TRIP REPORT

State of Alaska
Department of Fish and Game

Field Dates:	July 31 – August 2, 2024
Locations:	**Ft. Knox Stilling Basin, Water Supply Reservoir, Fish Creek and Developed Wetlands**
Objectives:	Sample Stilling Basin and Wetland Complex
Participants:	Chad Bear, Kieren Vasquez, Lauren Yancy (ADF&G Habitat) and Fort Knox environmental department college intern participants (FGMI)
Weather:	Rain, overcast, 50 – 60°F
Access:	State Truck

From July 31 to August 2, ADF&G staff made daily trips to the Ft. Knox Stilling Basin located below the Water Supply Reservoir (WSR) freshwater dam (Figure 1). Fish sampling was conducted using baited hoop traps for burbot, baited minnow traps for juvenile fish and angling for Arctic grayling (Figure 2). Two Fort Knox Environmental Department summer interns assisted in angling for grayling on August 1 (Figure 3).

Figure 1. Water Supply Reservoir spillway leading to the Stilling Basin, August 2, 2024.

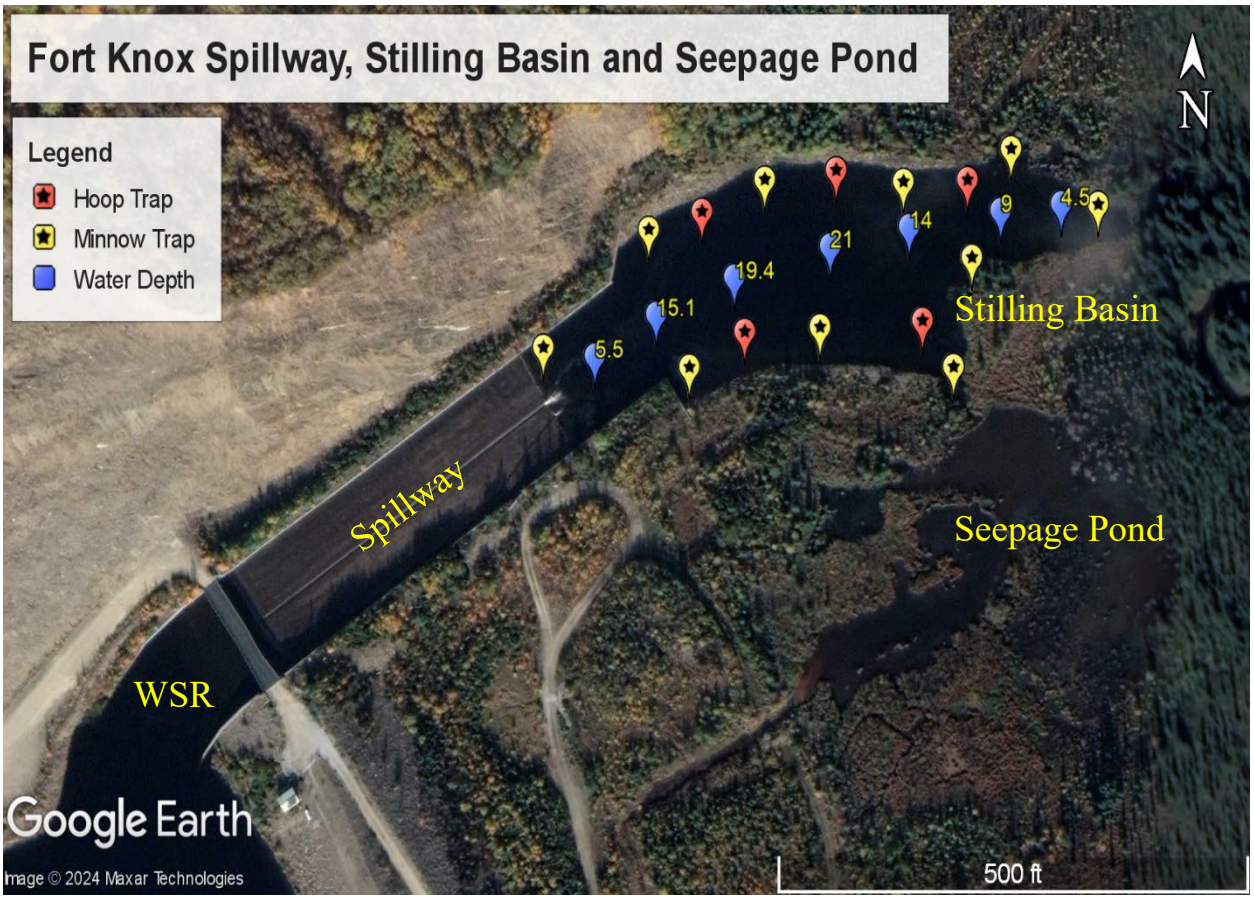

Figure 2. Ft. Knox WSR, Spillway, Stilling Basin and Dam Seepage Pond sampling and bathymetries (depth in feet).

