Fisheries Division
Job Progress Report

Montana Statewide Fisheries Management

Federal Aid Project Number: F-113
July 1, 2023 through June 30, 2024

Project Title: Montana Statewide Fisheries Management

Job Title: Lower Clark Fork River Drainage Fisheries Management

Authors: Jason R Blakney, Abigail Maddigan

Purpose: This report summarizes fish sampling and fisheries related surveys conducted in the Lower Clark Fork River Drainage from July 1, 20023 through June 30, 2024. Sampling was carried out as part of fisheries management duties of the Lower Clark Fork River drainage responsibility area located in FWP Administrative Region 1.

Lower Clark Fork River Drainage, Montana

Fisheries Monitoring Activities

July 1, 2023- June 30,2024

Prepared by:

Jason Blakney- Fisheries Biologist

Abigail Maddigan-Fisheries Technician

Montana Fish, Wildlife and Parks

August 2024

Table of Contents

Westslope cutthroat trout conservation project in the Thompson River drainage

Efforts to support the conservation of westslope cutthroat trout (WCT) in the Thompson River drainage included fish pathogen sampling, monitoring of recently translocated populations, collection of updated or novel genetic data from additional populations and translocation of fish from extant populations into newly established populations in previously fishless habitat above natural barriers.

From 2020-2024, WCT have been transferred into fishless stream reaches above natural barriers (i.e., secure) in three Thompson River tributaries: Bear Creek, Shroder Creek and South Fork Murr Creek. Fish from four to six populations within the drainage have been translocated into each of these streams (Table 1).

In 2023, sampling was conducted in each of the three previously fishless stream reaches where WCT have been recently translocated to document natural reproduction, relative abundance, distribution and to collect genetic samples for a parentage study. A genetic based parentage study will be conducted to evaluate the relative contribution of each population translocated into each stream. The parentage study will help determine if fish from each population successfully spawned in each stream, the relative contribution of each population to the newly founded (i.e., amalgamated) populations, and to compare measures of genetic diversity between donor populations (heterozygosity, allelic richness, number of alleles, presence of rare alleles, etc.) and newly founded populations. Initial genetic results from these on-going conservation efforts are documented in Kovach et al. (2024).

This project has increased the distribution of secure, non-hybridized populations in the Thompson River basin by at least 10 miles of stream habitat. It is unclear if any of the remaining aboriginal WCT populations in the Thompson River are secure from hybridization and non-native species colonization, however the vast majority of habitat currently occupied by the species are not secure.

Table 1. Number of individuals by year collected from donor populations and translocated into newly established secure populations in tributary streams above natural barriers in the Thompson River drainage.

Translocation Stream	**Donor Streams**					
Bear Cr.	Chippy Cr.	Big Rock Cr.	Alder Cr.	NF Little Thompson R.		
2020	253	37				
2022			71	30		
Shroder Cr.	Chippy Cr.	NF Little Thompson R.	Four Lakes Cr.	Big Rock Cr.	Alder Ditch	Indian Cr.
2021	69	71	75			
2022				46	78	
2023						33
SF Murr Cr.	Chippy Cr.	NF Little Thompson R.	Four Lakes	Alder Ditch	Indian Cr.	
2021	59	35	37			
2023				92	41	

Bear Creek- In 2023, three new sites were sampled with 117 fish captured (i.e., offspring of translocated fish) including one of the translocated parents with natural reproduction documented at each site. In 2022, the stream was first sampled following initial translocation in 2020 (fish also translocated in the fall of 2022) with 82 juvenile fish captured at three sites. A total of 391 WCT were translocated into Bear Creek in 2020 and 2022 from four populations: Chippy Creek, Big Rock Creek, Alder Creek and North Fork Little Thompson River (Table 1).

Shroder Creek -Five sites were sampled in Shroder Creek in 2023. Natural reproduction was observed at each site. These were the first sampling events in Shroder Creek following the initial fish translocation in 2021 (fish also translocated in 2022). A total of 183 fish were collected, including the recapture of 30 of the translocated parents. Natal origin of recaptured fish represented each of the five donor populations that were translocated in Shroder Creek in 2021 or 2022 including 31% from Alder Creek, 24% from Four Lakes Creek, 24% from North Fork Little Thompson River, 17% from Chippy Creek and 4% from Big Rock Creek. One of the 30 translocated fish was missing a PIT tag and but was determined to be one of the founding fish based on its length. Young-of-the-year fish were observed in the stream margins but were not handled due to their small size (< 50mm). Fish from one additional population were translocated into the stream in September 2023 following electrofishing surveys (Indian Creek n=33). From 2020 to 2023, 372 individuals representing six populations have been translocated into Shroder Creek including: Chippy Creek, North Fork Little Thompson River, Four Lakes Creek, Big Rock Creek, Alder Creek and Indian Creek (Table 1).

SF Murr Creek- Three sites were sampled in the South Fork Murr Creek in 2023. Natural reproduction was observed at each site. These were the first sampling events in South Fork Murr Creek following the initial fish translocations in 2021 (fish also translocated in fall of 2023 following summer sampling events). A total of 140 fish were collected, including the recapture of 31 of the translocated parents. Natal origin of recaptured fish represented each of the three donor populations that were translocated in South Fork Murr Creek in 2021 including , 41% from Four Lakes Creek, 44% from North Fork Little Thompson River and 15% from Chippy Creek. Four of the 31 translocated fish were missing a PIT tag and but were determined to be one of the founding fish based on length. Young-of-the-year fish were observed in the stream margins but were not handled due to their small size (< 50mm). Fish from two additional populations were translocated into the stream in September 2023 following electrofishing surveys (Indian Creek n=41 , Alder Creek n=92). From 2020 to 2023, 264 individuals representing five populations have been translocated into South Fork Murr Creek including Chippy Creek, North Fork Little Thompson River, Four Lakes Creek, Alder Creek and Indian Creek (Table 1).

Westslope Cutthroat Trout genetic sample collection

Twin Lakes Creek (Thompson River Drainage)- Genetic samples from WCT were collected from 61 fish at two locations, river kilometer (rkm) 1.7 to 1.9 and rkm 3.2 to 3.4. Initial results based on 91 loci indicate the population may be comprised of a very small amount of non-native rainbow trout (RB) ancestry (<0.1 %), or the observed polymorphism could be rare WCT genetic variation (Kovach et al. 2023). Further genomic testing indicated a very small amount of non-native ancestry (<0.01 %) (R. Kovach, FWP geneticist, personal communication).

