

Dolly Varden Life History and Mixed-Stock Analysis

Study period: 2021-2023

Funded by USFWS-OSM

Conducted by ADF&G , USFWS, UAF

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Priority Information Need

Changes in species compositions, abundance, and migration timing, especially of Dolly Varden and whitefish species in the Northwest Arctic area, to address changing availability of subsistence fishery resources.



Objectives

Using otolith microchemistry, characterize:

- Age-at-length
- Age at first seaward migration
- Frequency of seaward migration
- Maximum age
- Overwintering location



Dolly Varden Life History

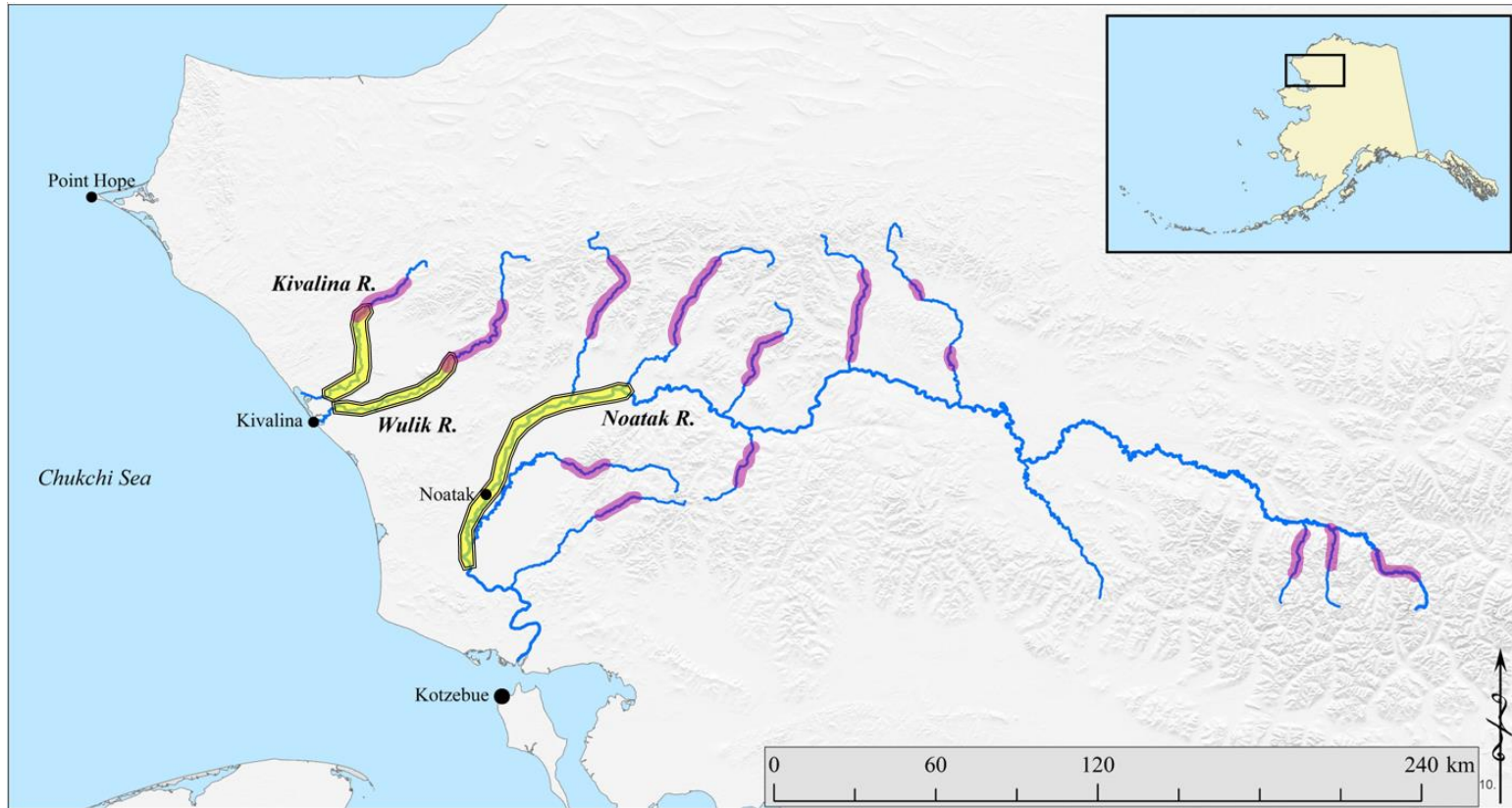
- Rear for 2-4 years in rivers
- Migrate to ocean in summer for feeding
- Return to rivers in fall to spawn/overwinter
- Often spawn and overwinter in different rivers
- Spawn every other year (typically)



