MONTANA FISH, WILDLIFE & PARKS

Fisheries Division

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Montana Statewide Fisheries Management

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Project Title: Montana Statewide Fisheries Management

Job Title: Yellowstone and Shields River Drainages Fisheries Management

Abstract: Sampling results for the Yellowstone River, Shields River, and Dailey Lake for 2019 and 2020.

Fisheries Investigations in the Yellowstone and Shields River Basins, Park County, Montana

Annual Report for 2019 and 2020

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Abstract

The Mill Creek Bridge Section on the Yellowstone River was sampled in 2019 and 2020, and trout abundance estimates were calculated. The Corwin Springs Section was not sampled in either year due to river flow conditions. In 2019, Rainbow Trout *Oncorhynchus mykiss* and Brown Trout *Salmo trutta* estimates in the Mill Creek Bridge Section were both lower than the 2018 estimates. Yellowstone Cutthroat Trout *Oncorhynchus clarki bouvieri* estimates were higher than 2018. Brown Trout and Rainbow trout populations in the Mill Creek Bridge Section both deceased in 2020, but Yellowstone Cutthroat Trout in this section continued to increase. River conditions prohibited sampling of Shields River sections in 2019 and 2020. This is a 4-year trend and is related to spring weather and flow conditions. Results from the long-term gill netting series in Dailey Lake show that catch-per-unit-effort (CPUE) for Walleye *Stizostedion vitreum* and Yellow Perch *Perca flavescens* increased in 2019 and decreased in 2020. Rainbow Trout increased in 2019 and decreased in 2020. Yellowstone Cutthroat Trout decreased in both years. Average lengths of Rainbow Trout increased both years while Yellow Perch increased in 2019 and decreased in 2020. Average lengths of Yellowstone Cutthroat Trout and Walleye decreased both years.

Introduction

Fisheries surveys were completed on the Yellowstone River and Dailey Lake in both 2019 and 2020. This sampling was part of long-term monitoring that has occurred in the Yellowstone River and Dailey Lake. Description of these efforts are provided, and discussion of the results are presented in this document.

Electrofishing Procedures

Mark-recapture methodology was used to estimate trout populations in the Yellowstone River. Marking and recapture runs consisted of electrofishing the entire section or reach of river, with multiple fish-working stops to minimize stress of sampled fish. During the marking run all fish were marked with a fin clip, which can be detected during subsequent sampling events. The fish were then released back into the section and allowed to redistribute for seven days prior to recapture runs. During recapture runs, fish were examined for fin clips and those with a fin clip were noted as recaptured.

Yellowstone River Procedures

In spring 2019 and 2020, trout were sampled in the Mill Creek Bridge Section of the Yellowstone River and Mountain Whitefish were sampled in the Mallard's Rest Section (Table 1 and Figure 1). The Corwin Springs Section was not sampled in 2019 and 2020. All are long-term monitoring sections.

Table 1 Survey sections where trout and Mountain Whitefish sampling occurred in the Yellowstone River in 2019 and 2020. Coordinates in decimal degrees are NAD83 datum.

Section Name	Survey Date	Length (ft)	Approximate Location		
Mill Creek Bridge	04/24/19 04/25/20	23,385	Upper Boundary	North West	45.41967 -110.64208
			Lower Boundary	North West	45.45764 -110.62569
Mallard's Rest	04/23/19 04/29/20	6,600	Upper Boundary	North West	45.48545 -110.62101
			Lower Boundary	North West	45.49075 -110.59970

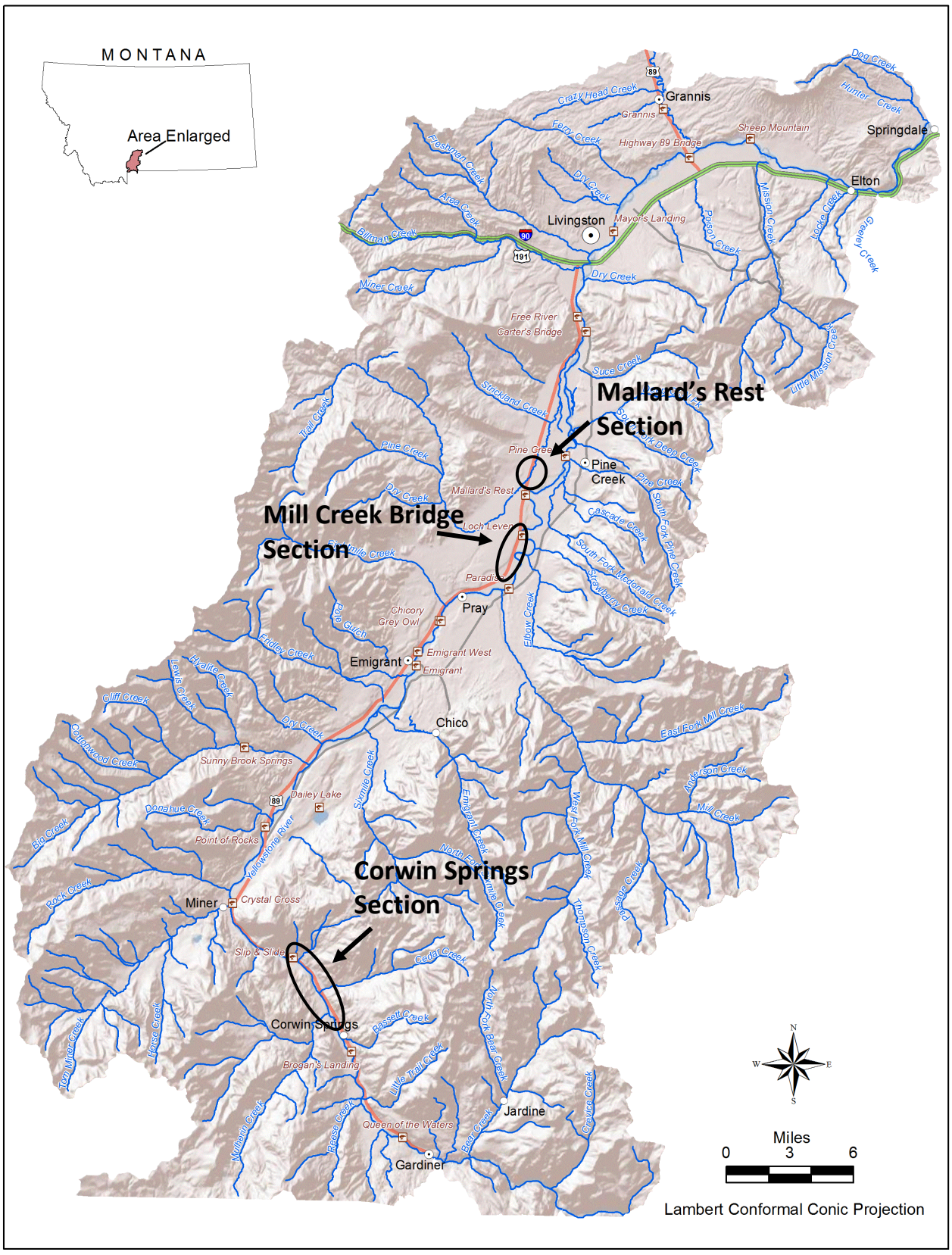

Figure 1: Map of the upper Yellowstone river displaying the 2019 and 2020 sampling locations.

