TRIP REPORT

State of Alaska
Department of Fish and Game

Field Dates:	September 6 -16, 2022
Location:	**Fort Knox Water Supply Reservoir**
Objective:	Burbot Sampling in Water Supply Reservoir and Pond AB
Participants:	Chad Bear, Lauren Yancy and Olivia Edwards
Weather:	25°- 50°F, sun, rain, fog, wind, fall weather
Access:	State truck, motorized skiff

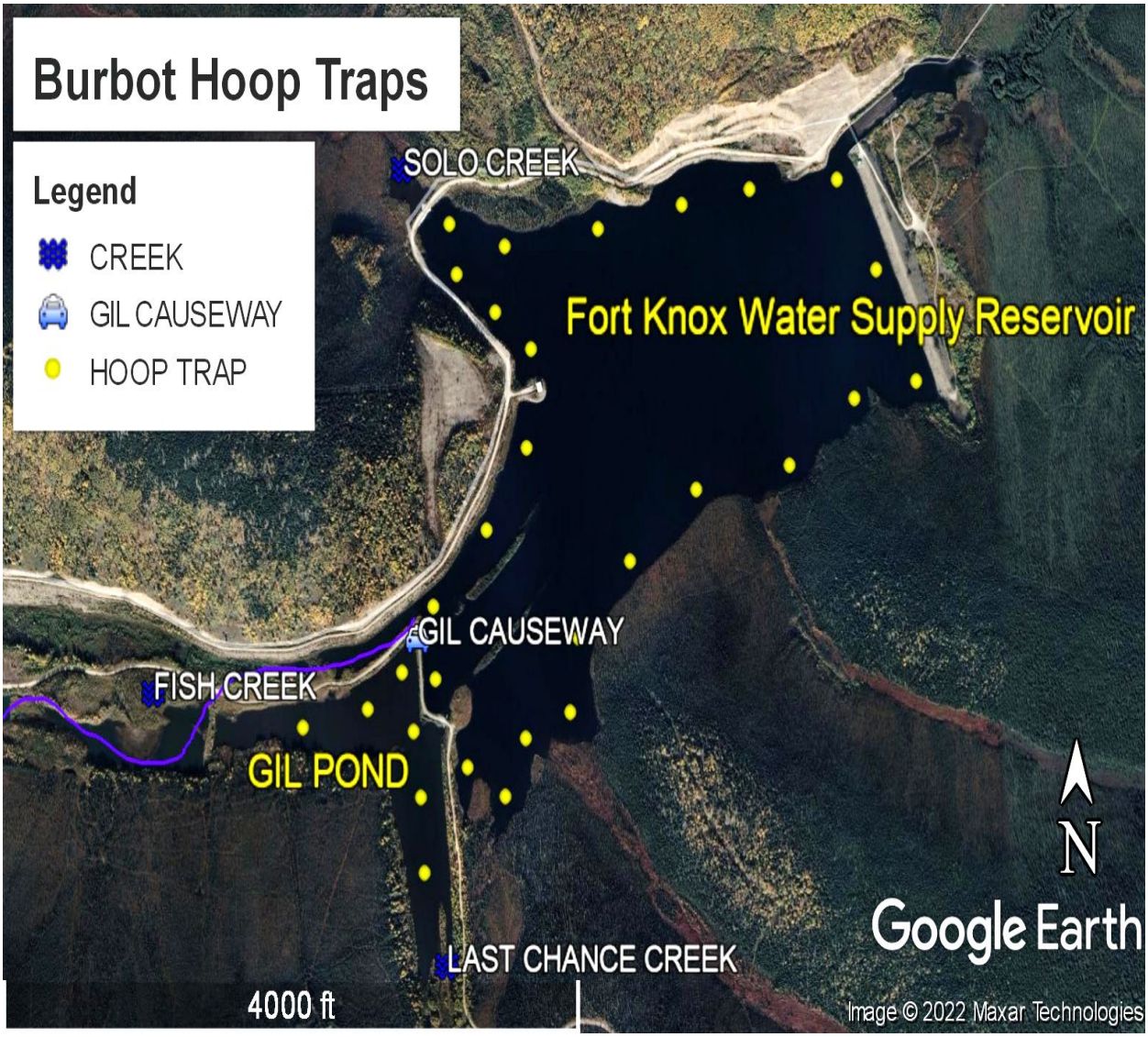

Figure 1. Fort Knox water supply reservoir and Gil Pond annual burbot hoop trap locations.