Indian Creek (Thompson River Drainage)- Thirty samples were collected from the lower perennial portion of upper Indian Creek in 2021 at rkm 6.1. Genomic testing in 2023 confirmed this WCT population is non-hybridized (Kovach et al 2023). Further sampling in the summer of 2023 outlined the

extant distribution of WCT in two upper forks of Indian Creek. Distribution of WCT in 2023 in upper right fork occurred from 47.94899 -115.10025 to 47.95740 -115.10437. Distribution of WCT in 2023 in upper left fork occurred from 47.95447 -115.11149 (rkm 7.3) to 47.9630 -115.12848 (rkm 9.0). The total amount of occupied habitat in 2023 left fork was estimated at 1.2 km and 1.6 km in the left fork. This population occupies some of the smallest stream habitat (in terms of linear distance, discharge, and wetted width) of any known WCT population in the lower Clark Fork River drainage, Montana. Fish from Indian Creek were translocated into Shroder Creek and South Fork Murr Creek in September 2023.

Meadow Creek (Thompson River drainage)- In September 2023, genetic samples were collected from WCT in Meadow Creek at three locations on Green Diamond property at rkm 6.1, rkm 9.0 (upper left fork) and rkm 0.3 (upper right fork). Westslope cutthroat trout were the only species captured during these surveys. This is the first-time genetic samples were collected from this population. Samples were collected from 72 individuals and 45 of these samples were evaluated for hybridization.

Two Yellowstone cutthroat trout (YCT) alleles at a single Yellowstone diagnostic locus were detected in the sample from Meadow Creek. In this case, it is suspected the signal may be real, rather than a false positive, as this marker was not polymorphic in any other WCT population in the Lower Clark Fork. At present, it appears that fish in Meadow Creek may have 0.04% YCT ancestry (Kovach et al. 2024).

Little Rock Creek (Thompson River drainage)- A total of 78 putative WCT were captured from Little Rock Creek on Green Diamond property (rkm 5.3 to 6.3) for translocation. From this sample, two RB trout hybrids were definitively detected. Both of those individuals appeared to be F2 backcrosses to a WCT (i.e., progeny of F1 x WCT mating(s) (Kovach et al. 2023). Among the remaining samples, we detected a single RB trout allele and a single putatively non-westslope allele. These data may suggest there is a very small amount of RB trout ancestry in fish from Little Rock Creek (<0.1%). That said, the observed alleles may instead be false positives. When there are so few non-native alleles in a sample it becomes almost impossible to differentiate between these two possible scenarios (Kovach et al. 2023). Higher resolution genomic data are necessary to better clarify the genetic status of fish in Little Rock Creek, and in turn, whether they may be suitable for ongoing conservation actions in the Thompson watershed. Therefore, the call was made to not translocate these fish, and all fish aside from the two definitive hybrids were released back into Little Rock Creek.

Dry Creek watershed (Prospect Creek drainage)- Genetic samples were collected from tributaries in the Dry Creek watershed: East Fork Dry Creek (n=52), West Fork Dry Creek (n=40), Knox Creek (n=60), and Joan Creek (n=20). All fish collected in West Fork Dry Creek, Knox Creek and Joan Creek were found to be non-hybridized. In the sample from East Fork Dry Creek, one individual was clearly a RB trout hybrid, but all the remaining fish in the sample appeared to be non-hybridized westslope cutthroat trout. The single RB trout hybrid had between 7-10% RB trout ancestry (depends on which markers are used to estimate individual ancestry). Previous samples from the Dry Fork drainage, including samples from the East Fork, have failed to detect any RB trout hybrids (#432, 437, 5164). This may suggest that RB trout hybrids are beginning to invade this portion of East Fork Dry Creek (Kovach et al. 2024).

Dry Creek is the largest tributary to Prospect Creek and enters at rkm 1.0, just upstream from its confluence with the Clark Fork River. A lengthy intermittent section occurs on Dry Creek from around rkm 1.0 upstream to just above the confluence of the West and East Forks around rkm 6.8. In 2019, 40 westslope cutthroat trout genetic samples, were collected from perennial reaches in West Fork Dry Creek, Knox Creek, East Fork Dry Creek, and Gold Rush Creek. All fish were nonhybridized and analyses

indicates the samples come from one randomly mating population. Over 10 miles of perennial stream occur among these streams in the upper Dry Creek watershed, making it one of the largest non-hybridized populations in the lower Clark Fork drainage. FWP will work with the U.S. Forest Service on potential fish barrier options for the lower intermittent section of Dry Creek. Within the Prospect Creek drainage, hybridization has been documented upstream of intermittent stream reaches implying these seasonally dry stream reaches are not absolute barriers to upstream conization by non-native trout species (FWP 2023).

Cataract Creek (Vermilion River drainage)

Genetic samples were collected from putative WCT hybrids (n=36) above a natural waterfall in Cataract Creek. Genetic analyses indicate no RB trout ancestry was detected, but YCT ancestry was clearly apparent. Individual YCT ancestry ranged from 37-55% and was detected in all of the fish in the sample. As such, this sample appears to have been collected from a hybrid swarm between WCT and YCT with approximately 46.0% YCT ancestry (Kovach et al 2024). This result is consistent with a past sample from Cataract Creek collected in 1983. The hybrid population in Cataract Creek presents a danger to the non-hybridized population of WCT that occurs in the Vermilion River and its tributaries between China Gorge and Vermilion Falls.

Temperature data collection

Summer stream temperature data was collected in the mainstem Thompson River and its tributaries (n= 35) as well as the Dry Creek watershed within the Prospect Creek drainage (n= 4). A report summarizing temperature data collected from sites the Thompson River drainage in 2022-23 was produced (Blakney et al. 2024). The 2022 and 2023 water years had considerably different flow conditions and comparing them can provide insight into stream temperatures during future low water years. The report summarizes mean, maximum, and mean daily maximums in each stream and provides a summary table for quick comparisons (Appendix A). Monitoring temperature in the Thompson River and its tributaries informs management decisions for angling, such as establishing hoot owl restrictions, decisions regarding native fish conservation and stream restoration projects, and can be evaluated alongside fish population data to better understand fish distribution, community composition and invasion dynamics of non-native salmonids in tributaries. Temperature data in Dry Creek was conducted to inform the potential for future native trout conservation efforts.

Thompson River sampling

The Thompson River is the most popular trout fishery in the lower Clark Fork River drainage, MT. Currently, three established long-term electrofishing sites occurs occur on the Thompson River. Montana Fish, Wildlife and Parks (MFWP) attempts to sample each of the three long-term sites every other year to evaluate data on the fish community over time. These data are used to investigate abundance, species composition, species distribution, and size structure. The information gathered during routine sampling events helps inform management decisions, such as changes to fishing regulations for the Thompson River. One of these three sites, the Big Rock Creek section, was sampled in 2024. The Big Rock Creek section was established in 2013 and occurs approximately rkm 51.5 to 49.4. Brown Trout (LL) have comprised 87% -97% of the fish community sampled at this site over time (Blakney et al., *In Prep*).