Electrofishing of the Yellowstone River was completed using one or two jet boats mounted with boom electrofishing equipment. The two boats were 20-foot Wooldridge™ outboard jet boats, one with an Evenrude™ 225 jet, equipped with a Smith Root™ VVP-15B and a Honda™ EM7500 generator and one with a Honda™ 200 jet, equipped with a Smith Root™ VVP-15B and a Honda™ ES6500 generator. The anodes on both boats were stainless steel cable droppers suspended from twin booms at the bow, and the hull served as the cathode.

Mark-recapture efforts were made on the Mill Creek Bridge Section for trout. Trout were netted and held in live cars. After anesthetizing, the fish were identified to species, measured to the nearest 0.1 inch, and weighed to the nearest 0.01 pound. Trout were marked with a fin clip and returned to the river. Seven days after the last marking run, the recapture effort was made. Catch-per-unit-effort (CPUE) was completed on the Mallard's Rest Section for Mountain Whitefish.

Trout population abundance was estimated using the Chapman Modified Peterson method (Chapman 1951). Population estimates for Brown, Rainbow, and Yellowstone Cutthroat Trout (YCT) $\geq$ 7 inches were calculated for the Mill Creek Bridge Section.

Corwin Springs Section

The Corwin Springs Section is a long-term monitoring section that has been sampled since 1978 (Figure 1). In 2019 and 2020, due to flow conditions initially being too low and then too high to sample in the spring the mark-recapture effort could not be completed. This section was last monitored in 2018 and monitoring is planned for 2021. Data for this section can be found in the 2018 report (Opitz 2018).

Mill Creek Bridge Section

The Mill Creek Bridge Section is a long-term monitoring section that has been sampled since 1981 (Figure 1). In 2019 and 2020, the section was sampled using the mark-recapture method to produce population abundance estimates for trout.

In 2019, the section was marked on April 24 and the recapture effort was completed on May 1. In 2020, the marking run was completed on April 30 and the recapture run was completed on May 6. The section was split into four subsections and sampled with two boats, one on each bank. Trout were sampled in all four subsections and were marked with an anal fin clip. The recapture run during both years was completed with two boats in the same method as the marking run.

Population estimates, by species, for the Mill Creek Bridge Section for 2019 and 2020 are presented below (Table 2).

Table 2: Population estimate results for the Mill Creek Bridge Section of the Yellowstone River by species in 2019 and 2020. N/mile represents the estimated number of Rainbow, Brown, and Yellowstone Cutthroat (≥7 inches) per mile. Upper and lower 95 % confidence intervals are also provided.

Year	Fish Species	N/mile	Lower 95%	Upper 95%
2019	Rainbow Trout	263	217	323
	Brown Trout	274	201	386
	Yellowstone Cutthroat Trout	75	55	107
2020	Rainbow Trout	231	184	293
	Brown Trout	263	224	311
	Yellowstone Cutthroat Trout	74	49	117

Rainbow Trout

The 2019 Rainbow Trout population estimate was 263 fish/mile (≥ 7in) (Figure 2). In 2020, the estimate decreased to 231 fish/mile (≥ 7in). The 2019 and 2020 estimates were both down when compared to the 2018 estimate of 358 fish/mile (≥ 7in) and the long-term mean of 306 fish/mile (≥ 7in). Both current abundance estimates are higher than many of the those from the 1980s and 1990s while remaining lower than those from 2001-2016.

For both 2019 and 2020, the number of Rainbow Trout captured during the marking effort and the recapture effort were compared. The number total number of fish captured in the recapture effort were lower than the marking effort by 30% in 2019. Sampling conditions were examined, and stream flow declined 775 cfs and water clarity increased from 47 cm to 106 cm between the mark and recapture efforts. This combination likely reduced capture efficiency. There may have also been outmigration of Rainbow Trout from the sampling section between the two efforts. The outmigration of Rainbow Trout during 2019 may have been the result of spring pre-spawning movement as most of the length groups that declines of numbers captured were noted in were groups that would contain sexually mature fish. In 2020, there was a 34% decrease in the number of Rainbow Trout captured during the recapture effort in this section. Sampling conditions between the two efforts in 2020 were examined and two changes were noted. Flow increased by 1,830 cfs and visibility increased from 27 cm to 55 cm. Like 2019 there was likely some outmigration associated with spawning movements. It's not clear if the decline in Rainbow Trout numbers between the marking and recapture efforts in the result of reduced capture efficiency, outmigration or a combination of both.

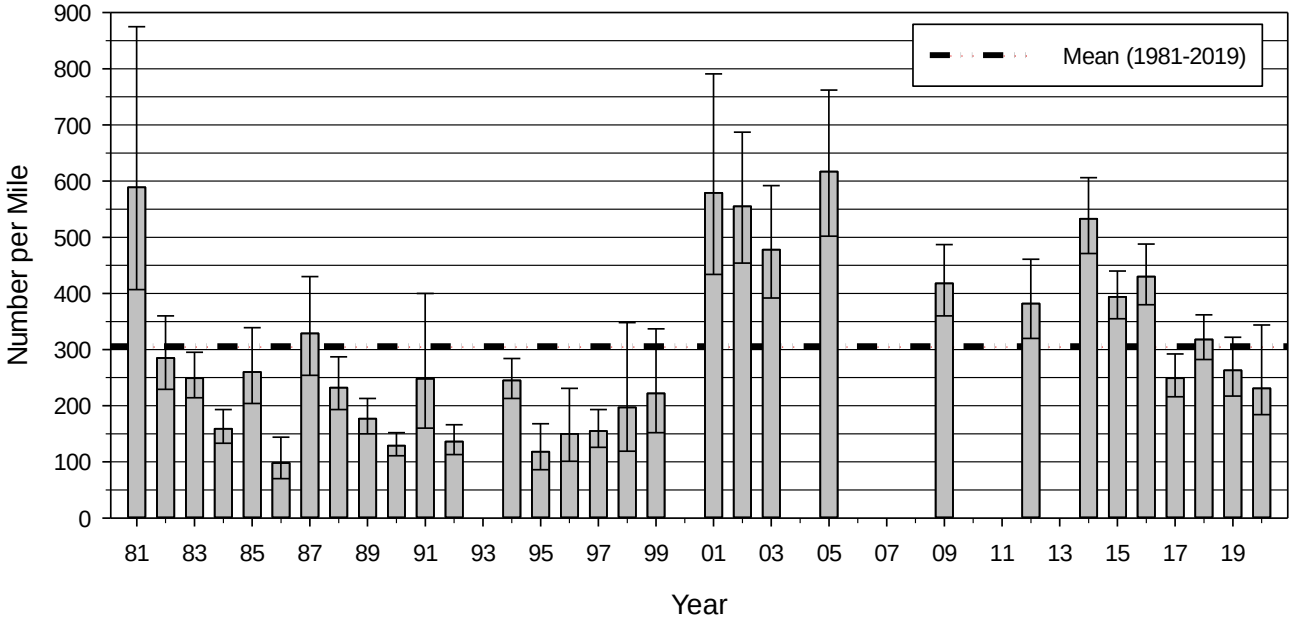

Figure 2: Mill Creek Bridge Rainbow Trout population estimates for fish 7 inches and greater from 1981 to 2020. The error bars represent the upper and lower 95% confidence intervals. Estimates were not completed in 1993, 2000, 2004, 2006-2008, 2010, 2011, and 2013.