Figure 3. ADF&G and Fort Knox Environmental staff angling for adult Arctic grayling.

During July approximately ten inches of precipitation fell in the Fish Creek drainage. Water was flowing over the entire surface of the spillway and in the low flow channel (Figure 1). Despite high precipitation for July, water temperatures in the Stilling Basin were still relatively warm and near 20°C. An ADF&G canoe is stored at the Stilling Basin and was used for setting the hoop and minnow traps. Angling for Arctic grayling is typically best around the spillway's low water channel that brings insects and cool water from the WSR into the Stilling Basin (Figures 1 and 3).

Population estimates of the Arctic grayling residing in the Stilling Basin were last performed in 2007-2009 and ranged between 815 to 1,159 fish (Ott and Morris 2009). The Stilling Basin was sampled for Arctic grayling in 2019, and 71 fish were captured and tagged during nine hours of angling effort; however a population estimate was not generated because a recapture event was not conducted (Bear 2020). During this 2024 sampling event only one Arctic graying was successfully captured during six hours of angling effort. The current population of adult Arctic grayling in the Stilling Basin may be at a lower level than in 2007-2009, or in 2019, based on the reduced ability to capture fish. Approximately 20 juvenile Arctic grayling were observed swimming in the shallow water around the edge of the basin. (Figure 4).

Figure 4. Juvenile Arctic grayling observed in Stilling Basin July 31, 2024.

Arctic grayling recruit into the Stilling Basin by passively flowing over the WSR spillway. Arctic grayling tagged during spring sampling in the WSR and Fish Creek Wetlands have been recaptured in the Stilling Basin during past sampling events, (Bear 2020). Fish movement up Fish Creek and into the Stilling Basin is unlikely as the outlet typically has a beaver dam in place that creates a vertical obstruction (Figure 5). Multiple beaver dams also exist further downriver in Fish Creek drainage limiting fish movement. During high water events, Arctic grayling residing in the Stilling Basin may be able to exit and move downstream in Fish Creek, but it is suspected they cannot return due to the beaver dam obstruction. In August through September of 2022 the WSR spillway relief valve was opened and the WSR water level was lowered 2 - 3 vertical feet for maintenance and inspections (Bear 2023). The increased velocity of water exiting the WSR created a high-water event in the Stilling Basin. Resident grayling may have exited the Stilling Basin and moved downriver in Fish Creek. The current beaver dam at the outlet is not as impassable as past years and grayling could also be steadily exiting the Stilling Basin in search of cooler water or food downstream.

Figure 5. Stilling Basin outlet beaver dam, August 1, 2024.

Five hoop traps baited with cut herring were set on July 31 near the middle of the Stilling Bain (Figure 6). Ten minnow traps were baited with cured salmon eggs and set along the shoreline (Figure 2). Traps were checked every day and fished for 48 hours before they were removed. Captured burbot were measured, tagged if ≥300 mm, then released. Eight burbot were caught in the hoop traps between 90 and 373 mm total length (TL). Three burbot were ≥ 300 mm and tagged with a unique numbered Floy tag near the dorsal fin. Minnow traps exclude large burbot from entering and typically capture more juvenile fish from a population. Fourteen burbot were caught in the ten minnow traps between 45 and 150 mm. One 70 mm slimy sculpin was also captured. These catch numbers are similar to the 2019 Stilling Basin sampling event but larger burbot were captured during that event. In 2019, eight burbot were captured and tagged between 320 to 615 mm TL in 22 hours of fishing effort. During this 2024 sampling event no tagged burbot were recaptured from the 2019 Stilling Basin sampling or past WSR tagging events.

Figure 6. Setting hoop traps in the Stilling Basin, July 31, 2024.

Twenty-two total burbot were captured during the 2024 Stilling Basin sampling. Fifteen of the captured burbot had a milky appearance to one or both of their eye pupils (Figure 7). Burbot pupils are typically black with yellow or golden colored irises (Figure 8). In some burbot the eyes were bulging or protruding from the head more than is typical for the species appearance. During past WSR and Fish Creek wetlands sampling events one or two burbot with similar conditions have been observed, but not in as large of a percentage of the population. Milky eyes were previously attributed to physical trauma to the fish's head, or to eye cataracts that develop in old age, and no special diagnostic testing was performed.

Figure 7. Two of the 15 burbot captured with milky pupils, Stilling Basin, August 1, 2024.