A total of 537 fish were captured over the four-day sampling period including 493 LL (91.8%), 23 sculpins (4.2%), 13 brook trout (EB, 2.4%), two RB (0.3%), four longnose sucker (0.7%), two largescale sucker (0.3%). In 2024, mark-recapture (M-R) estimates were only produced for LL but not RB or EB, as both species were caught in very low abundance and because an adequate number of marked fish were not recaptured. Abundance was estimated for catchable trout which were defined as fish ≥ 150 mm. Capture efficiency (CE est.) was also estimated and provides a simple alternative method to estimate abundance when few marked fish are recaptured (< 5) (Blakney et al. 2024). For LL, the M-R estimate was 711 fish/1.6 km compared to an CE estimate of 901 fish/1.6 km (Table 2). If the MR estimate was considerably higher than the CE est. it was presumed that the assumptions of the MR estimate had been violated (e.g., fish moved out of the section between the mark and recapture run). If the MR estimate was substantially lower than the CE est., such a finding may have been associated with a relatively large difference in numbers of fish captured on the mark run versus the recapture run. The overlap between confidence intervals for the M-R and CE estimates, indicates agreement between MR and CE estimates which suggests the assumptions of the abundance estimator (MR) were likely met. Estimated abundance of LL and EB in the Big Rock Creek section are stable, while a significant decline in RB abundance over time has occurred at the site (Blakney et al. 2024). The 2024 M-R estimate was the highest estimate of catchable brown trout abundance recorded at the site (Figure 1). The proportion of catchable brown trout in the section that were ≥ 356 mm was 17% in 2024 which is very similar to previous years aside from 2020 (Figure 2), when the proportion of larger fish was higher yet the overall abundance of catchable fish within the reach was considerably lower (Figure 1).

Mountain white fish were also abundant at the site (similar abundance to trout) but were not captured due to limitations of fish holding space on the drift boat. Sculpin were captured within the site accidentally while netting other species and thus their abundance within the site is much higher than number collected. For additional information on Thompson River sampling methods, results, discussion of monitoring data, and tributary sampling efforts see Blakney et al. 2024 ,Blakney et al. 2022, Kreiner and Terrazas 2020, Kreiner and Terrazas 2018.

Table 2. Chapman mark-recapture and capture efficiency estimates for the brown trout (LL) and brook trout ≥ 150 mm per 1.6 km in the Big Rock Creek section of Thompson River sampled in May, 2024.

				Mark-Recapture		**Capture Efficiency**	
Section	**Date (2024)**	**Section length**	**Spp.**	**Fish ≥ 150 mm/1.6 km**	**95% CI**	**Fish ≥ 150 mm/1.6 km**	**95% CI**
Big Rock Creek	5/6,7,13 &14	1.3	LL	710.6	572.3 - 903.8	901.3	764.6 - 1097.3
			EB	-	-	14.7	9.9 - 47.1

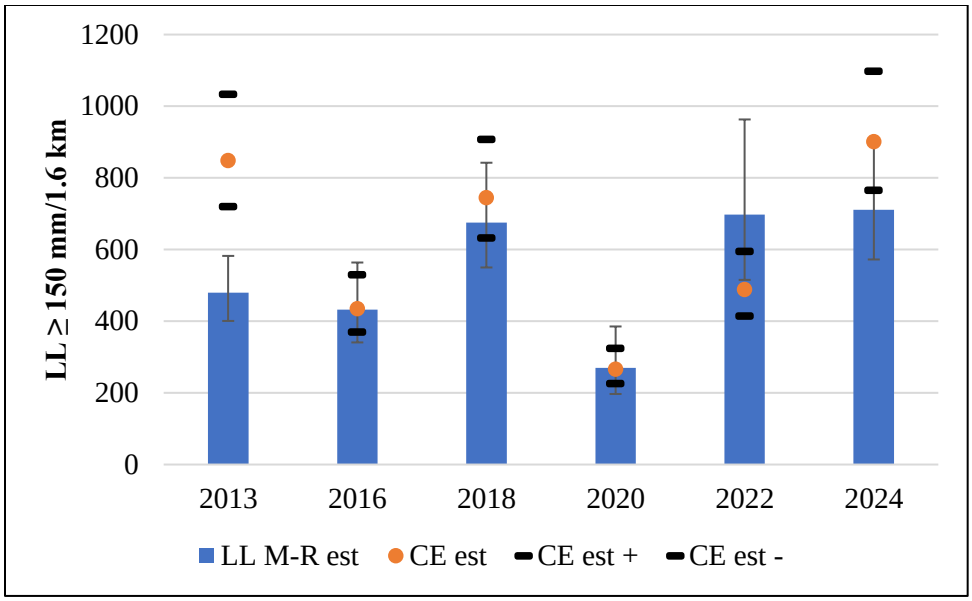

Figure 1. Chapman mark-recapture estimate (M-R est) and capture efficiency estimate (CE est, CE est +, CE est -) with 95 % confidence interval for brown trout (LL) per 1.6 km (per mile) in the Big Rock Creek section of the Thompson River (river kilometer-rkm 51.5 to 49.4) from 2013 to 2024.

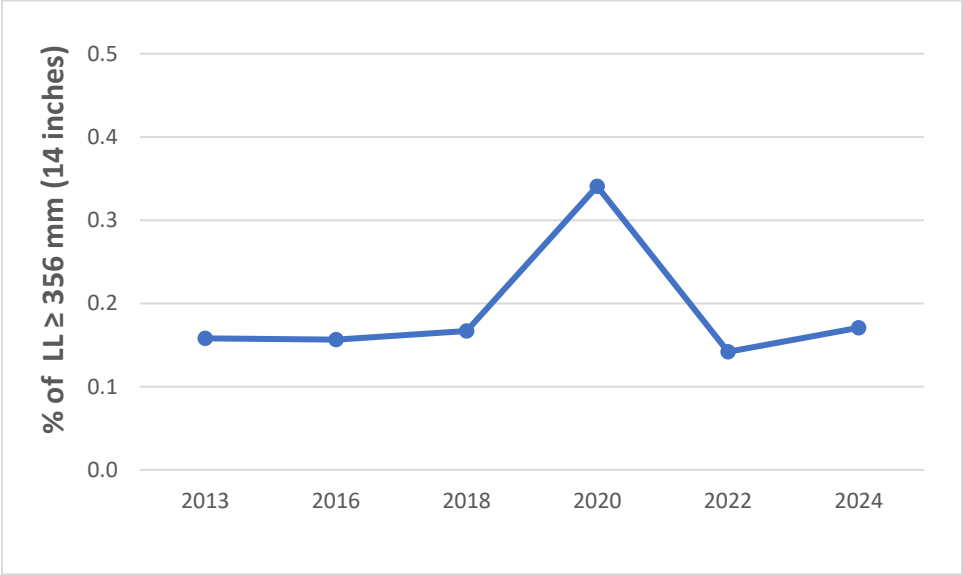

Figure 2. Percentage of catchable brown trout (LL) greater than or equal to 356 mm (≥ 14 inches) in the Big Rock Creek section of the Thompson River from 2013 to 2024.