Length-frequency distribution of Rainbow Trout in the Mill Creek Bridge Section in 2019 was similar to 2018 for fish from 4.0 to 11.5 inches and 16.5 inches and larger in length (Figure 3). There was an obvious decline of the number of fish in the length groups between these two points. This is unexpected given the high numbers in 2018. As mentioned earlier, decreased numbers of fish from the sampling section between the marking and the recapture efforts was noted 2019. This decrease in numbers is most likely the cause of the noted declines.

The 2020 length-frequency distribution showed a decline in most length groups under 12.5 inches when compared to 2019. Numbers increased in the 12.5 to 19.5-inch range when compared to 2019. Like 2019, decreases in the number of Rainbow Trout between the marking and recapture efforts was noted in 2020. There also appears to be some reduction in recruitment occurring as well.

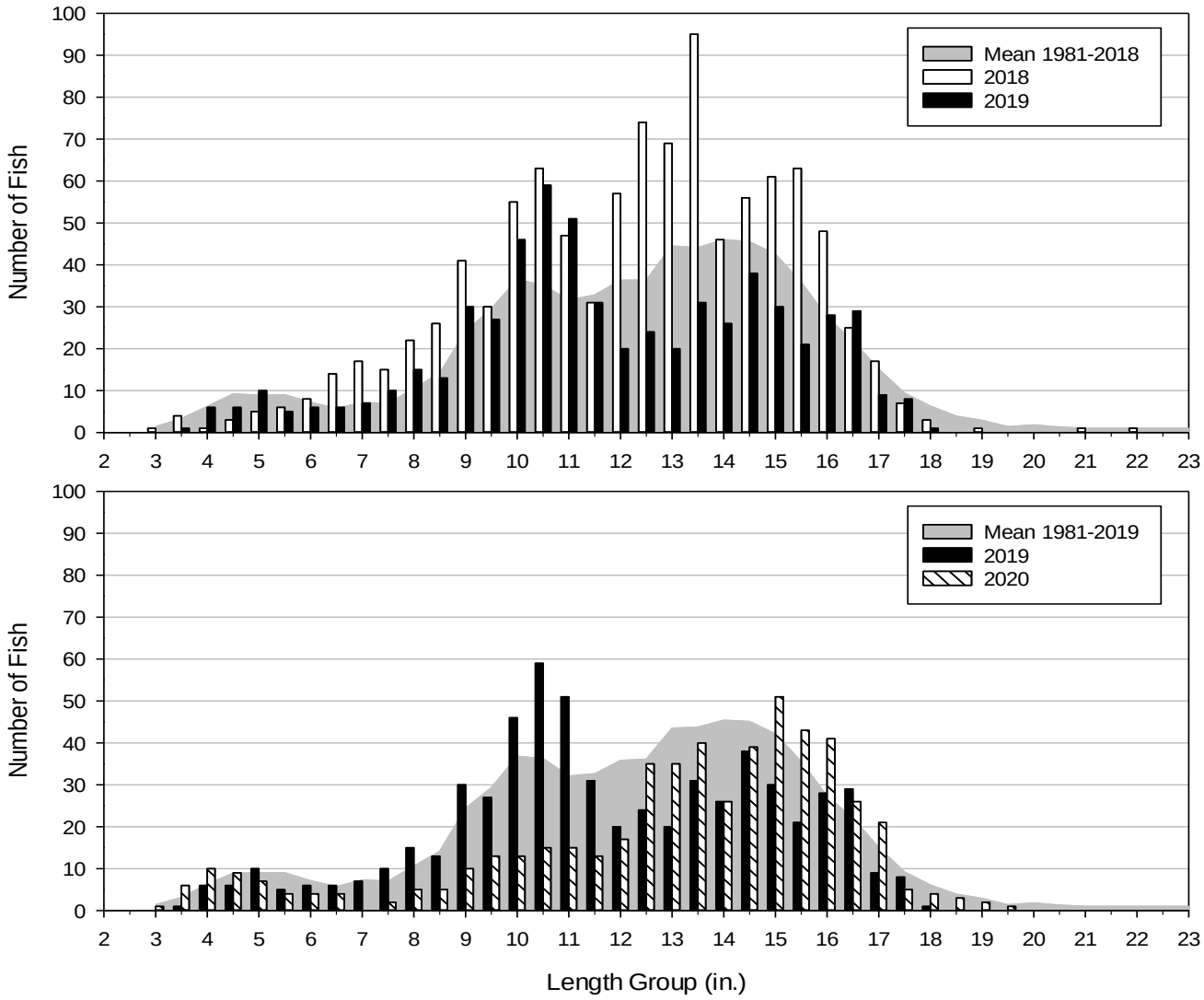

Figure 3: Length frequency distribution for Rainbow Trout in the Mill Creek Bridge Section for 2018 -2020 by half-inch group.

Brown Trout

The Mill Creek Bridge Section Brown Trout population estimate for 2019 declined to 274 fish/mile (≥ 7in) from 291 fish/mile (≥ 7in) in 2018 (Figure 4). In 2020, the estimate continued to decline to 263 fish/mile (≥ 7in). Current estimates continue to remain below the long-term mean of 355 fish/mile (≥ 7in) as well as estimates from the 1980s and early 1990s.

For both 2019 and 2020, the number of Brown Trout captured during the marking effort and the recapture effort were compared. In 2019, the number of fish captured in the recapture effort was lower than the marking effort by 61%. Like Rainbow Trout in this section the large drop in numbers of Brown Trout from the sampling section between the two efforts likely contributed to the lower Brown Trout abundance estimate in 2019. It is unclear if outmigration, reduction of capture efficiency, or a combination of both is occurring with Brown Trout in this section. While brown trout exhibit some movement in the spring, presumably moving from over-winter habitat to more secure habit prior to spring runoff, it is not clear if the change observed is the result of movement. Sampling conditions were examined,

and stream flow declined 775 cfs and water visibility increased from 47 cm to 106 cm between the mark and recapture efforts. In 2020, the number of Brown Trout captured in the recapture effort were 52% lower than the marking effort and outmigration appeared to continue to impact the population estimate. From the marking effort to the recapture effort in 2020 the flow increased 1,830 cfs and visibility increased from 27 cm to 55 cm.