From September 6 - 16, Chad Bear, Lauren Yancy, and Olivia Edwards performed the burbot population assessment in the Fort Knox water supply reservoir (WSR). Twenty-four hoop traps were set in the WSR, and six in Gil Pond, which is connected to the WSR by several culverts (Figure 1). Traps were set at depths ranging from five to 15 feet of water. Deeper areas were avoided to prevent burbot mortality from low dissolved oxygen levels. The traps were baited with cut herring and checked every two to three days. The WSR was ice free for the duration of our trapping efforts and water temperatures ranged between 13.6°C on September 6 to 11.9°C on September 16. Three additional hoop traps were set in Pond AB on September 14 and checked September 16 to determine if burbot were inhabiting the uppermost water body in the Fish Creek wetland complex.

The WSR water level had been lowered during August for a required spillway inspection and maintenance. The spillway relief valve had been closed and water levels were returning to normal but remained 2 – 3 vertical feet below full on September 6 (Figure 2). During this period of low water, heavy equipment was used to remove two upland areas near the Gil Causeway and create additional wetland habitat. Water levels rose and returned to normal by September 16 and these areas were flooded creating shallow water aquatic habitat within the WSR (Figure 3).

Figure 2. WSR lowered 2 – 3 vertical feet for spillway inspection and maintenance, September 6, 2022.

Figure 3. Two upland areas removed during low water to create aquatic habitat in the WSR. These lowland areas were flooded when WSR water levels returned to normal on September 16, 2022.

Burbot in the Water Supply Reservoir

Burbot residing in the WSR and Fish Creek wetlands were captured during the 2022 spring Arctic grayling fyke netting event. During the 2022 spring sampling event, 35 burbot were captured in Fish Creek and North Fork Fish Creek fyke nets. Five of these were ≥ 300 mm and tagged with a unique numbered Floy tag. Most (32 of 35) burbot were captured in the North Fork Fish Creek fyke net. One burbot was recaptured that had been tagged in a prior year. No burbot were captured in the Pond AB fyke net during the 2022 spring sampling (May 9 - 17). The five spring newly tagged burbot were not included in the WSR burbot population estimate calculations as only burbot sampled annually from fall to fall are used.

The 2020 burbot population estimate used 2020 fall hoop trapping as the mark event, and 2022 fall hoop trapping as the recapture event. During September 2020, 123 burbot were captured, 110 were ≥300 mm and tagged, 78 of which were ≥400 mm. In the 2022 capture event, 135 burbot were caught, 75 were ≥300 mm and tagged, of these 45 were ≥400 mm, and 11 were recaptures from the 2020-mark event. In both events, fish from Gil Pond were included in the population estimate as it is connected to the WSR by culverts.

The 2020 WSR population estimate for burbot ≥400mm is 302 fish (95% CI: 171 to 432 fish). Population estimates from 2012 to 2020 have varied from a low of 80 to a high of 402 (Figure 4). The 2020 WSR population estimate for burbot ≥300 mm was not calculated because there were no recaptures in Fall 2022 between 300 and 400mm.