Bull trout redd counts

Bull trout redd counts were focused in the Thompson River, specifically in the Fishtrap Creek and West Fork Thompson River drainages, the last week of September and the first week of October, 2023.

Sections of stream were walked at long-term monitoring reaches known as index reaches as well as at stream reaches of interest known as exploratory reaches, which are not covered during the index counts. Definitive redds were recorded if the gravel had been worked and if an obvious pit and mound were

visible. Brook Trout do not occur in most reaches where redds counts are conducted in the Thompson River drainage, except in lower mainstem Fishtrap Creek, mainly downstream of Basin Draw. Bull trout redds in this portion of the drainage are often larger, found earlier and in different locations compared to brook trout redds. However, some overlap between the two char species in space and time for spawning and the size of redds, in lower Fishtrap Creek and elsewhere in the lower Clark Fork is certainly possible (Blakney et al. 2022).

Bull trout redds have been observed as early as the first week of September within the Fishtrap Creek index section (i.e., 2015; Blakney, FWP, personal observation). These large redds were barely noticeable during the official redd count at the end of September and would have been missed by an observer that did not previously know of their existence. Future efforts should seek to count some reaches multiple times in September and October to identify the best time each reach or stream should be surveyed. Collecting this information over multiple years may help understand potential differences in spawning timing in mainstem Fishtrap versus tributaries streams and difference in spawn timing between migratory and resident fish (Blakney et al. 2022).

In 2023, both beaver activity and low flows likely reduced migratory bull trout access to a large portion of the Fishtrap Creek drainage. Large beaver dams between Jungle Creek and Basin Draw were found to be complete barriers during the redd count period and two migratory bull trout were observed on September 25 spawning below the lowest dam. More bull trout redds have been observed in lower Fishtrap Creek in recent years compared to the upstream index reaches. This change in distribution is mainly attributed to blocked passage from fall beaver dam construction and maintenance, which seems to pick-up drastically in late August or early September. Redd counts in upstream tributaries such as West Fork Fishtrap and Beatrice Creeks have also dropped off from historic counts (Figure 3). Natural debris jams in Jungle Creek, Beatrice Creek and West Fork Fishtrap Creek almost certainly limit upstream connectivity at base flows some years, with the location and longevity of these barriers depending on the year, the intensity of the previously run-off regime as well as the size and amount of debris. West Fork Fishtrap Creek went dry at the mouth in August 2023, thereby blocking access to miles of prime spawning and rearing habitat, however some resident redds were still observed in the stream. The lower West Fork Fishtrap appears to be a losing reach, yet the mouth has not been observed to be dry since at least 2015. Cryptic spawning likely occurs in the drainage (as well as other streams across the lower Clark Fork drainage) as bull trout abundance estimates were good in 2021 (Blakney et al. 2022), despite just a few redds observed in the stream each year.

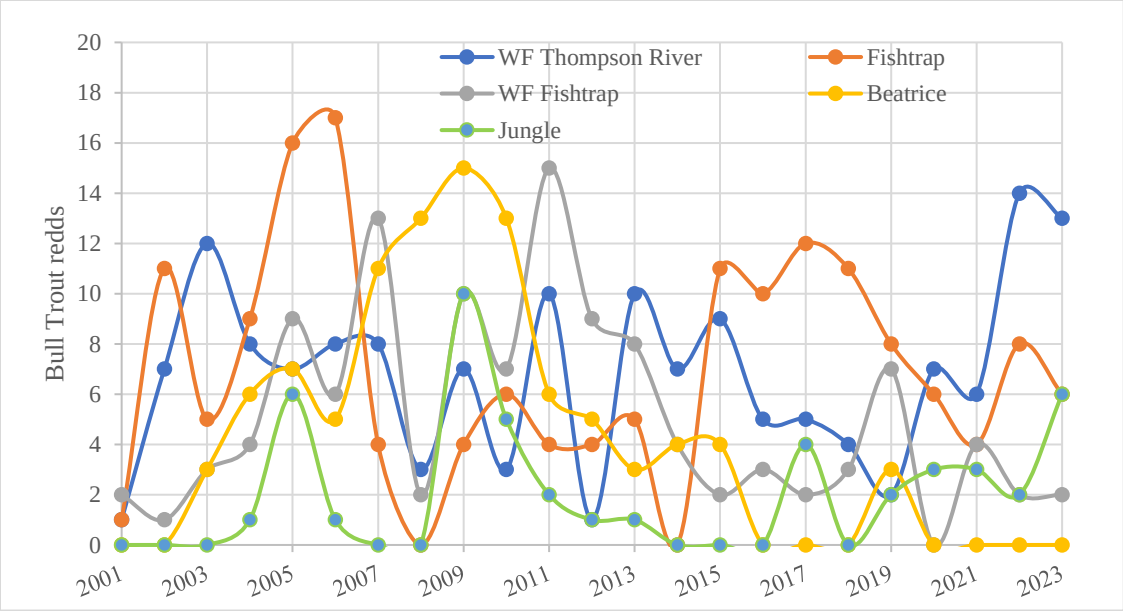

Figure 3. Annual bull trout redd counts from index reaches and non-index reaches within the Thompson River drainage, from 2001 and 2023. Jungle Creek and Beatrice Creek redd counts did not begin until 2003 and were not conducted in 2018. The amount of habitat surveyed for non-index redd counts in Fishtrap Creek has increased over time.

In 2023, the total number of redd counted within index and non-index reaches in the Thompson River drainage was 27 which is higher than the 2001 to 2022 mean total count of 25 (index count in 2023 n=21, 2001-2022 mean n=23). Within the Fishtrap Creek drainage, 14 redds total were found. Ten of these redds were found within the index reaches while four were found in the exploratory reaches in Fishtrap Creek downstream of the index reach between Jungle Creek and Basin Draw. In the West Fork Thompson River, 13 redds were found, 11 within the index reach.

