectively).
- The subset of hatchery males that returned as 2-year olds (jacks) did not exhibit the same fitness decrease as males that returned as 3-year olds.

We concluded that our results point to relaxed selection during the reproduction phase of the life cycle, rather than selection on juveniles, as the mechanism causing fitness declines in hatchery fish. We are expecting to add one replicate (F2 returns in fall 2009 that will be analyzed in spring 2010) that will allow us to assess differences or similarities in results over a temporal scale and rigorously evaluate our conclusions.

Another manuscript related to the success of unfed fry releases versus smolt releases that was at the draft stage in previous reports is now in press in the Canadian Journal of Fisheries and Aquatic Sciences, and will appear in the March issue. A draft copy is attached.

Véronique presented her different findings at seminars at Laval University, Quebec, Canada in January 2009 as well as at the Abernathy Fish Technology Center in Longview, Washington in April 2009. She also shared her results at the Legislative Coastal Caucus in Salem, Oregon, in March 2009.

Graduate student Marc A. Johnson completed his PhD and he and Dr. Banks celebrated commencement in June 2009. His thesis entitled:

**Patterns of Natural Selection and demography in Coastal Oregon Coho salmon (*Oncorhynchus kisutch*) Populations: Evidence from Neutral and Olfactory receptor Gene-linked Markers**  
to follow in snail mail and available at:  
<http://ir.library.oregonstate.edu/jspui/handle/1957/11595>

Chapter 1 was published in *CJFAS* under title:

**Genetic Structure, migration and allelic Richness Among coho salmon (*Oncorhynchus kisutch*) populations of the Oregon Coast**

– pdf attached.

Chapter 3 came out last year in *MARINE GENOMICS* under title:

**Interlocus variance of FST provides evidence for directional selection over an olfactory receptor gene in Coho salmon (*Oncorhynchus kisutch*) populations**

– pdf attached.

Chapter 2 is currently in revision for submission for peer review publication later this year.

We are happy to report that Marc was selected for Fisheries Research Analyst position with the Oregon Department of Fish and Wildlife, working with upper Willamette River spring Chinook hatchery management, a post he began on the 1<sup>st</sup> February, 2010.