

Ichthyophonus in Yukon River King Salmon: Histology Results Summary

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Background

Subsistence fishers were the first to notice signs of disease caused by *Ichthyophonus* parasite infection in Yukon River Chinook (king) salmon, reporting white spots within muscle or organs, mushy fillets, and unusual smell. First reported in the 1980s and heavily studied in the early 2000s, an outbreak in 2020 raised serious concern because king runs dropped to record low returns and *Ichthyophonus* can kill kings.

Conservation Collaborations

Beginning in 2021 with a few samples and expanding drainage-wide in 2022, ADF&G and USFWS partnered with Tribal Governments, local fishers, academic institutions, and other organizations to study the impacts of *Ichthyophonus* on Yukon River kings. This work brought together Indigenous Knowledge, local observations, and western science. Sampling efforts were established at key locations from the lower to upper river with local and Tribal fishers contributing to fish capture and fieldwork. All sampled fish were given to communities for subsistence use. The collaborative effort provided the platform to explore salmon health, emphasizing community involvement and future conservation.

Information Collection

From 2022 to 2024, king salmon hearts were collected to understand the presence or absence of *Ichthyophonus* parasites and to count the number of parasites within infected heart tissue across the upriver migration path. In total, 1,378 kings were captured and sampled using a combination of ADF&G sonar test fisheries (Pilot Station and Eagle) and fish wheels operated in partnership between USFWS and local fishers at Rapids and Fort Yukon. Researchers used histology, a microscope lab-based technique, to examine heart tissue and study the relationship between *Ichthyophonus* and mortality risk.

Findings

Ichthyophonus parasites can cause visible inflammation in tissue, often marked by white spots that indicate infection, especially prominent in the hearts of king salmon caught near or after the middle river. The visual signs of disease are not as noticeable in the lower river. Histology results show that *Ichthyophonus* parasites were present in about 30 to 40% of the sampled kings each year, with similar rates across sampling locations. However, measuring parasite intensity (the number of parasites within infected heart tissue) provides more insight into potential impacts than simply looking at presence or absence. Kings with higher parasite counts are less likely to complete the long migration and may die before spawning. Yukon fishers from the upper river have typically seen fewer signs of disease, which supports the idea that the kings that remain actively swimming past upper river communities tend to have mild or no infection. Assessing parasite intensity is useful to estimate disease-related mortality and better understand *Ichthyophonus* impacts.

Complementary Studies

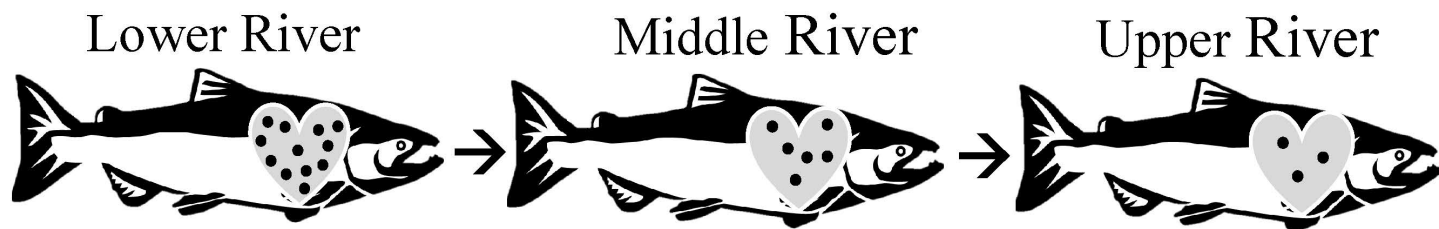
Additional partner projects helped us explore different stressors affecting Yukon River king salmon. These efforts tested other ways to identify diseases, including the potential use of muscle or blood which wouldn't require killing fish. Some investigated the impacts of diet deficiencies or heat stress caused by increased water temperature. In laboratory settings, researchers studied *Ichthyophonus* infections in juvenile kings over a range of water temperatures. Other work focused on marine food webs and identified opportunities to expand community-based monitoring. Together, these projects highlight the broad knowledge needed to identify the health threats salmon face. More detailed reports are expected in fall 2026.

Yukon River, 2022-2024



Ichthyophonus parasite intensity

As king salmon migrated upriver



Ichthyophonus in heart tissue

- Parasite intensity was based on the number of parasites counted using histology
- Parasite counts progressively decreased in fish caught farther upriver – likely due to highly infected fish dying before reaching the middle or upper river
- Parasite counts were highest in 2022 and decreased in 2023 and 2024
- Higher parasite counts were found in larger and later migrating kings

Count *Ichthyophonus* parasites under microscope