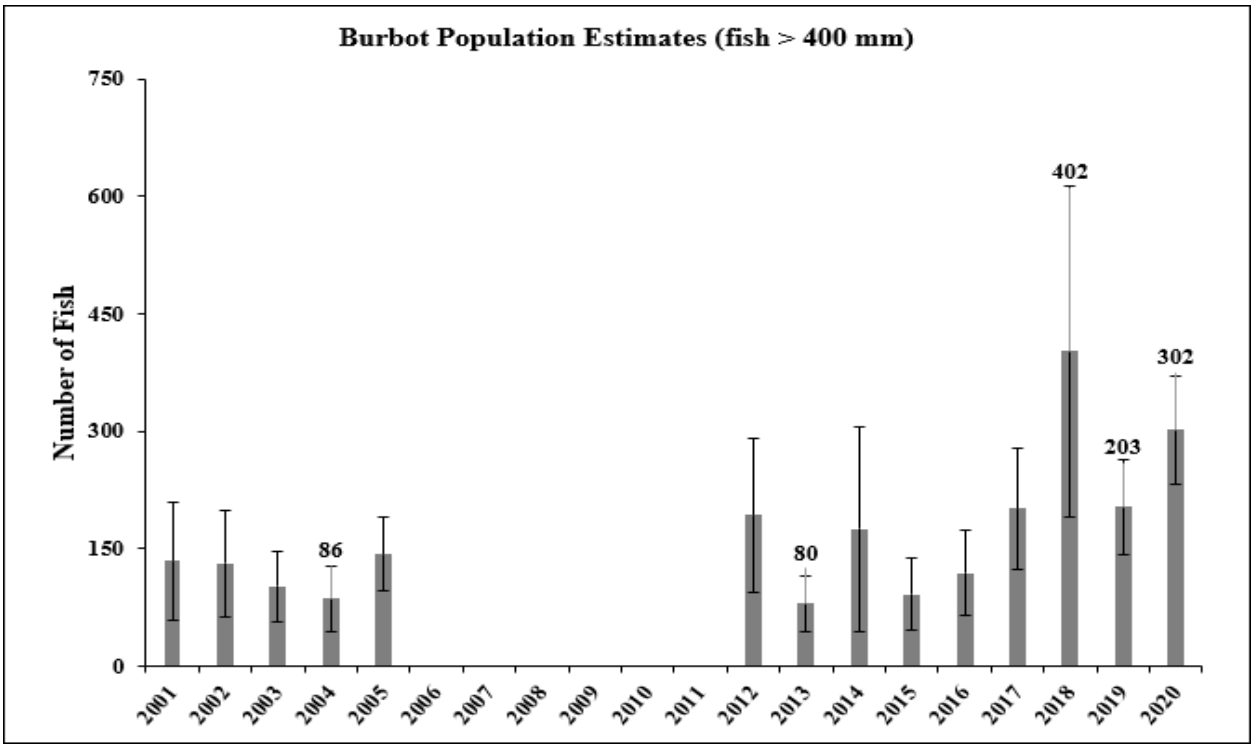

Figure 4. Population estimates of burbot ≥400 mm in the Fort Knox WSR, 2001-2020 (95% Confidence Interval).

Catch Per Unit Effort (CPUE) of all burbot captured in 2022 was 0.45 fish per day per trap (Figure 5). This is identical to the CPUE of 2020, but much lower than 2018's CPUE of 1.1. The 2022 CPUE is tied with 2019 for being the lowest since 1996. CPUE of burbot over 400mm decreased from 0.25 fish per day per trap in 2020 to 0.15 in 2022 (Figure 5).