Reservoir monitoring

Each year since 2000 standardized gillnetting (gill nets set in the exact same location) has occurred on Noxon Reservoir and Cabinet Gorge Reservoirs in October. This project is a collaboration between FWP management and mitigation staff (funded by Avista through the Clark Fork Settlement Agreement through the recreational fisheries mitigation program), Avista staff (utility company that owns both dams) and students from the University of Idaho fisheries management class. Nylon multifilament experimental sinking gillnets have been used during all gillnetting efforts. Gillnets are set in the afternoon, fished overnight, and retrieved the following morning. Coldwater sites such as tributary mouths, have been intentionally avoided to reduce native salmonid bycatch and mortality. A detailed report is prepared annually for reservoir monitoring activities including fall gillnetting, spring walleye sampling and bass tournament monitoring (ex., Rehm et al. 2024).

Noxon Reservoir

A total of 1,320 fish representing 12 species were captured during netting efforts on Noxon Reservoir (Table 3). The catch rate of 44.0 fish/net was up from recent years and above the historic average (2000–2022 mean catch 33.7 fish/net). Yellow perch were the most abundant species captured representing

over 45.5% of the total catch (n = 600). The mean number of yellow perch captured in 2023 was 20 fish/net which is substantially greater than the mean 2000-2022 catch of 12.2 fish/net. This was the highest number observed since standardized netting began in 2000. Pumpkinseed was the second most abundant fish species caught and comprised 24.7% of the total catch (n = 326). The mean catch rate for pumpkinseed was 10.9 fish/net in 2023, which was more than double the 2000-2022 mean of 4.4 fish/net and was highest number observed since standardized netting began in 2000. Pumpkinseed abundance has increased over time (linear regression, $r^2 = 0.28$, $p = 0.01$) in Noxon Reservoir. Lake whitefish abundance has also increased over the sampling period (linear regression, $r^2 = 0.33$, $p = 0.006$), representing over 4.1% of the total catch in 2023. The mean number of lake whitefish captured in 2023 was 1.8 fish/net which is substantially greater than the mean 2000-2022 catch of 0.8 fish/net. Yellow perch, pumpkinseed, and lake whitefish are likely an important prey base for the top four predators (i.e., largemouth bass, smallmouth bass, northern pike, and walleye) in Noxon Reservoir. Once common, native non-gamefish species such as northern pikeminnow, peamouth, and largescale suckers continue to be captured at low levels as predatory sportfish abundance have increased over time (Rehm et al. 2024).

Table 3. Mean catch rates (fish/net night), total number caught, percentage of total species composition by number and biomass (percent of total weight), mean weight, weight range, mean length, and length range for species captured in Noxon Reservoir during gill netting surveys conducted in 2023 (Rehm et al. 2024). Species abbreviations are specified in Appendix B.

Species	Mean fish/net (STDEV)	Total # caught	Species Comp. (%)	Percent of Total Weight (%)	Mean Weight (g)	Weight Range (g)	Mean Length (mm)	Length Range (mm)
YP	20.0 (17.0)	600	45.5%	11.6%	78.4	30–275	181.8	115–290
PUMP	10.9 (11.1)	326	24.7%	4.6%	56.9	15–210	132.2	60–245
YLBH	3.0 (3.8)	89	6.7%	6.4%	288.9	35–550	261.6	139–325
SMB	2.6 (4.4)	79	6.0%	9.6%	490.8	40–1765	294.2	146–475
NP	2.2 (2.9)	67	5.1%	28.1%	1687.4	185–3870	614.7	315–796
LWF	1.8 (3.2)	54	4.1%	13.7%	1020.7	340–1730	458.9	234–573
WE	1.7 (2.7)	52	3.9%	11.3%	894.6	195–2590	435.8	290–639
NPMN	0.9 (1.0)	27	2.0%	7.5%	1113.0	50–1985	456.3	160–580
LSSU	0.5 (1.2)	16	1.2%	6.0%	1511.6	920–2520	500.5	440–619
LMB	0.3 (0.5)	8	0.6%	0.4%	198.1	40–625	212.0	131–325
PEA	<0.1 (0.2)	1	0.1%	0.1%	510.0	510–510	365.0	365–365
LL	<0.1 (0.2)	1	0.1%	0.6%	2505.0	2505–2505	636.0	636–636

Gillnets are an effective method to monitor relative abundance of two of the four top predators in Noxon Reservoir: walleye and northern pike. In general, bass are not susceptible to being captured in gillnets when compared to most other species in the reservoirs. Smallmouth bass are captured at a higher rate than largemouth bass, but both species are underrepresented to an unknown degree in relation to their abundance in the fish community.

Smallmouth bass were the most abundant top predator species captured within Noxon Reservoir, representing 6% of the total catch (n = 79), which was the highest number since standardized netting began in 2000. Mean catch rate for smallmouth bass in 2023 was 2.6 fish/net (Table 3), which is substantially higher than the 2002–2022 mean catch rate (1 fish/net). This is the second consecutive year we have observed historic high catches of smallmouth bass. However, it is difficult to determine if the increase in catch per unit effort is due to unseasonably warm weather during both sampling events that

increased susceptibility to capture in gillnets or a dramatic increase in abundance. Even with the notable difficulty catching the species in gillnets, future gill net surveys should shed light on the distinction (Rehm et al. 2024).

Northern pike comprised 5.1% of the netted fish and were the second most abundant predator species sampled within Noxon Reservoir. Northern Pike represent the highest amount of biomass at 28.1% of total weight of captured fish. Mean catch rate for northern pike in 2023 was 2.2 fish/net (Table 3), which is substantially higher than the 2002–2022 mean catch rate (1.3 fish/net). Northern pike abundance has increased significantly since standardized gillnetting began (linear regression, $r^2 = 0.74$, $p < 0.001$) (Rehm et al. 2024).

Walleye were the third most abundant top predator species captured representing 3.9% of the total catch (n = 52), which is substantially down from 2021 when the highest number since standardized netting began in 2000 was recorded (n = 96). However, walleye abundance has increased over time (linear regression, $r^2 = 0.77$, $p < 0.001$), and the 2023 mean catch rate was still 1.7 fish/net (Table 3), which was substantially higher than the prior mean 2000–2022 catch rate of 1.1 fish/net. Walleye recruitment in Noxon Reservoir appears to be becoming more consistent overtime with the majority of fish captured comprising three consecutive year classes: 2021 (50%), 2019 (30.8%), and 2020 (11.5%) (Rehm et al. 2024).

Since standardized gillnetting began, a significant decline has been observed in the relative weight (Wr) of walleye and northern pike but not smallmouth bass. The downward trends in walleye and northern pike Wr may be indicative of increasing competition for prey resources and habitat among top predators in this complex ecosystem. It is much less clear if the Wr of smallmouth bass is representative of the actual population given the notable difficulty in catch the species in gillnets (Rehm et al. 2024).