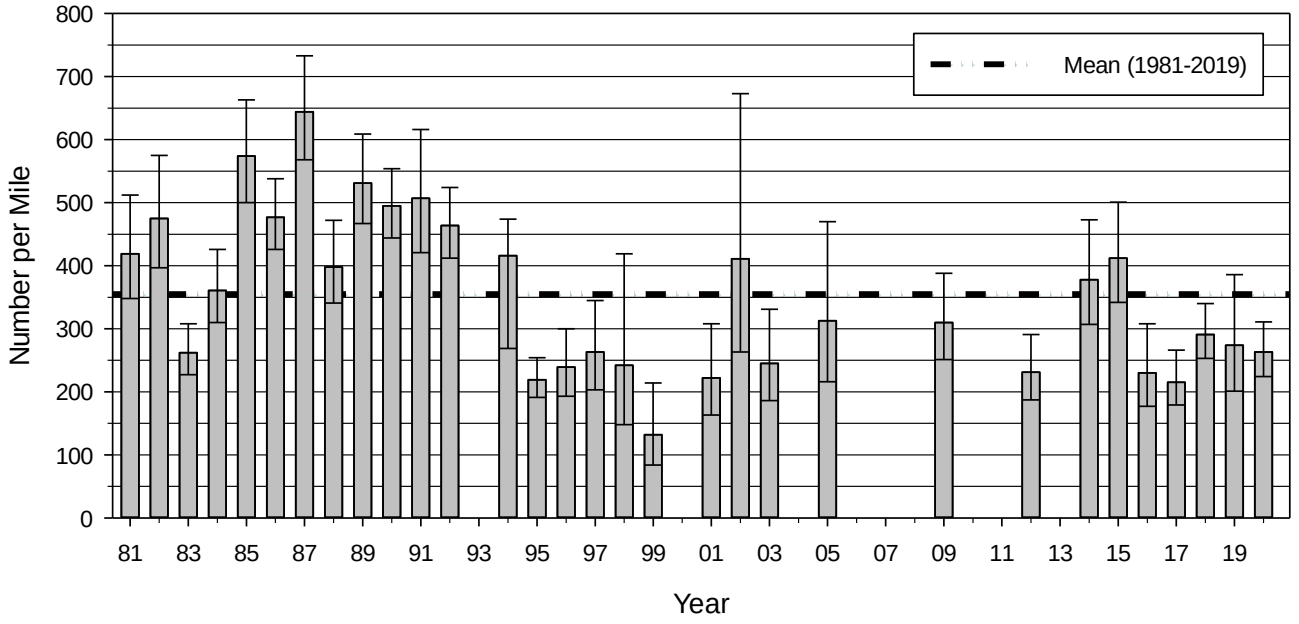

Figure 4: Mill Creek Bridge Brown Trout population estimates for fish 7 inches and greater from 1981 to 2020. The error bars represent the upper and lower 95% confidence intervals. Estimates were not completed in 1993, 2000, 2004, 2006-2008, 2010, 2011, and 2013.

In the Mill Creek Bridge Section in 2019, the length-frequency distribution showed a decline in the number of Brown Trout across almost all length groups when compare to 2018 and the long-term mean (Figure 5). The most notable declines were in the 8.0 to 10.5-inch range and the 13.5 to 16.5-inch range. As discussed earlier, the large amount of outmigration, decline in capture efficiency, or combination of both for Brown Trout between the marking and recapture efforts likely contributed to the declines noted in the 2019 length-frequency distribution.

The length-frequency distribution for Brown Trout in 2020 continued to decline for fish less than 12.5 inches in length. Fish in the 15.5 to 19.0-inch range increased to a level that was much higher than 2019 and the long-term mean. There was a decrease in the number of Brown Trout captured between the marking and recapture efforts in 2020 that likely contributed to the declines noted. The increase of fish in the 15.5 to 19.5-inch range is encouraging given that they haven't been present at this level for several years as well as their spawning potential for fall 2020.

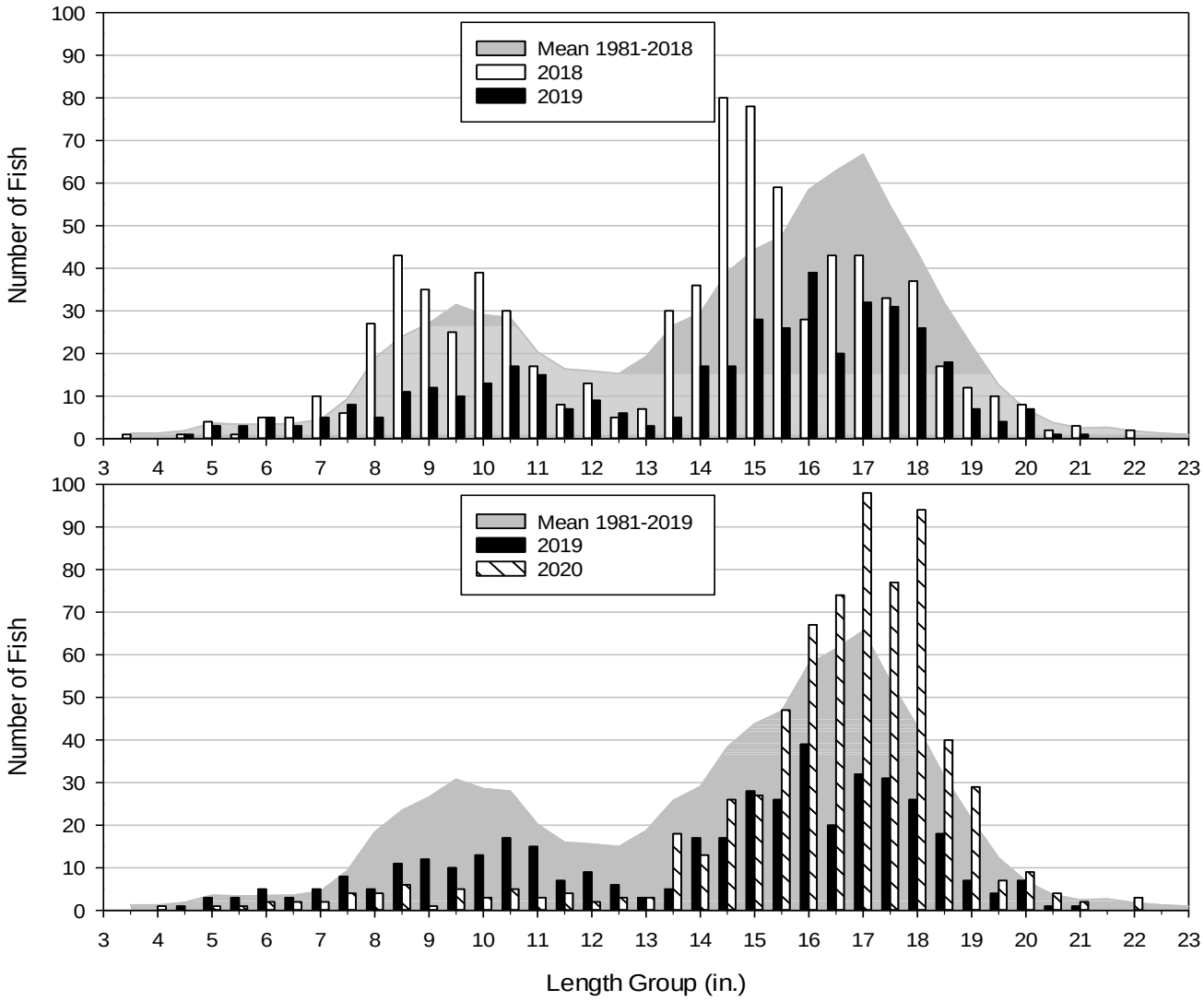

Figure 5: Length-frequency distribution for Brown Trout in the Mill Creek Bridge Section by half-inch group.

Yellowstone Cutthroat Trout

The abundance estimate for YCT in the Mill Creek Bridge Section in 2019 increased to 75 fish/mile (≥ 7in) from the recent low of 55 fish/mile (≥ 7in) in 2018 (Figure 6). In 2020, the abundance estimate deceased by one fish to 74 fish/mile (≥ 7in). The abundance estimates for both 2019 and 2020 remain at just more than half of the 133 fish/mile (≥ 7in) long-term mean. Unlike Rainbow and Brown Trout in 2019, when numbers of YCT from the marking effort and recapture effort were compared there were only 13% less fish in the recapture effort indicating little or no outmigration of fish. In 2020, there was a large amount of immigration of fish between the marking and recapture efforts as indicated by a 163% increase in the number of fish in the recapture effort. This is just the opposite of RB and LL in this section and it is unclear if this is the result of fish movement or capture efficiency.