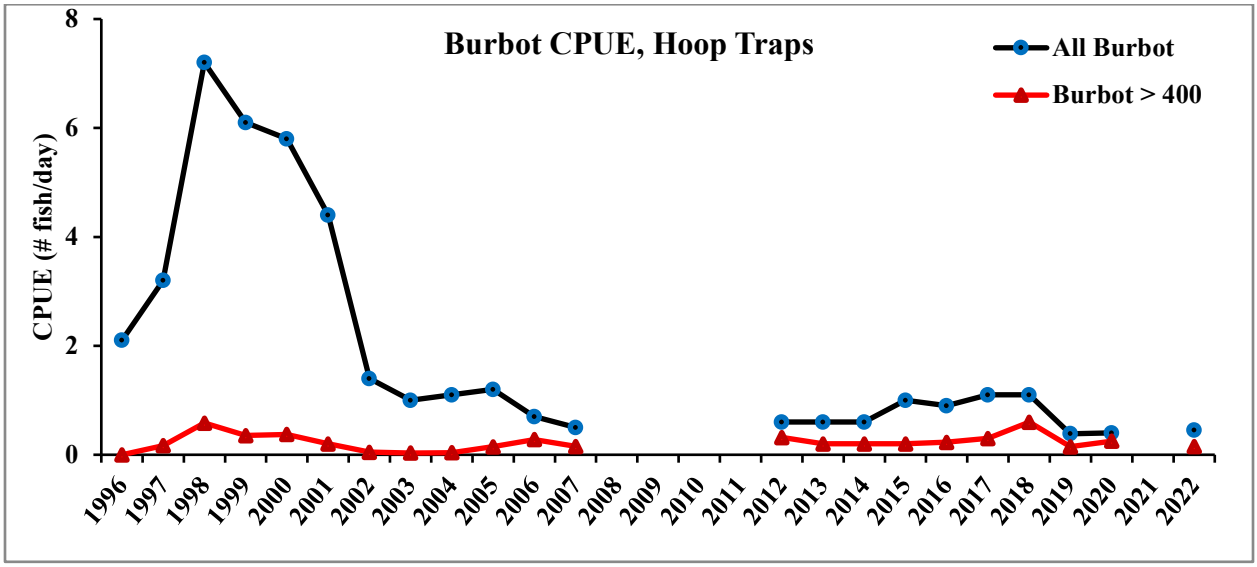

Figure 5. CPUE for all burbot and burbot ≥400 mm in the Fort Knox WSR.

In Fall 2022, 135 burbot were caught in the WSR with hoop traps. Burbot length ranged from 67 to 780mm (Figure 6). The burbot length distribution was more evenly spread across all size ranges compared to the 2020 length frequency (Figure 7). More juvenile burbot <200 mm were captured than in previous years with 21 of these <100mm (Figure 8).

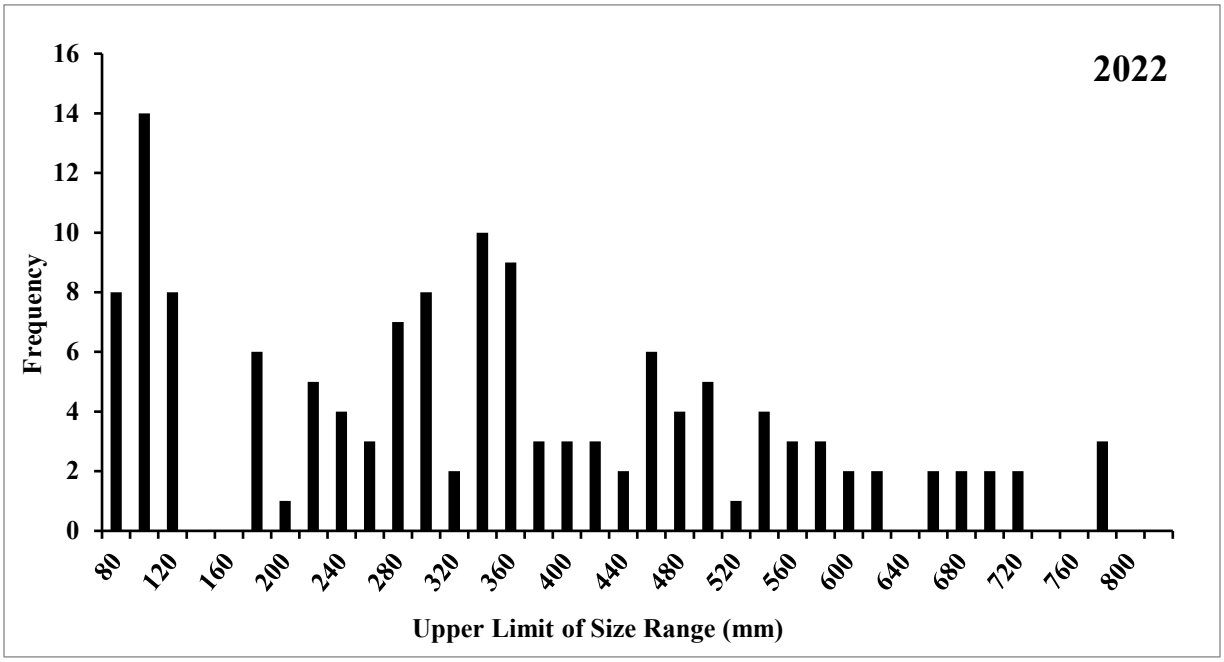

Figure 6. Length-frequency distribution of burbot captured in the Fort Knox WSR, 2022.