A person wearing a blue jacket and a red hat is working on a boat deck. They are surrounded by large fish, likely salmon, which are hanging from wooden poles. The person is holding a fish and appears to be inspecting it. The background shows the boat's structure and a clear blue sky.

What we don't know

- What age do fish make their first ocean migrations?
- How often do they spawn?
- How often do they migrate/skip migration?
- Do different spawning populations overwinter in different areas?
- Have there been changes since the 1980's?



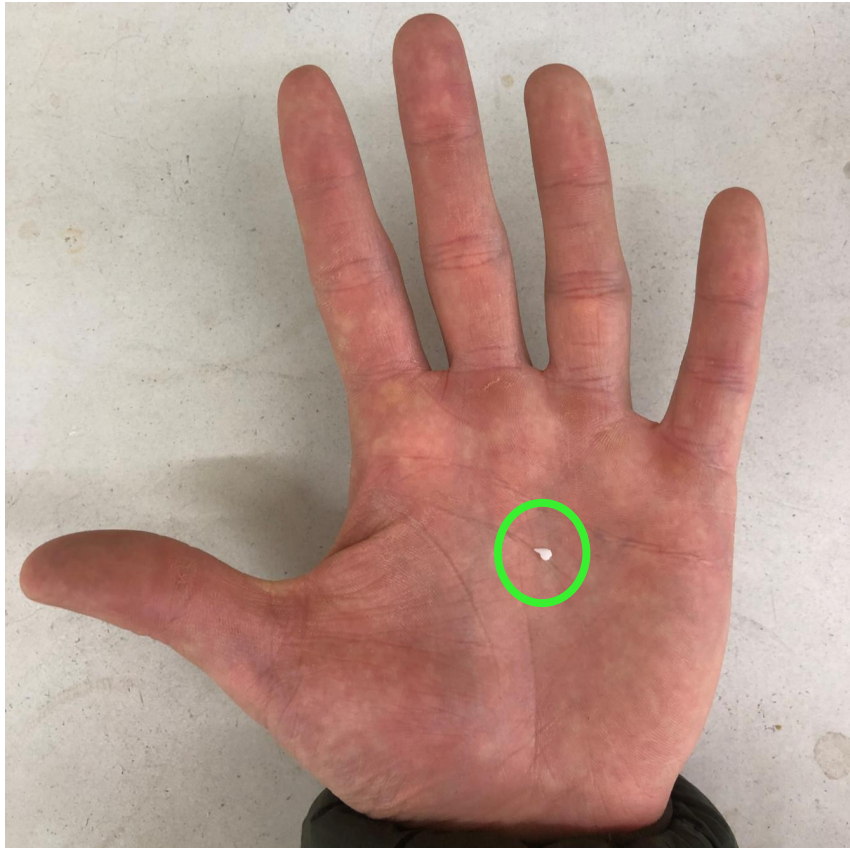
Major Dolly Varden spawning (purple) and overwintering (yellow) areas in northwestern Alaska are highlighted.