Cabinet Gorge Reservoir

Gillnetting on Cabinet Gorge Reservoir produced a total of 217 fish representing 10 species (Table 4). The catch rate of 14.5 fish/net is up from recent years and above the historic average (2000–2022 mean catch 13.3 fish/net). Yellow perch were the most abundant species captured in 2023, representing 42.9% of the total catch (n = 93). The mean number of yellow perch captured in 2023 was 6.2 fish/net which is more than the 2000–2022 mean catch of 3.8 fish/net (Rehm et al. 2024). Similar to trends in Noxon Reservoir, native non-gamefish species in Cabinet Gorge Reservoir such as northern pikeminnow, peamouth, and largescale suckers continue to be captured at low levels as predatory sportfish numbers have increased over time (Rehm et al. 2024).

Smallmouth bass were the most abundant top predator species captured, representing 14.7% of the total catch (n = 32; Table 4). Mean catch (2.1 fish/net) in 2023 was greater than the 2000–2022 (mean 0.6 fish/net). This is similar to 2022 catch of 2.3 fish/net which was the highest number observed since standardized netting began in 2000. Similar to the recent high catch rates of smallmouth bass in Noxon Reservoir, it is unclear if this increase in catch per unit effort is due to unseasonably warm weather during both sampling events that increased susceptibility to capture in gillnets or a dramatic increase in abundance. Even with the notable difficulty catching the species in gillnets, future gill net surveys should shed light on the distinction (Rehm et al. 2024).

Northern pike were the second most abundant top predator species captured, representing 7.4% of the total catch (n = 16) (Table 4). This was a substantial decline from 2021 (1.6 fish/net), which had the highest number since standardized netting began in 2000. Mean catch was 1.1 fish/net, which was near the historic average (2000–2022 mean catch 0.7 fish/net). Northern pike abundance has shown a significant increase since standardized gillnetting began (linear regression, $r^2 = 0.32$, $p = 0.01$) (Rehm et al. 2024).

Walleye catch (0.8 fish/net, n = 12) in 2023 was greater than the 2000–2022 (mean 0.2 fish/net) (Table 4). This was the highest number observed in Cabinet Gorge Reservoir since standardized netting began in 2000. However, we have not observed the same increases in the Cabinet Gorge walleye population as those in Noxon Reservoir. This is likely due to the lower water residence time in Cabinet Gorge and the inability of walleye to recruit within the reservoir. We suspect walleye captured within Cabinet Gorge are spawned and subsequently washing down from Noxon Reservoir. Walleye captured in 2023 were comprised of the 2021 (50%), 2020 (8%), 2019 (33%), and 2017 (8%) year-classes. Similar to Noxon Reservoir, the 2021 and 2019 year-classes represent the majority of walleye captured (Rehm et al. 2024).

Mean Wr for northern pike has declined since standardized netting began in Cabinet Gorge, however Wr for smallmouth bass has remain stable over this time period. Mean Wr for northern pike was 104.8 in 2023, this is the highest condition factor we have observed since 2015. However, overall the northern pike condition has been in decline since 2000 (linear regression, $r^2 = 0.32$, $p = 0.01$). While Wr in northern pike has declined from the 2000–2022 mean (111.7), northern pike condition is still considered greater than the 50th percentile in large standing waters of North America. Condition of smallmouth bass captured within Cabinet Gorge Reservoir continues to be high with a mean Wr of 104 in 2023. Smallmouth bass mean Wr has ranged from a low of 88.6 (n = 3) in 2017 to a high of 112.4 (n = 8) in 2000 and no decline has been detected over the sampled period (linear regression, $p = 0.07$). The downward trend in northern pike Wr may be indicative of increasing competition for prey resources and habitat among top predators in this complex ecosystem. It is much less clear if the Wr of smallmouth bass is representative of the actual population given the species is notable difficulty to catch using gillnets. Walleye have not been captured in high enough frequency in Cabinet Gorge Reservoir to evaluate Wr trends overtime(Rehm et al. 2024).

Table 4. Catch rates (fish/net), total number caught, percentage of total species composition by number and biomass (percent of total weight), mean weight, weight range, mean length and length range for species captured in Cabinet Gorge Reservoir during gill netting surveys conducted in 2023 (Rehm et al. 2024). Species abbreviations are specified in Appendix B.

Species	Mean fish/net (STDEV)	Total # caught	Species Comp. (%)	Percent of Total Weight (%)	Mean Weight (g)	Weight Range (g)	Mean Length (mm)	Length Range (mm)
YP	6.2 (8.2)	93	42.9%	5.7%	72.6	25–185	180.6	134–286
SMB	2.1 (2.6)	32	14.7%	18.8%	661.9	79–1360	336.7	177–445
NPMN	1.4 (1.7)	21	9.7%	19.3%	1091.5	85–2390	436.1	221–600
NP	1.1 (1.4)	16	7.4%	23.9%	1688.4	750–2645	612.7	481–714
LSSU	1.0 (1.6)	15	6.9%	14.5%	1088.7	850–1410	460.9	433–506
WE	0.8 (1.2)	12	5.5%	6.4%	600.4	150–2055	381.3	272–558
PUMP	0.7 (2.3)	11	5.1%	0.3%	30.0	20–50	111.6	98–136
LL	0.5 (0.6)	8	3.7%	7.5%	1051.9	120–1630	460.5	241–582
LWF	0.4 (0.7)	6	2.8%	3.3%	746.0	715–765	413.3	370–429
LMB	0.2 (0.6)	3	1.4%	0.4%	156.7	80–220	208.0	165–238

Spring Walleye monitoring-Noxon Reservoir

Walleye sampling via jetboat electrofishing occurred on upper Noxon Reservoir on nine evenings from April 1-May 1, 2024. Walleye were illegal introduced to the reservoir in the late 1980s or 1990s. Annual monitoring of their spawning run has occurred each spring on the upper reservoir since 2012 and is a collaboration between FWP management and mitigation staff (funded by Avista through the Clark Fork Settlement Agreement) as well as Avista staff.

A total of 356 fish were captured and 80 were sacrificed for aging purpose to document year class strength (n=79). The catch was comprised of 83% male fish (n=297) of which were determine all were determined to be mature except for two individuals (Figure 4). All of the 59 females were presumable to be mature based on their length and presence on known spawning grounds. The majority of age-determined fish comprised three year-classes: 2021 (32 %), 2019 (38 %) and 2015 (18 %) (Figure 5). Catch per unit effort (CPUE) ranged from 16 fish/hr. on April 1 to 105 fish/hr. on April 17, with a mean CPUE of 46 fish/hr. Spring walleye electrofishing is reported annually and in detail along with fall reservoir gillnetting and bass tournament monitoring in a report to Avista to fulfill mitigation obligations associated with Montana's portion of the Clark Fork Settlement Agreement.