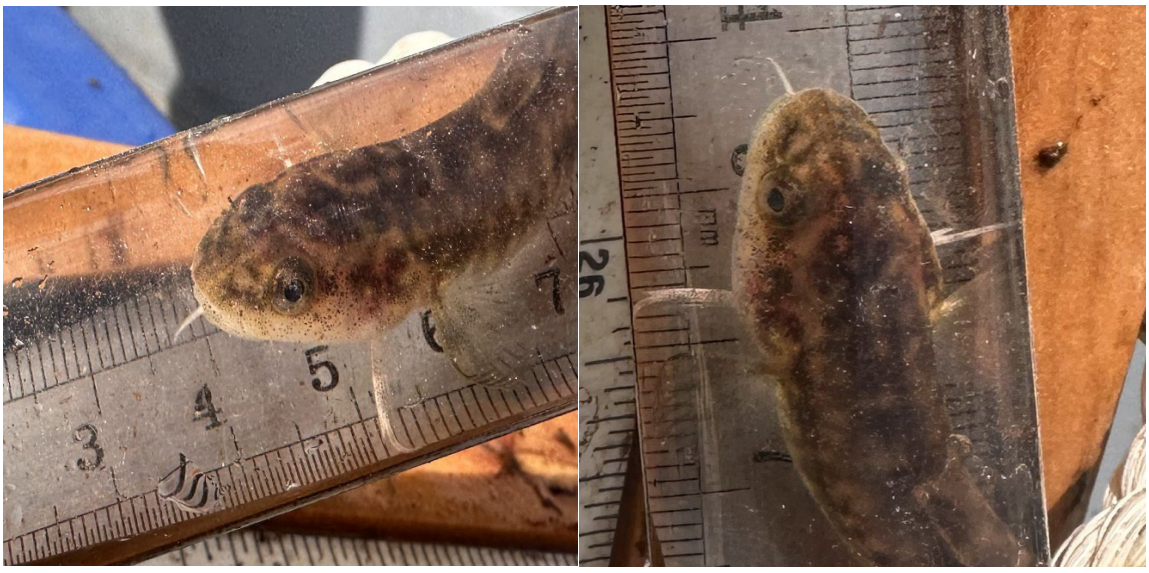

Figure 8. Burbot with normal pupils captured during the fall 2023 WSR burbot sampling.

Seven burbot were collected and frozen for diagnostic testing to determine the cause of the eye condition. Five samples will be sent to the ADF&G Fish Pathology Laboratory operated by the Division of Commercial Fisheries in Anchorage. Two samples will be sent to AZT Laboratories Inc for whole body elements analysis.

Eye fluke or Larval *Diplostomulum* of the Eye is a potential diagnosis (*Diseases of Wild and Cultured Fishes in Alaska Field Guide* - ADF&G Pathology Laboratory). This condition is caused by parasitic larval trematodes of the genus *Diplostomulum* that infect the eye of many freshwater fish species found in Alaska. A common trematode found in the eye lens is *D. spathaceum* while others are found in the vitreous chamber (pupil) of the eye. The parasite can remain in the eye for a long period of time often resulting in cataracts and blindness in the host (Meyers 2019). Fish become parasitized through the water from infested snails. The invasive cercariae (free swimming larval form of the parasite) are released from the host snail, penetrate the fish skin and migrate to the fish eye where the larva matures. The host fish may be consumed by a piscivorous host bird (ex/ Gull) where the larval fluke matures into an adult while in the intestinal tract. The mature fluke releases eggs into the water through expelled bird feces. Fluke eggs mature into miracidium (non-feeding larva) that infest snails in the water. The cycle is complete when the host snails release free swimming cercaria into the water and parasitize fish again (Meyers 2019).

Glaucous-winged Gull, Glaucous Gull and the Herring Gull (Gulls) are common in Alaska and up to twelve gulls of unidentified species are currently nesting on the rock face near the WSR spillway and Stilling Basin (Figures 1 and 5). These birds can be the host for other parasites, bacteria, viruses, and fungi that can infect resident fish. The ADF&G Pathology lab and AZT Laboratory may take up to six months to process these samples. Their findings will be reported in the ADF&G Fort Knox Technical Report that will be produced by the 2025 FGMI annual meeting.

Reports Cited:

Bear, C.E. and A.G. Ott. 2020. Fish and Water Quality Monitoring at the Fort Knox Mine, 2019. Alaska Department of Fish and Game, Technical Report No. 20-03, Fairbanks, Alaska.

Bear, C.E., and A.G. Ott. 2023. Fish and Water Quality Monitoring at the Fort Knox Mine, 2022. Alaska Department of Fish and Game, Technical Report No. 23-01, Fairbanks, Alaska.

Meyers, T., Burton, T., Bentz, C., Ferguson, J., Stewart, D., and Starkey, N. 2019. Diseases of Wild and Cultured Fishes in Alaska. Alaska Department of Fish and Game Fish Pathology Laboratory, Anchorage, Alaska.

Ott, A.G. and W.A. Morris. 2009. Arctic Grayling and Burbot Studies at the Fort Knox Mine, 2009. Alaska Department of Fish and Game Technical Report 09-05. Division of Habitat. Juneau.