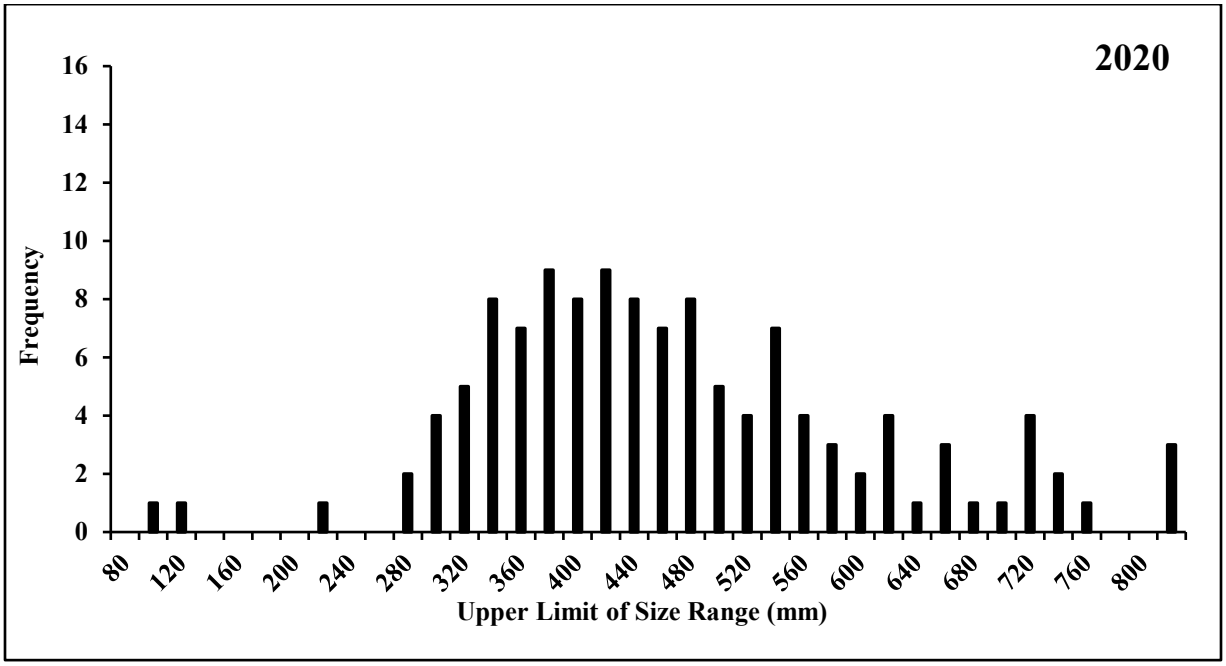

Figure 7. Length-frequency distribution of burbot captured in the Fort Knox WSR. 2020.

Figure 8. Examples of juvenile burbot <100 mm captured in Fort Knox WSR, September 2022.

Annual burbot growth in the WSR since 2000 ranges from 24 mm in 2013 to 70mm in 2016. The average annual growth rate since the year 2000 is 40mm. The most recent annual growth rate calculated was 2019 with an average of 39.9mm (Figure 9). The burbot growth rate in the WSR from Fall 2020 to Fall 2022 was not calculated because two years had passed between sampling events.

During the 2022 WSR sampling two melanistic burbot were captured (Figure 10). Melanistic animals occur naturally in animal populations such as black wolves or black sheep. These all-black burbot have been captured during past years sampling. Melanism is a hereditary genetic trait and these burbot are in an isolated population with a possible higher percentage than in a larger wild population because of interbreeding.