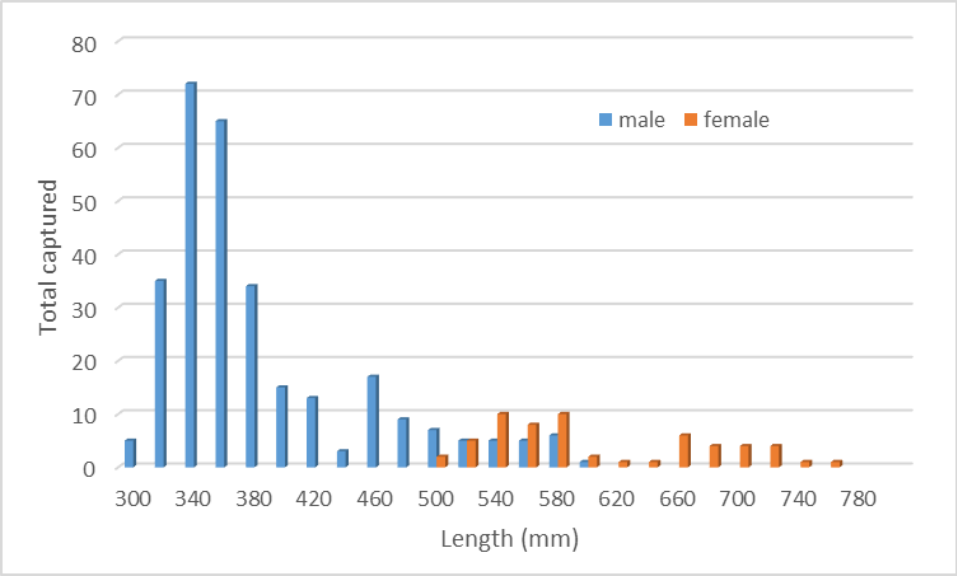

Figure 4. Length frequency distribution for spring walleye captured in upper Noxon Reservoir, spring 2024.

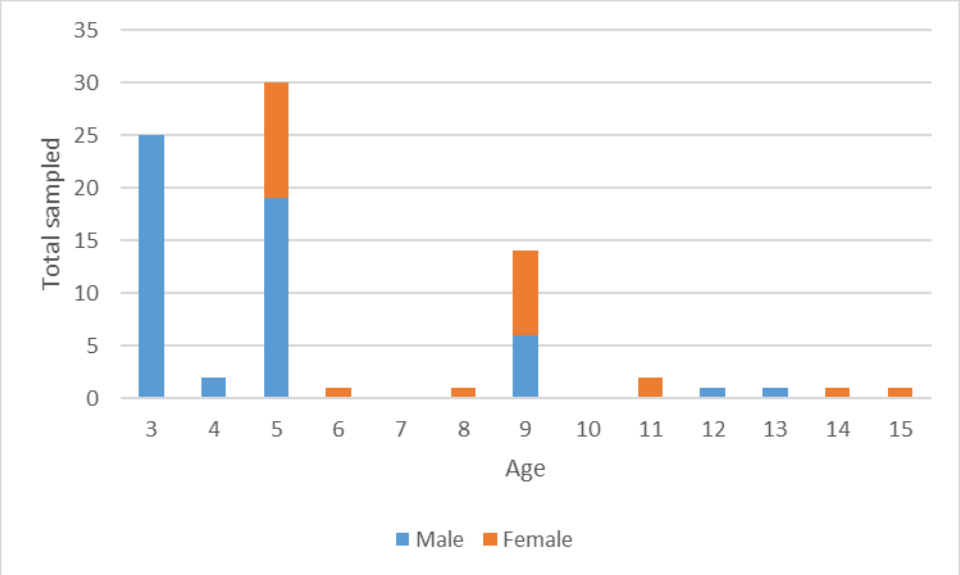

Figure 5. Age frequency distribution for spring captured walleye captured in upper Noxon Reservoir, spring 2024.

Work cited

Blakney, J., Maddigan, A., and H. Carlsmith. 2024. Thompson River long-term monitoring update-through 2024. Montana Department of Fish, Wildlife, and Parks. Thompson Falls, MT.

Blakney, J., Maddigan, A., and H. Carlsmith. 2024. Thompson River drainage temperature monitoring report 2022-2023. Montana Department of Fish, Wildlife, and Parks. Thompson Falls, MT.

Blakney, J., Maddigan, A., and H. Carlsmith. 2022. Thompson River drainage fisheries monitoring report: 2021. Montana Department of Fish, Wildlife, and Parks. Thompson Falls, MT.

Kovach, R., Painter, S., Lodmell, A., and S. Amish. 2023. October 25,2023 genetic letter to Montana Fish, Wildlife and Parks biologists Jason Blakney and Travis Rehm. University of Montana Conservation Genetics Laboratory. Division of Biological Sciences, University of Montana, Missoula, Montana.

Kovach, R., Amish, S., Painter, S., and A. Lodmell. 2024. June 27,2024 genetic letter to Montana Fish, Wildlife and Parks biologists Jason Blakney and Travis Rehm. University of Montana Conservation Genetics Laboratory. Division of Biological Sciences, University of Montana, Missoula, Montana.

Kreiner, R. and M. Terrazas. 2018. Lower Clark Fork River tributary sampling. Montana Department of Fish, Wildlife, and Parks. Thompson Falls, MT

Kreiner, R. and M. Terrazas. 2020. Lower Clark Fork River tributary sampling. Montana Department of Fish, Wildlife, and Parks. Thompson Falls, MT.

Montana Fish, Wildlife and Parks (FWP). 2023. Montana statewide fisheries management plan 2023-2026. Montana Department of Fish, Wildlife, and Parks. Helena, MT.

Rehm, T., Blakney, J., and T. Tholl. 2024. Cabinet Gorge and Noxon Reservoir fisheries monitoring: 2023 annual project update. Montana Tributary Habitat Acquisition and Recreational Fishery Enhancement Program, Appendix B, Clark Fork Settlement Agreement. Report to Avista Corporation Noxon, Montana and Montana Fish, Wildlife and Parks, Thompson Falls, Montana.

Appendix A- Thompson River drainage and Dry Creek summer temperature data summary

Table A. Mean Daily, Maximum, and Mean Daily Maximum temperatures (temp.) during July and August in 2022 and 2023.