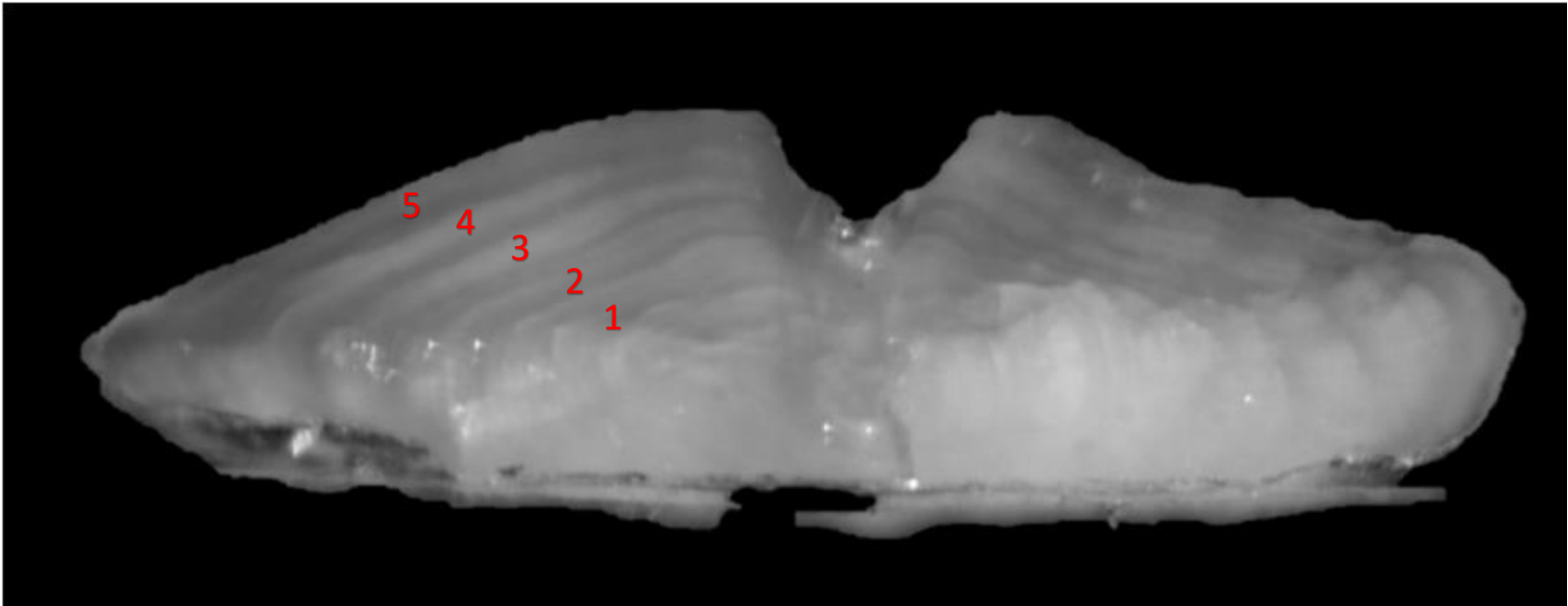
Becky Norton of Kivalina provided samples from her subsistence Dolly Varden catch, May 2022



Students of Noatak School provided samples from their subsistence catch, April 2022

