



Study of Summer and Winter Run Steelhead Distributions in the Somass, Ash and Stamp Rivers

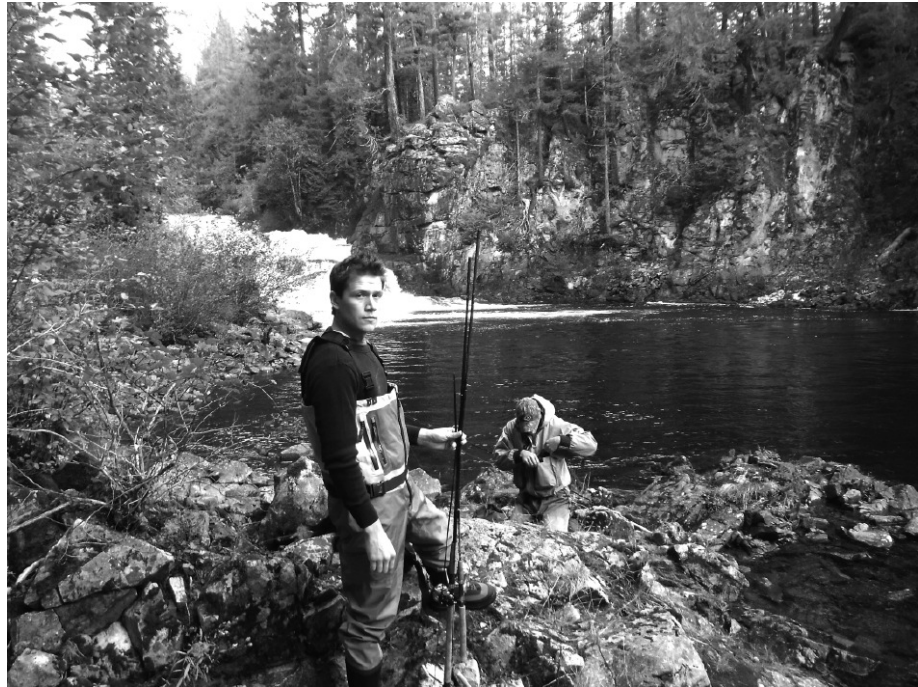
This is the second instalment of a special summer series focusing on a research project in Nuuchah-nulth Ha-ha-houlthee.

This and other research-based projects help further the objectives of Uu-a-thluk to manage our aquatic resources consistent with Nuuchah-nulth practices and principles, complimenting and reinforcing Ha'wilth patuk Ha'wiih (Nuuchah-nulth governance).

There's a growing body of evidence that anadromous fish had access to the upper Ash in the past and some access to the Elsie Dam now (with steelhead and coho for some years). Discussions on developing fish passage objectives for the Ash River with various management agencies and interested groups are constrained by concerns over the potential impacts to summer run steelhead trout in the Ash River based on current assumptions of their distribution. For example, modifying access in the Ash River to allow unrestricted migration of anadromous fish above Dickson Falls could result in a loss of the distinct summer steelhead populations in the Ash.

A key factor in the discussions is the assumption that the area above Dickson Falls is a summer steelhead refuge. Summer run fish migrate into the system in late May, peaking in July. It is assumed that they're able to migrate past lower barriers on the Ash River as far up to the Elsie Lake Dam and generally spawn earlier than winter steelhead. Winter fish arrive later, peaking in January, and predominately use the Stamp and Somass Rivers. Because of water flows and lower temperatures, it is presumed that they can't migrate past the lower falls on the Ash River. So determining if a steelhead is either a summer or winter run is primarily based on observations of location in the watershed and the time of spawning.

To help address the uncertainty of the status of the winter and sum-



Hupacasath Fisheries Technician (John Porter) and BC Conservation Foundation Biologist (Jeremy Damborg) collecting DNA samples from steelhead at Dickson Falls on the Ash River in 2014.

mer steelhead distributions in the Ash River, researchers examined the genetic variability of the summer and winter steelhead populations in the Somass watershed. This was to determine if summer and winter steelhead can be identified genetically, and if this information can improve the understanding of the distribution of summer and winter steelhead within the Ash and Somass watershed as a whole.

The proponent of the study was Hupacasath First Nation, with most of the funding from BC Hydro's Fish

& Wildlife Compensation Program (FWCP). The leads were Uu-a-thluk Biologist, Jim Lane and Scientist Dr. John Taylor with assistance and input from MOE and BC Conservation Foundation staff. Researchers collected and assigned samples from historic and present day steelhead to the one of six assumed populations—Ash wild summers, wild Stamp summers, contemporary hatchery Stamp summers, wild Stamp winters, late Stamp summers and Stamp fall run, as well as a 1990s' sample from the Robertson Creek hatchery (Robert-

son). These samples were then sent for analysis to DFO's Genetic Lab at the Pacific Biological Station (PBS) in Nanaimo, world renowned for its work in fish genetics.