Stream Name	Location Rkms	July Mean Daily Temp. 2022	July Mean Daily Temp. 2023	July Maximum Temp. 2022	July Maximum Temp. 2023	July Mean Daily Maximum Temp. 2022	July Mean Daily Maximum Temp. 2023	August Mean Daily Temp. 2022	August Mean Daily Temp. 2023	August Maximum Temp. 2022	August Maximum Temp. 2023	August Mean Daily Maximum Temp. 2022	August Mean Daily Maximum Temp. 2023
Bear Creek	2.6	10.6		13.7		11.8		11.5		13.4		12.4	
Bear Creek	4.5		10.5		12.7		11.7		10.9		13.5		11.9
Bear Creek	6.1	10.3	10.8	13.4	12.9	11.6	11.8	11.4	11.2	13.7	13.3	12.4	11.8
Beatrice Creek	0.2	7.9	8.6	10.9	11.3	9.3	10.4	8.5	9.0	10.5	11.7	9.9	10.3
Big Hole Creek	4.2	9.4	11.1	14.3	15.0	11.9	13.8	10.9	15.5	14.7	11.6	13.2	13.7
Big Rock Creek	1.0	13.2	13.7	17.7	16.8	15.2	15.2	13.8	13.8	16.6	16.8	15.3	15.0
Big Rock Creek	4.8	12.2	12.6	16.3	16.1	14.0	14.5	12.9	12.8	15.5	16.2	14.4	14.2
Big Rock Creek	7.2	11.7		15.8		13.4		12.3		15.0		13.8	
Big Rock Creek	10.0	11.5		16.4		13.8		11.9		15.7		14.1	
Big Rock Creek	15.9	9.7		11.7		11.2		9.2		11.5		10.2	
Chippy Creek	4.1	12.6	13.3	17.4	17.7	15.0	16.0	13.7	13.6	17.2	17.8	15.9	15.6
Deerhorn Creek	0.1	7.8	8.2	10.2	10.4	8.9	9.8	8.6	8.5	10.9	10.9	10.1	9.8
Fishtrap Creek	0.2	10.9	11.5	15.7	16.2	13.7	14.9	11.8	10.8	17.7	16.4	14.9	14.1
Fishtrap Creek	4.8	11.6	13.7	17.4	19.9	14.9	17.7	12.3	13.7	17.3	20.1	15.4	16.8
Fishtrap Creek	11.4	8.9	10.2	13.8	16.6	12.1	12.7	10.1	9.8	13.3	12.8	12.2	11.5
Fishtrap Creek	16.8	9.7	9.9	13.1	13.0	11.8	12.3	9.7	9.3	12.7	12.5	11.6	11.3
Fishtrap Creek	20.8		13.5		17.2		16.0		13.2		16.9		14.9
Fishtrap Creek	21.1	15.0		20.5		17.8		15.1		19.5		17.5	
Jungle Creek	1.3	8.3	9.1	10.7	11.3	9.3	10.3	9.1	9.5	11.0	11.7	9.9	10.3
Jungle Creek	5.8	7.0	7.5	8.9	8.9	7.9	8.4	7.6	8.9	8.8	7.7	8.3	8.2
Little Rock Creek	4.3	11.4	11.8	14.1	14.7	12.4	13.2	12.5	12.5	14.3	15.3	13.3	13.5
Little Thompson River	0.1	15.8	16.4	22.6	22.3	19.7	20.6	16.1	15.9	21.5	22.0	19.6	19.1
Murr Creek	2.7	11.0	11.7	14.9	14.7	12.5	13.4	12.2	12.3	14.9	15.0	13.8	13.6
NF Murr Creek	0.1		10.8		13.4		12.0		11.5		13.6		12.5

Stream Name	Location Rkms	July Mean Daily Temp. 2022	July Mean Daily Temp. 2023	July Maximum Temp. 2022	July Maximum Temp. 2023	July Mean Daily Maximum Temp. 2022	July Mean Daily Maximum Temp. 2023	August Mean Daily Temp. 2022	August Mean Daily Temp. 2023	August Maximum Temp. 2022	August Maximum Temp. 2023	August Mean Daily Maximum Temp. 2022	August Mean Daily Maximum Temp. 2023
SF Murr Creek	4.2	10.3	10.7	12.5	11.8	10.9	10.9	11.6	11.5	12.6	12.4	11.9	11.6
NF Little Thompson	0.7	12.4	13.1	17.4	17.8	14.9	15.8	13.7	13.7	16.9	17.9	15.8	15.5
Shroder Creek	0.1	10.7	11.0	13.5	13.3	11.7	11.9	11.5	11.5	13.8	14.1	12.3	12.3
Shroder Creek	2.7		9.8		11.6		10.7		10.3		12.1		11.0
Shroder Creek	5.3	8.2	8.8	10.1	10.3	8.7	9.4	9.2	9.6	10.6	11.0	9.7	10.0
Thompson River	1.5	13.7	15.4	18.3	19.7	16.0	18.3	14.0	14.8	18.4	19.6	16.4	17.2
Thompson River	11.7	14.0	15.3	18.2	18.9	16.6	17.6	14.4	14.7	18.0	18.3	16.3	16.2
Thompson River	26.1	16.3	16.8	22.8	22.2	19.8	20.6	16.3	16.1	21.6	22.1	19.7	19.3
Thompson River	38.2	16.1	17.2	19.6	19.4	18.4	18.3	15.8	16.1	18.8	19.8	16.9	17.4
Thompson River	50.4	14.8	15.5	20.7	19.9	17.6	18.2	14.2	14.3	19.2	17.6	17.0	15.7
Thompson River	65.3	17.3	18.0	21.8	21.3	18.7	19.8	16.7	16.6	20.3	21.2	18.4	18.7
WF Fishtrap Creek	0.6	9.5	10.0	12.8	13.2	11.2	12.1	9.6	10.1	12.3	14.1	11.2	11.8
WF Fishtrap Creek	8.9	8.7	9.0	11.1	10.8	9.6	9.9	9.1	9.3	10.7	11.1	9.8	9.8
WF Thompson River	0.3	9.0	10.0	11.3	12.0	10.2	11.3	9.4	10.3	11.1	12.2	10.5	11.2
WF Thompson River	8.0	8.6	9.4	11.0	11.6	9.8	10.5	9.1	9.7	10.9	11.7	9.9	10.4

Appendix B- Species abbreviations and scientific names of fish in Noxon and Cabinet Gorge reservoirs

BLBH Black Bullhead *Ameiurus melas*

EB Brook Trout *Salvelinus fontinalis*

LL Brown Trout *Salmo trutta*

LWF Lake Whitefish *Coregonus clupeaformis*

LMB Largemouth Bass *Micropterus salmoides*

LSSU Largescale Sucker *Catostomus macrocheilus*

MWF Mountain Whitefish *Prosopium williamsoni*

NP Northern Pike *Esox lucius*

NPMN Northern Pikeminnow *Ptychocheilus oregonensis*

PEA Peamouth *Mylocheilus caurinus*

PUMP Pumpkinseed *Lepomis gibbosus*

RB Rainbow Trout *Oncorhynchus mykiss*

SMB Smallmouth Bass Micropterus dolomieu

WE Walleye Sander vitreus

YLBH Yellow Bullhead Ameiurus natalis

YP Yellow Perch Perca flavescens