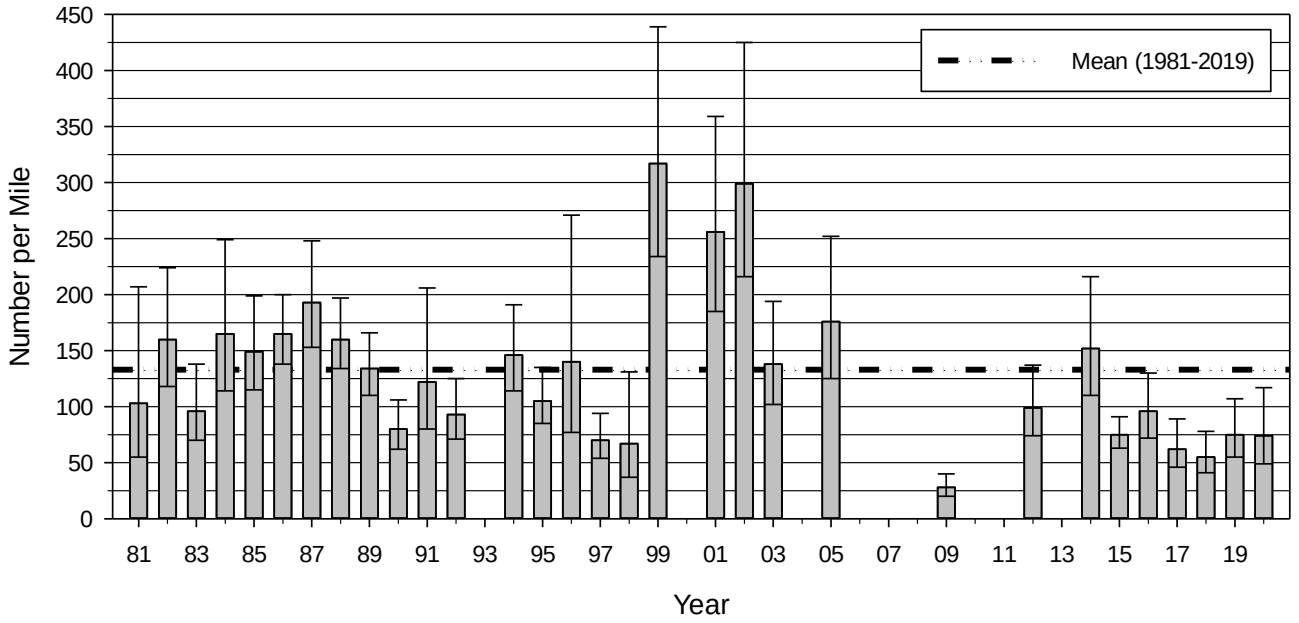

Figure 6: Mill Creek Bridge Yellowstone Cutthroat Trout population estimates for fish 7 inches and greater from 1981 to 2020. The error bars represent the upper and lower 95% confidence intervals. Estimates were not completed in 1993, 2000, 2004, 2006-2008, 2010, 2011, and 2013.

The length-frequency distribution of YCT in the Mill Creek Bridge Section in 2019 showed increases and decreases in numbers of fish in several length groups when compared to 2018. In 2019, the number of fish in the 8.5 to 11.5 increased when compared with 2018 (Figure 7). The most obvious increase that occurred was in the 13.5 to 18.5-inch range where YCT were absent in 2018. In 2019, fish in the 6.0 to 8.0 and the 12.0 to 13.0- inch ranges decreased, most notably in the 6.0 to 8.0-inch range with no fish being captured in most of the length groups.

In 2020, the length length-frequency distribution of YCT indicated a shift to larger length groups. The YCT 12.0 inches and larger all had increases except for the 14.0, 16.5, and 18.5-inch length groups. YCT that were 11.5 inches and smaller decreased except for fish in the 8.0-inch length group. Like 2019, no fish were captured in the 6.5 to 7.5-inch groups. This could be an indication of limited spawning success and recruitment or that these smaller fish aren't present in this section of the river in the spring. Future monitoring should provide insight.

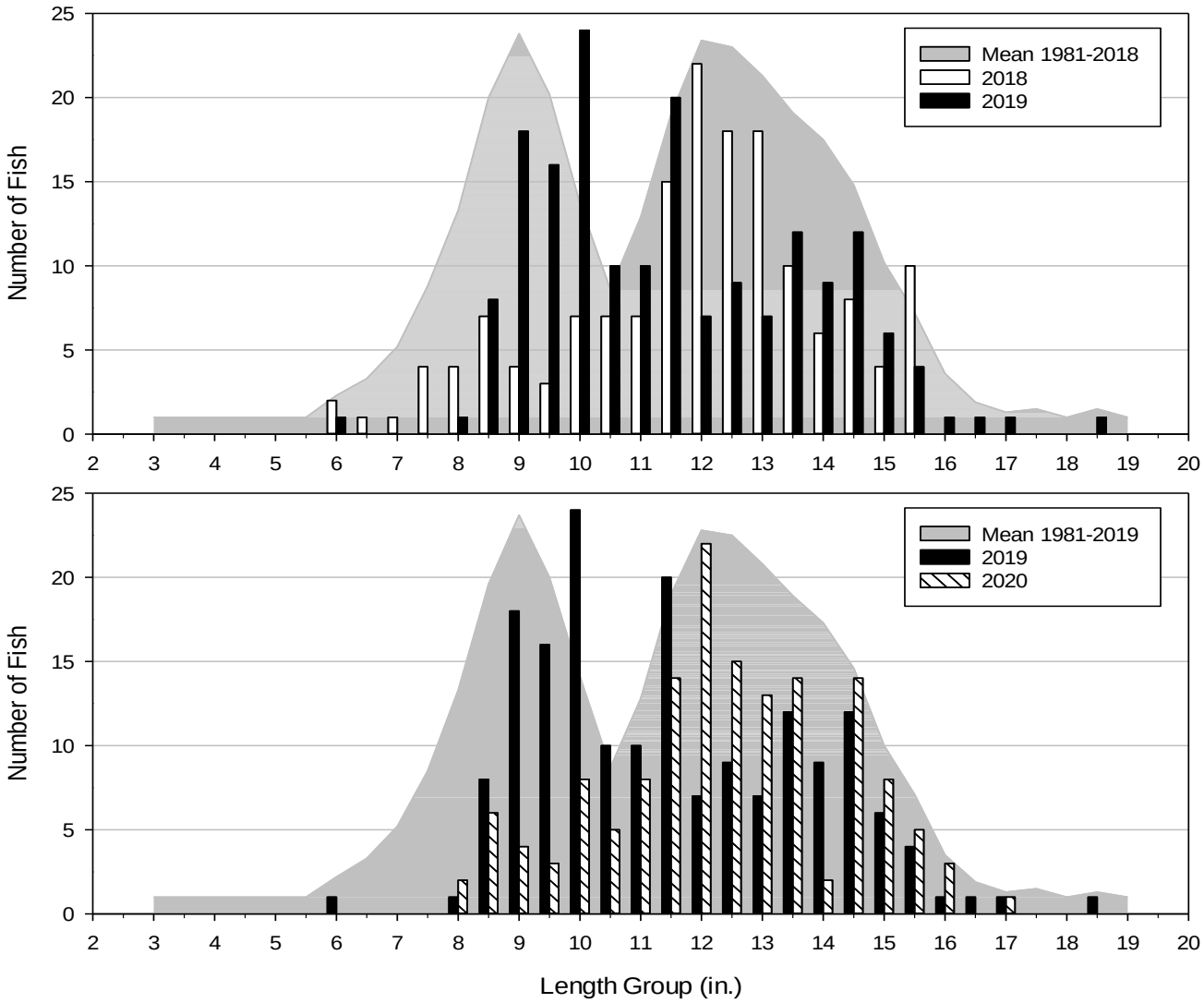

Figure 7: Length-frequency distribution for Yellowstone Cutthroat Trout in the Mill Creek Bridge Section by half-inch group.