To read Part 1 of this study, please visit Uu-a-thluk's website homepage at uuathluk.ca

To read the complete study on steelhead in the Somass, Ash, and Stamp Rivers use the following link: <http://uuathluk.ca/wordpress/wp-content/uploads/2017/05/Somass-Stamp-Ash-Steelhead-Genetics-Final-March-15-2016.pdf>



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Study of Summer and Winter Run Steelhead Distributions in the Somass, Ash and Stamp Rivers

This is the third and final instalment of a special summer series focusing on a research project in Nuuchahnulth Ha-houlthee. This and other research-based projects help further the objectives of Uu-a-thluk to manage our aquatic resources consistent with Nuuchahnulth practices and principles, complimenting and reinforcing Ha'wilth patuk Ha'wiith (Nuuchahnulth governance).

The results of the DNA analysis did shed light on steelhead genetics in the Somass watershed, while at the same time showing that further work is needed. A principal component analysis of the populations (Figure 2.) indicates the Ash summers and the Robertson populations are genetically distinct between themselves and the Stamp summer and winters and the contemporary hatchery populations. Whereas the Stamp summer and winters and hatchery populations appear to be closely related to each other (Note: The Robertson group is from samples collected at the Robertson Creel hatchery in the 1990s.).

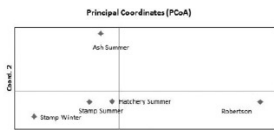


Figure 2. Principal component plot illustrating genetic separation among the primary groups of Stamp Somass steelhead (From Taylor and Lane, Genetic Assessment of summer and winter run Steelhead salmon in the Ash River. 2016).

In a principal component analysis, the greater the distance between groups, both within and between compartments, the greater the genetic separation. In this case, the Ash summer and Robertson groups occupy their own compartment and are the longest distance away from each other and the other groups, indicating they are the most genetically distinct groups. In contrast, the Stamp summer



Uu-a-thluk Biologist Danny O'Farrell with a steelhead caught in the Ash River just below the Dickson Lake.

and winters and the hatchery groups are all within the same compartment and are relatively close to each other, indicating the genetic separation in these three groups is very small.

Other analytical procedures indicate that, while the differences between these three populations are statistically significant, they are too small to conclude that they're independent of each other. Therefore they should be considered a single population group for now.

The genetic analysis showed Ash summers as being genetically different from the Stamp summers and winters and contemporary hatchery which grouped together. However, other analysis indicated 30 per cent of the Ash summer samples being either Stamp summer or winter steelhead. One interpretation of these results is that the Ash summer steelhead are distinct genetically, but Stamp winter and summer steelhead can also access habitats above the Dickson Falls barrier. This indicates that the Ash River above Dickson Lake is not a refuge for Ash summer steelhead. An alternative interpretation is that the genetic baselines for the summer and winter

populations we developed need to be refined.

As mentioned in part one of this article, assigning steelhead in the Somass to summer or winter categories is done by field staff based on the protocols of location, spawning condition, and the time of the year the fish is caught. Many of the summer steelhead samples used in this study were caught in the winter, so the potential for misassignments exists. Interestingly, a similar issue of misassignment was discovered a few years ago in DFO's Puntledge River summer Chinook enhancement program. In this case, summer Chinook were distinguished by their run-timing in to the Puntledge River. When researchers carried out genetic testing, DFO discovered a significant number of Chinook being used for summer sun broodstock were found to be either, fall run or summer/fall run hybrids. To confirm if the Ash River above Dickson Lake is a refuge for Ash Summer steelhead and to see if the Stamp Summers, Winters, Hatchery group can be separated further, researchers will need to collect additional genetic samples

using different sampling protocols. For example, summer steelhead samples would only be collected in the summer months, when there's almost no possibility of overlap with the winter populations.

The Fish and Wildlife Compensation Program on behalf of its program partners BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and the public, funded this study in keeping with its aim to conserve and enhance fish and wildlife impacted by the construction of BC Hydro dams. Uu-a-thluk Biologist, Jim Lane and Scientist Dr. John Taylor and fisheries managers working with Hupacasath First Nation hope that this study will help further the research in to the distribution of steelhead in the Stamp, Somass and Ash rivers to aid the discussions of fish passage in the Ash system.

To read the complete study on steelhead in the Somass, Ash, and Stamp Rivers use the following link: <http://uuathluk.ca/wordpress/wp-content/uploads/2017/05/Somass-Stamp-Ash-Steelhead-Genetics-Final-March-15-2016.pdf>