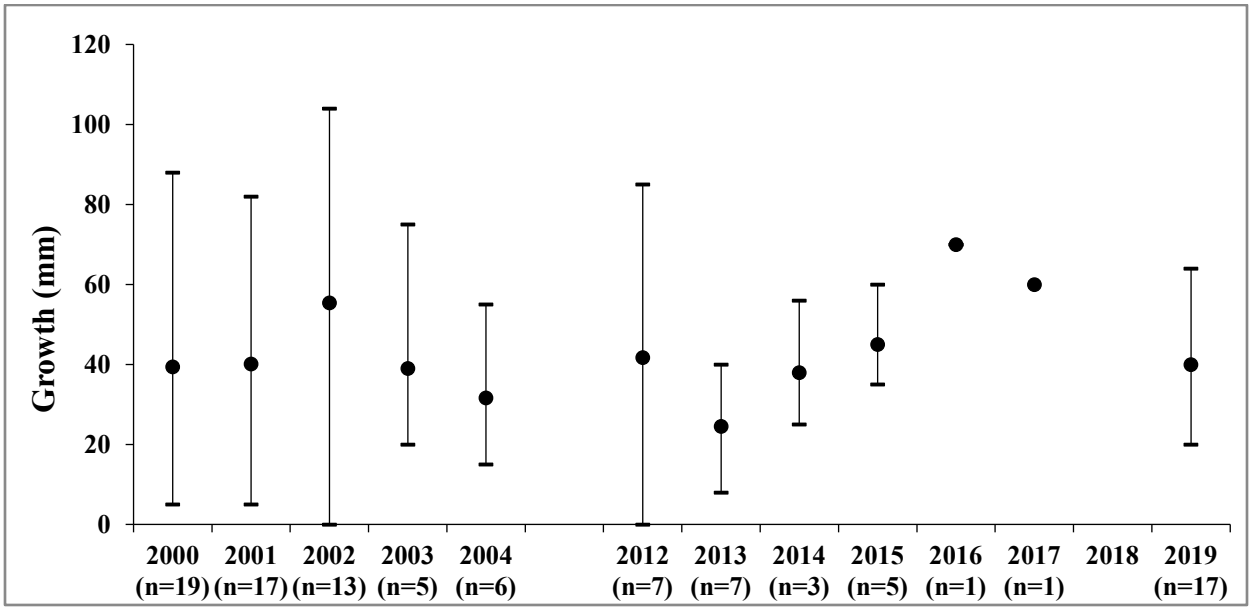

Figure 9. Average annual burbot growth rate in the WSR 2000-2019.

Three additional hoop traps were set in Pond AB on September 14 and checked September 16 to determine if burbot were inhabiting the upper most water body of the wetlands. Seven burbot were captured in the 48 hours the three hoop traps were fished (Figure 11). Burbot lengths ranged from 170mm to 301mm. We tagged the 301mm burbot but did not include it in the WSR burbot population estimate. Pond AB is connected to the WSR by North Fork Fish Creek, the Reverse

Osmosis (RO) discharge channel. Numerous beaver dams are present in the RO channel and limit fish movement between the WSR and Pond AB. ADF&G habitat trip report *5-02-2022; Bear; Fort Knox spring AG spring sampling* documents the presence of these beaver dams and the Arctic grayling captured in Pond AB during the spring fyke netting. No burbot were captured during the spring fyke netting and the burbot captured here are the first documented in the upper most part of the wetlands complex. Movement into Pond AB has periodically been possible during period of increased RO water discharge or before beaver dams were present in the drainage.

Figure 10. Melanistic burbot captured, tagged and released to WSR, September 2022.

Figure 11. Sampling burbot in Pond AB, the uppermost water body in the Fish Creek wetlands complex, September 16, 2022.

A post-mining population goal was not established for the burbot within the WSR, however a small population of fish larger than 400mm remains present. For 2020, that population was estimated to be 302 fish.