Mill Creek Bridge Section Overall Trout Population

The trend of abundance estimates for Brown and Rainbow Trout being more than twice as high as YCT in the Mill Creek Section continued in 2019 and 2020 (Figure 8). In 2019 and 2020, Brown Trout had the highest abundance of the three species and Rainbow Trout were the second highest. Brown Trout historically were the most abundant species in the 1980s and 1990s. Starting in 2000, Rainbow Trout began to be the most abundant species in the section except for 2015, 2019 and 2020. The trend of YCT having the lowest abundance has been ongoing since the early 1980s and is likely the result of dewatering of spawning tributaries, limited fry production and recruitment, and competition with Rainbow and Brown Trout. Historically angler harvest may have contributed to the lower abundance of YCT as well.

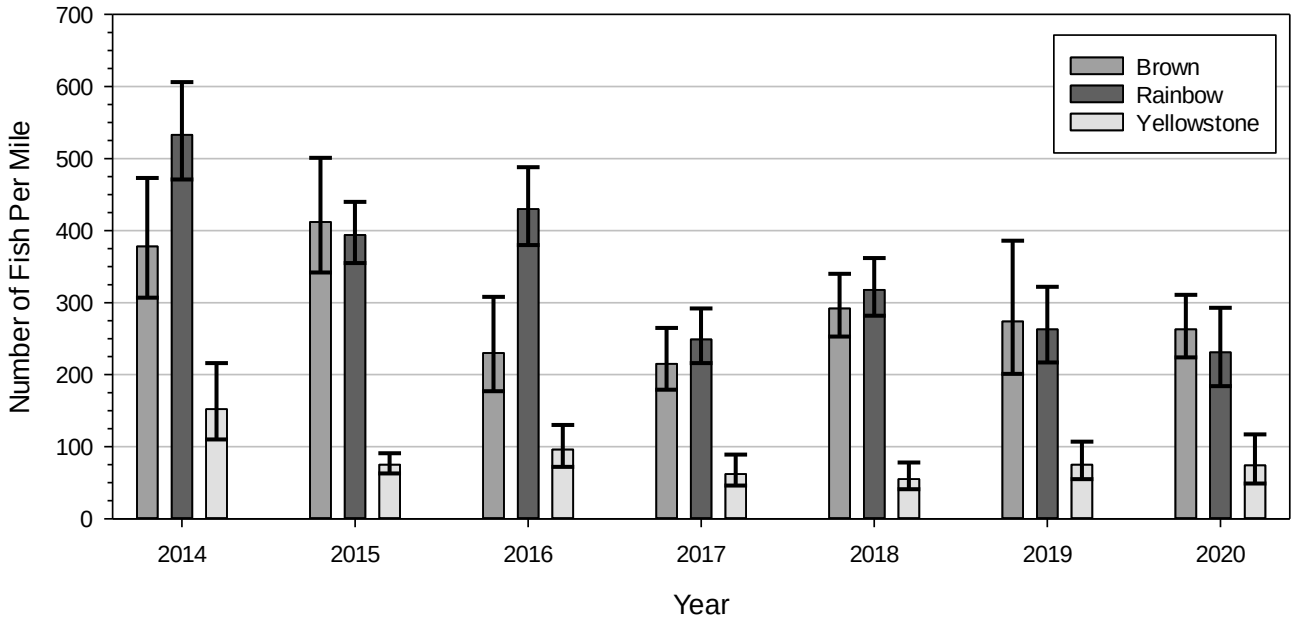

Figure 8: Abundance estimates for Brown, Rainbow, and Yellowstone Cutthroat Trout (≥ 7in) in the Mill Creek Bridge Section of the Yellowstone River for 2014 to 2020. Error bars represent the upper and lower 95% confidence intervals.

The 2019 length-frequency distributions for the combined trout species in the Mill Creek Bridge Section had two distinct peaks. One peak occurred around fish in the 10.5-inch length group and the other occurred around fish that were in the 14.5 to 16.0-inch length groups (Figure 9). Rainbow Trout made up most of the fish in the 3.5 to 15.0 length range. Brown Trout made up most of the fish in the 15.5 to 18.5-inch length range and were the only species in the 19.0 to 21.0-inch range.

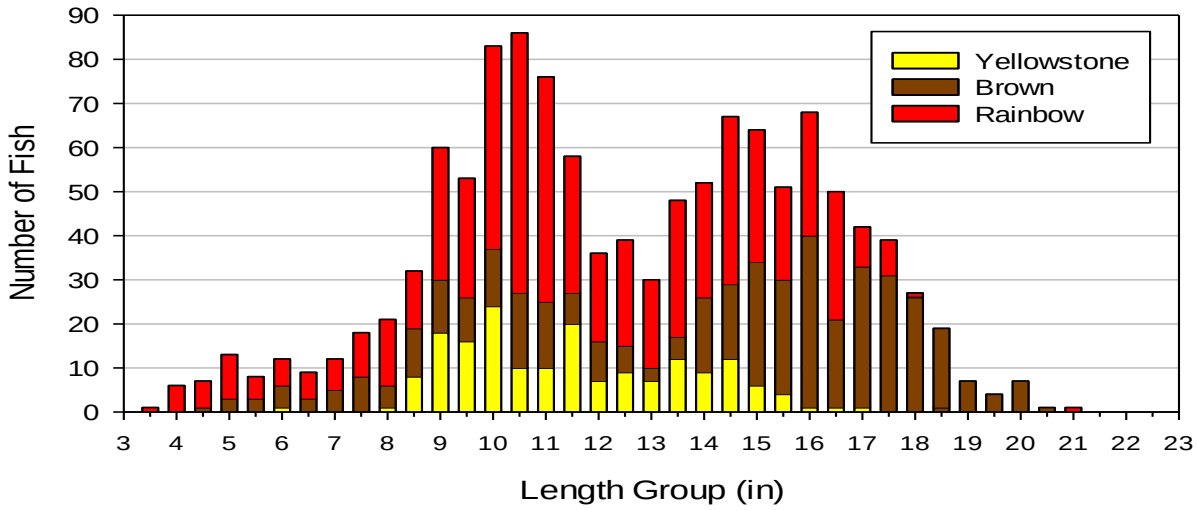

Figure 9: The length-frequency distribution for Rainbow, Brown, and Yellowstone Cutthroat Trout sampled in the Mill Creek Bridge Section of the Yellowstone River in 2019.

The 2020 length-frequency distributions for the combined trout species in the Mill Creek Section only had one peak with a shift in the distribution to larger fish when compared to 2019. This graph indicates a large decrease in the number of trout in the 7.0 to 11.5-inch length groups suggesting poor recruitment in these length groups when compared to 2019. Overall numbers of larger trout increased in 2020. Rainbow Trout continued to make up most of the fish in the 3.0 to 15.0-inch range (Figure 10). Brown Trout made up the largest portion of the trout in the 15.5 to 19.5.0-inch length ranges and were the only species present in the 20.0 to 22.0-inch range. YCT made up most of the trout in the 5.0, 11.5, and 12.0-inch groups in 2020.

