



## Fish Assemblages and Genetic Stock Determination of Salmon in Bering Land Bridge National Preserve



### Background

The National Park Service and the Alaska Department of Fish and Game (ADF&G) staff from the Alaska Freshwater Fish Inventory (AFFI), Anadromous Waters Catalog (AWC), Division of Commercial Fisheries and Gene Conservation Lab (GCL) programs completed a multi-year fish habitat and population genetics project in waterbodies of Bering Land Bridge National Preserve (BELA). This project, funded by the Office of Subsistence Management Fisheries Resource Monitoring Program through an agreement with the NPS (grant number P21AC10663-00), aimed to document habitats supporting anadromous fishes, such as salmon and some whitefishes, as well as resident freshwater species in the waters draining into or out of BELA. Our other primary goal was to establish genetic baselines for salmon populations in four target streams: the Nuluk River, Arctic River, Serpentine River, and Nugnugaluktuk River. Through this project, streams were identified that support anadromous species such as salmon and some whitefish species and then nominated to the AWC, which provides some additional protections to these streams pursuant to the Anadromous Fish Act (AS 16.05.871). Although we initially tried to only sample genetics of pink and chum salmon, we were able to expand to coho salmon. This project began in July 2021 and ends in December 2024.

### Field work

During the summer of 2021, the project began with fish surveys combined with genetic sampling for pink salmon and chum salmon in August. We performed aerial surveys for spawning coho salmon and Dolly Varden that October. Our 2022 efforts involved more dedicated sampling for genetic baseline data of pink and chum salmon in August. In 2023, we performed seasonal sampling in June, July, and October to better document fishes in lakes, collect species like the spring spawning rainbow smelt, and to collect enough genetic samples for coho salmon during their fall spawning period in the South Fork Serpentine River. Throughout this project, we caught fish for surveys and genetic samples by backpack electrofishing, raft electrofishing, gillnetting, seining, minnow trapping, and angling.



*Left: Backpack electrofishing a beaver dam in a small tributary to the South Fork Serpentine River; Right: Raft electrofishing for salmon in the Arctic River.*



*Left: June experimental gillnetting Kuzitrin Lake; Right: October seine haul of salmon in Serpentine River.*

## Results

**Fish surveys** – We sampled 96 sites and caught 20 species, 10 of which were anadromous species. We submitted 57 nominations to the AWC that included documented spawning by all five species of Pacific salmon, juvenile rearing of coho salmon and Dolly Varden, presence of pond smelt, rainbow smelt, Bering cisco, and humpback whitefish. These nominations added or extended 300 kilometers (186 miles) of habitat across 38 different waterbodies in the AWC. Other nominations involved adding new species or life stages ( $n = 21$ ) or providing supporting data ( $n = 17$ ) to waterbodies already listed in the AWC. Freshwater resident or saltwater fishes caught included Alaska blackfish, northern pike, Arctic grayling, slimy sculpin, round whitefish, burbot, threespine stickleback, ninespine stickleback, starry flounder and Arctic flounder.



*Left: Pond smelt from the Nugnugaluktuk River; Right: Burbot from Kuzitrin Lake.*

**Genetic baselines** – We sampled 2,094 salmon for genetics, 96% of those samples were for chum and pink salmon (Table 1). Chum salmon from the four target rivers were assigned to the Kotzebue Sound genetic reporting group. Pink salmon were assigned to the western Alaska genetic reporting group. All samples of chum, pink, and coho salmon contributed to filling in large spatial gaps in genetic baseline data coverage by the Division of Commercial Fisheries GCL.



*Table 1. Genetic samples per salmon species collected from Seward Peninsula streams, 2021-2023.*

Species	Genetic samples
Chum salmon	720
Coho salmon	81
Pink salmon	1,288
Sockeye salmon	5

Genetic sampling provides managers and geneticists data to inform mixed stock analysis of commercial fisheries catching salmon from different streams or regions. Understanding mixed stock fisheries is important to assess how different salmon stocks that also contribute to subsistence or sport fisheries are involved with the commercial fisheries. For more information on the GCL, visit their webpage: <https://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main>



*Left: June ice-out gillnetting Kuzitrin Lake; Right: July gillnet set at the mouth of Cripple River, Kotzebue Sound is in the background.*

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The Anadromous Waters Catalog and the Alaska Freshwater Fish Inventory Database are updated annually in June. Both can both be viewed interactively online at

**[www.adfg.alaska.gov/sf/SARR/AWC](http://www.adfg.alaska.gov/sf/SARR/AWC)** or through an internet search of “Alaska AWC.” Click ‘Interactive Mapper,’ then ‘Start Mapper’ and select either the AWC tab (default) or AFFI tab at the top of the page.

**Can you provide documented information on anadromous fish (with photos and GPS coordinates) leading to AWC nominations?**

- The Indigenous Sentinels Network’s **Fish Map App** can be used to submit nominations to the AWC, and approved nominations will **earn you \$100!** Visit [alaskafishmapping.org](http://alaskafishmapping.org)
- Or, contact the ADF&G staff members listed above.

**2021-2023 Bering Land Bridge National Preserve project photos (captions below each image):**



Cannibalistic Dolly Varden from Hot Springs Creek.



A fish survey site at Hot Springs Creek.



Aerial survey along the Pinguk River.



Male chum salmon from the South Fork Serpentine River.



October fish sampling on upper Nuluk River.



Recording habitat data at a Kuzitrin Lake tributary stream.