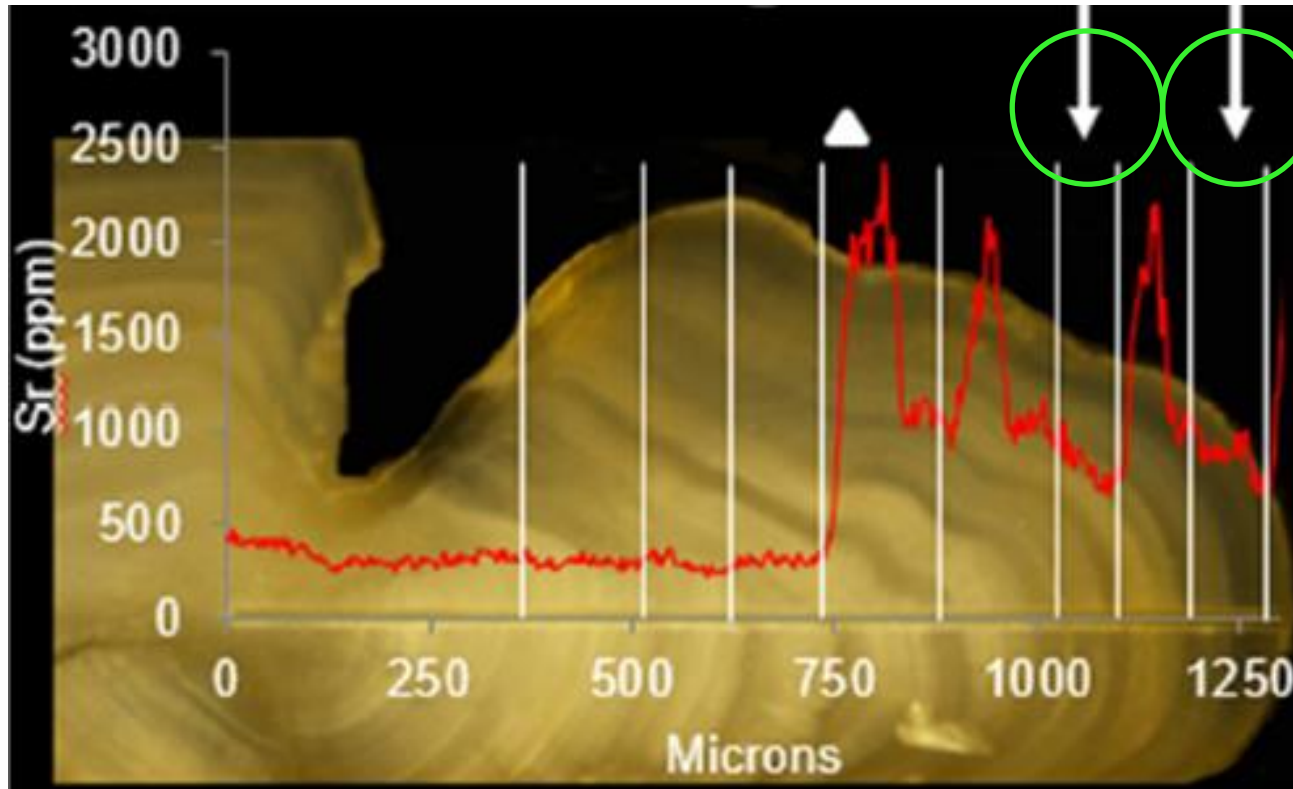


Dolly Varden otoliths



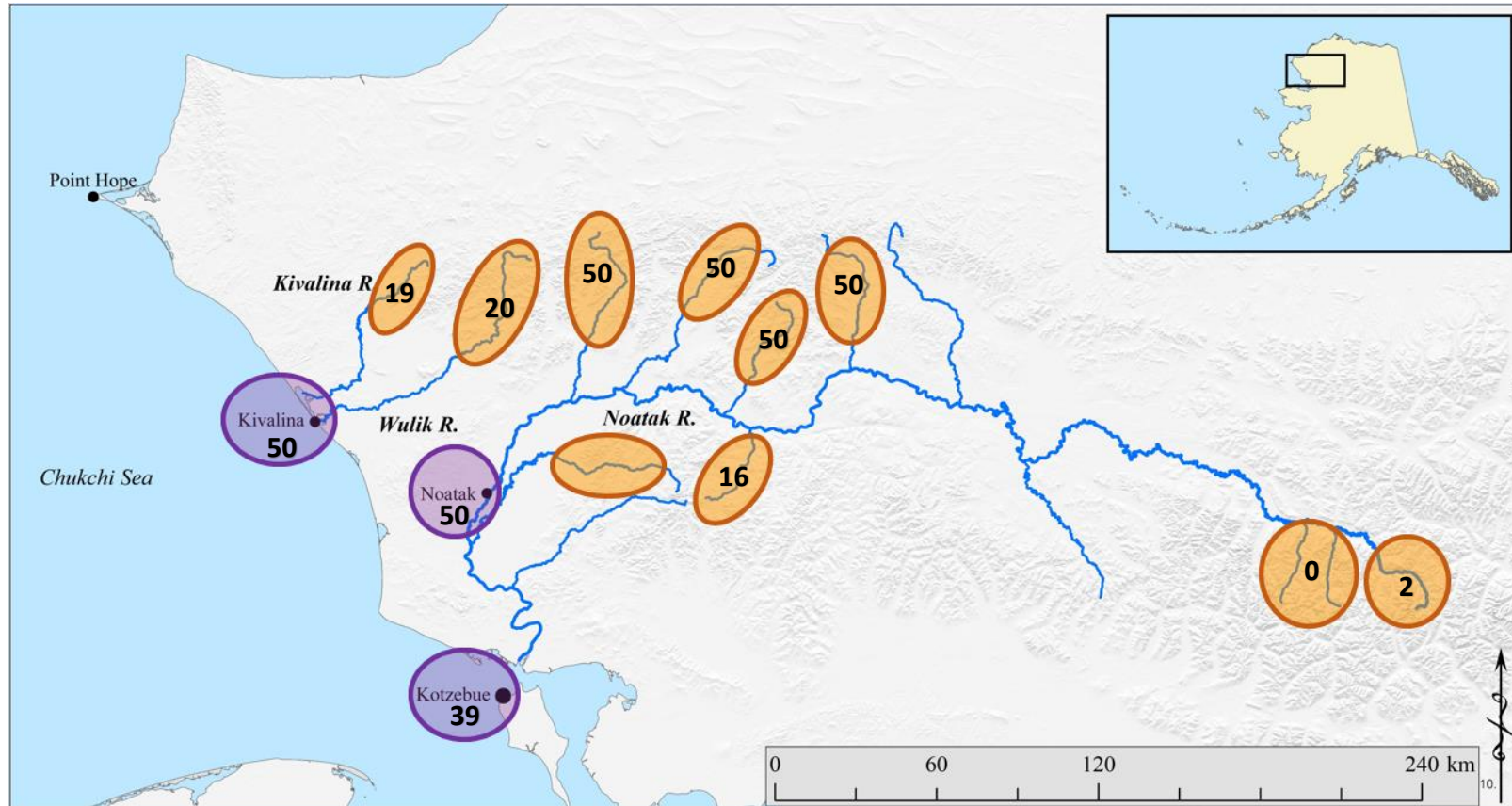
Christie Morrison, DFO Canada

Dolly Varden otolith thin-sectioned for ageing. This Dolly Varden has overwintered 5 times.



Colin Gallagher, DFO Canada

Dolly Varden otolith with Strontium (Sr) concentration superimposed. Growth years with high strontium levels indicate seaward migration, and low strontium levels indicate freshwater residency. Circled arrows indicate years in which the Dolly Varden evidently did not migrate to the ocean.



Sample sites in northwestern Alaska, including major spawning areas (orange) and subsistence fisheries (purple). Numbers indicate the number of samples collected from each location as of October 2022.



Mineral-rich “seeps” have recently emerged in several tributaries of the Noatak River that historically contained spawning Dolly Varden populations. This phenomenon has also been observed in tributaries of the Wulik River, Kobuk River, and rivers on Alaska’s North Slope. These seeps often produce colorful, turbid water.



The cause of these mineral seeps and their effect on the spawning and rearing success of Dolly Varden is not well understood. In the summer of 2022, a crew observed this seep in the Igning River, a tributary of the upper Noatak River that was historically documented to contain several hundred spawning Dolly Varden. Few or no adult Dolly Varden were observed in rivers with seeps; we were not able to collect samples here.

Next Steps

- Analyze otoliths with microchemistry instruments at UAF
- Collect samples from the subsistence harvests in Kivalina and Noatak



Plate 3-7.—Noatak-style jigging gear. Photo by Nicole M. Braem, ADF&G.

Questions/comments?