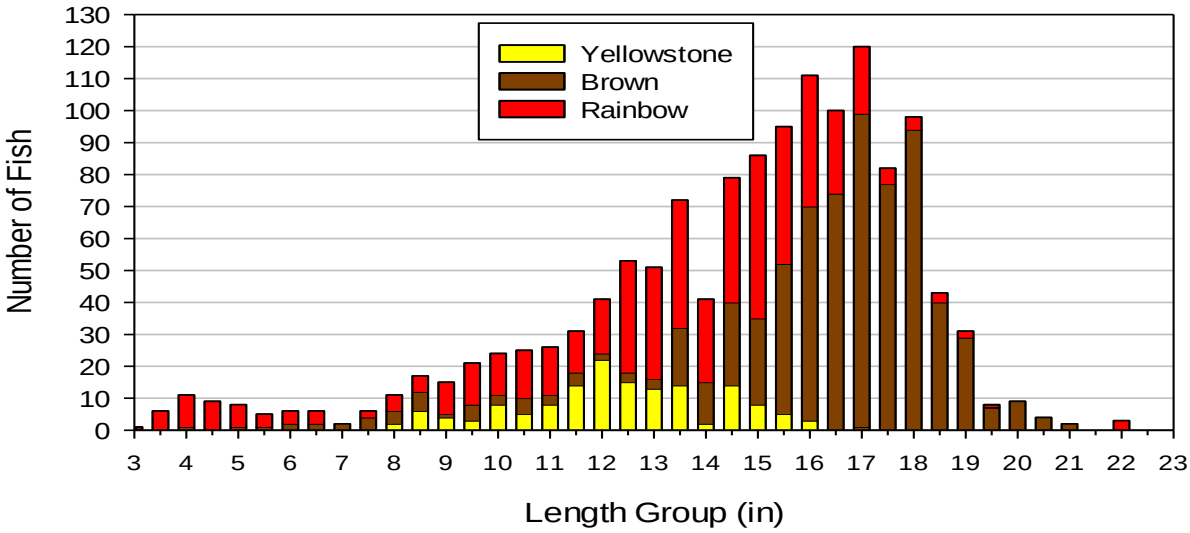

Figure 10: The length-frequency distribution for Rainbow, Brown, and Yellowstone Cutthroat Trout sampled in the Mill Creek Bridge Section of the Yellowstone River in 2020.

Mallard's Rest Section

MWF mark-recapture population estimates in the Yellowstone River are difficult and often produce unreliable estimates. To look at population trends for MWF, CPUE efforts were started in 2017 in the Mallard's Rest Section (Figure 1). The recent CPUEs were then compared to the CPUE of the marking effort in previous mark-recapture efforts in the section. The 2019 and 2020 CPUEs continue to remain much lower than the 1980s and 1990s long-term mean of 897 fish/mile, indicating notable change in abundance of MWF (Figure 11). The CPUEs for 2019 and 2020 were both up when compared to 2018 and both were lower than 2017. The 18-year time span between sampling makes it difficult to determine if MWF have been declining over time or more recently as a result of the 2016 PKD fish kill, other biotic or environmental factors, or a combination of factors. Continued monitoring will provide insight into the changes in abundance that have occurred.

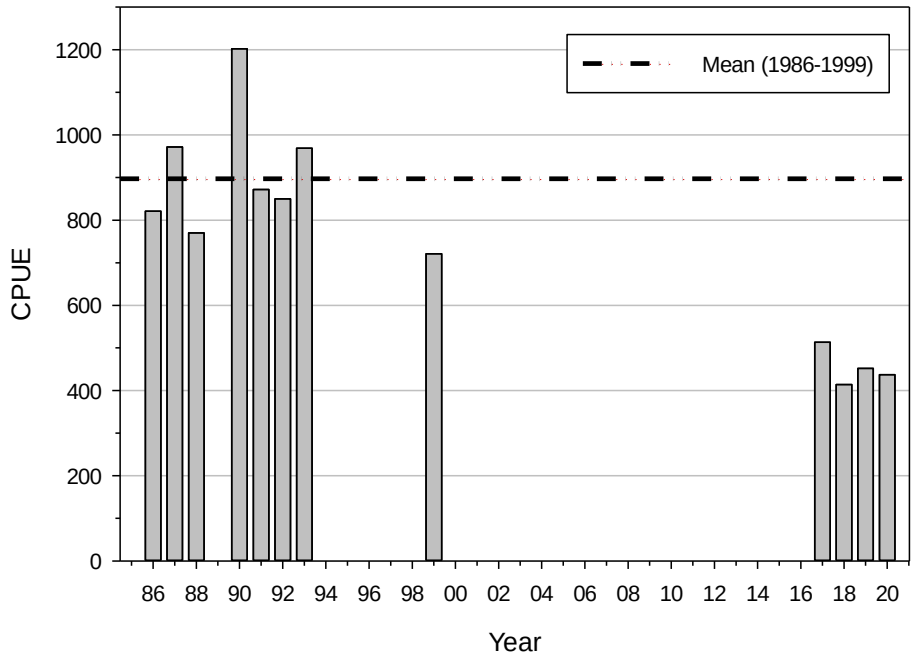

Figure 11: Mountain Whitefish CPUE in the Mallard's Rest Section from 1986 to 2020. The CPUE value is Mountain Whitefish (≥ 7in) per mile. Sampling efforts were not completed during the years with no bars.

The Mallard's Rest Section length-frequency distribution of MWF in 2019 was similar to 2018 with the exception of fish in the 4.5 to 7.0-inch range (Figure 12). In the 4.5 to 7.0-inch range the number of MWF were higher in 2019 indicating good recruitment of young fish. Obvious increases in numbers of MWF in 2019 also occurred in the 12.5, 14.0, 17.0, 18.0, and 19.5-inch groups.

In 2020, the length-frequency distribution of MWF generally saw decreases in numbers with a few exceptions when compared to 2019. The 8.0 to 9.5 and the 14.5 to 16.5-inch length groups did have increases when compared to 2019. The increases in the 8.0 to 9.5 are encouraging and hopefully those fish will continue to recruit to larger size classes.

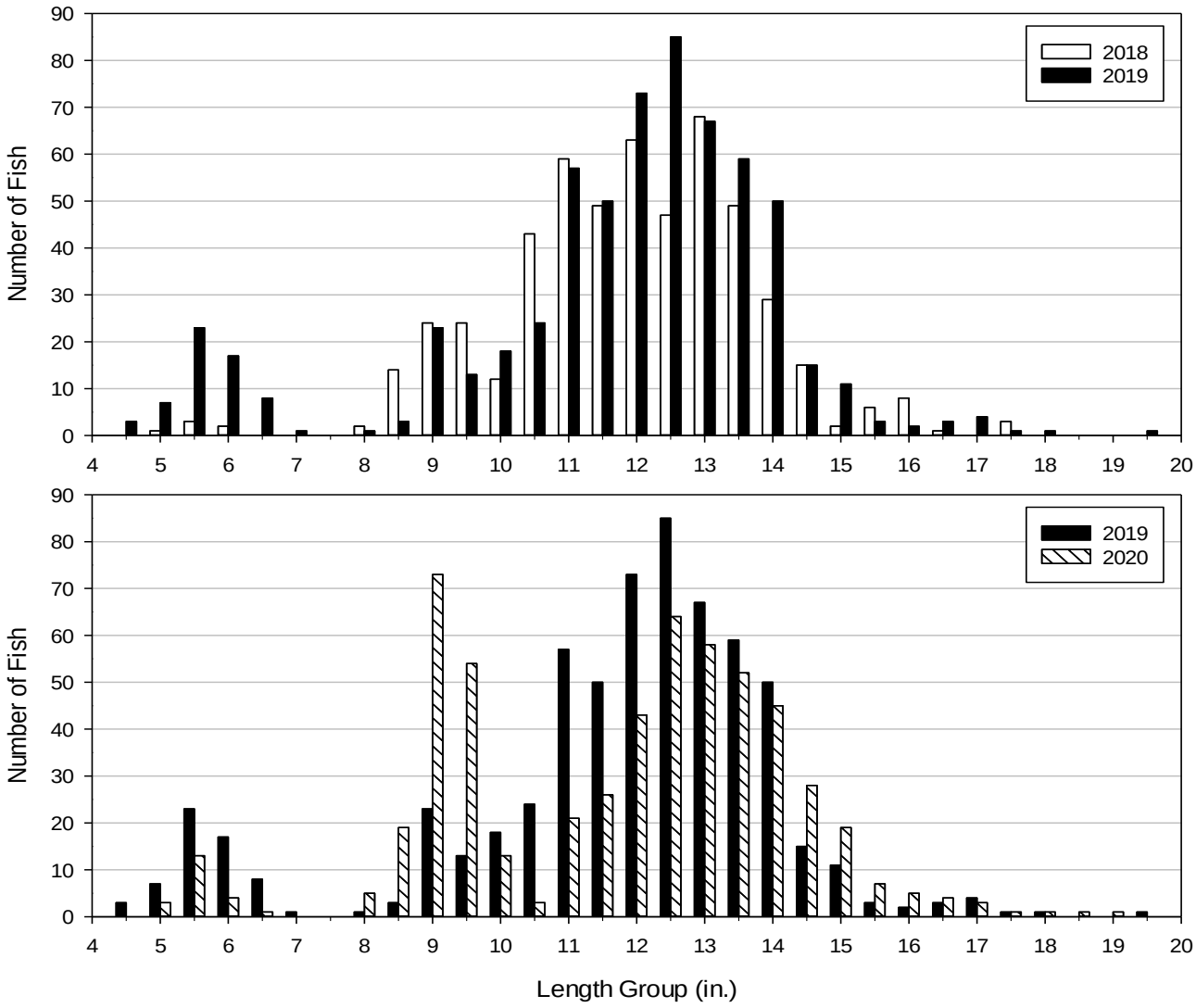

Figure 12: Percent of catch for MWF in the Mallard's Rest Section by half-inch group.

Dailey Lake

Fish Stocking

Dailey Lake is stocked with Rainbow Trout, YCT, and Walleye to maintain a recreational fishery and control the naturally reproducing Yellow Perch population in the lake. Trout are stocked on an annual basis and Walleye on a 2-year rotation. In 2019, the lake was stocked with Rainbow Trout, YCT, and Walleye and in 2020 it was stocked with Rainbow Trout and YCT.

Walleye

In 2019, Dailey Lake was stocked with Walleye as part of a stocking plan change that was initiated in 2012. Walleye stocking was changed from annually to every other year and the number of Walleye stocked was reduced from 10,000 to 5,000. The intent of the change is to increase the survival of Walleye by reducing competition within and among the fish species in the lake. This change is being monitored to determine success and will be changed as necessary.

Stocking rates for Walleye from 2011 through 2019 are presented in the table below (Table 3). The reduced number of stocked Walleye in 2017 was the result of poor survival at the hatchery prior to stocking.

Table 3: Walleye stocking data for Dailey Lake from 2010-2019.

Year	Date	Strain	Length (in)	Number
2011	June 29	Fort Peck	1.6	5,112
	Sept. 13	Fort Peck	5.0	5,000
			Total	10,112
2013	Sept. 30	Fort Peck	4.5	5,000
2015	Sept. 02	Fort Peck	5.0	5,000
2017	Aug. 08	Fort Peck	8.2	1,800
2019	Aug. 16	Fort Peck	3.1	5,085

Rainbow and Yellowstone Cutthroat Trout

The number of Rainbow Trout that were stocked in the lake was reduced from 20,000 to 10,000 as part of an annual stocking plan change implemented in 2012. The intent is to increase the survival of Rainbow Trout by reducing the competition within the species. This change is being monitored and will be modified if necessary.

A total of 5,000 Arlee Rainbow Trout young-of-the-year (YOY) from Giant Springs Trout Hatchery were stocked in 2019 (Table 4). A total of 5,500 Eagle Lake strain YOY Rainbow Trout from Bluewater Springs Trout Hatchery (BSTH) were also stocked in 2019. Finally in 2019, 2,450 YCT From the Yellowstone River Hatchery were stocked. The reduction of YCT stocked in 2019 was the result of hatchery production cutbacks. In 2020, a total of 5,001 Arlee Rainbow Trout from the Joko River Trout Hatchery were stocked in Dailey Lake. No Eagle Lake Rainbow Trout were stocked in 2020. A facility shut down at BSTH in 2020 prevented the stocking of both Arlee and Eagle Lake strain Rainbow Trout from that facility. Arlee Rainbow Trout from the Jocko River Trout Hatchery were the only fish available to replace the scheduled

BSTH stocking. BTSH is producing fish again and is scheduled to stock both Arlee and Eagle Lake Rainbow Trout in Dailey Lake in 2021.

Table 4: Trout stocking data for Dailey Lake from 2016-2020.

Year	Date	Strain	Length (in)	Number
2016	Apr. 27	Arlee	3.5	5,500
	Apr. 20	Yellowstone	6.1	5,192
	Jun. 08	Eagle Lake	3.1	6,309
			Total	17,001
2017	Apr. 03	Yellowstone	7.8	1,728
	Apr. 24	Yellowstone	8.4	1,186
	Apr. 25	Arlee	4.6	5,032
	Apr. 26	Yellowstone	8.4	1,043
	May 1	Yellowstone	8.3	1,050
	Jun. 22	Arlee	8.4	5,500
	Oct. 10	Eagle Lake	7.3	5,398
	Nov. 16	Yellowstone	4.0	4,200
			Total	25,137
2018	Apr. 24	Yellowstone	7.6	1620
	Apr. 28	Yellowstone	7.6	744
	May 16	Arlee	4.5	5,000
	Aug. 21	Eagle Lake	4.8	6,380
			Total	13,744
2019	Apr. 29	Arlee	4.1	5,000
	Apr. 23	Yellowstone	7.2	2,450
	Aug. 27	Eagle Lake	5.3	5,500
			Total	12,950
2020	Sep. 03	Arlee	11.3	875
	Sep. 03	Arlee	11.7	229
	Sep. 03	Arlee	6.7	3,897
	Mar. 30	Yellowstone	6.6	1,680
	Apr. 06	Yellowstone	6.6	1,695
	May 26	Yellowstone	7.4	1,625
			Total	10,001

Gill Nets

Two floating and two sinking experimental (125-feet long and 6.0-feet deep with 1.0, 1.5, 2.0, 2.5 and 3.0 inch-bar-measure mesh), multifilament gill nets were used to sample Dailey Lake in 2019 and 2020. The long-term series of gill nets were set the evening of May 14, 2019 and May 18, 2020. This set consists of one gill net located in each of the four corners of the lake (Figure 13).

The nets were pulled on the morning of May 15, 2019 and May 19, 2020. Lengths were recorded for all fish to the nearest 0.1 inch and weights to the nearest 0.01 pound. All live fish were released back into the lake.

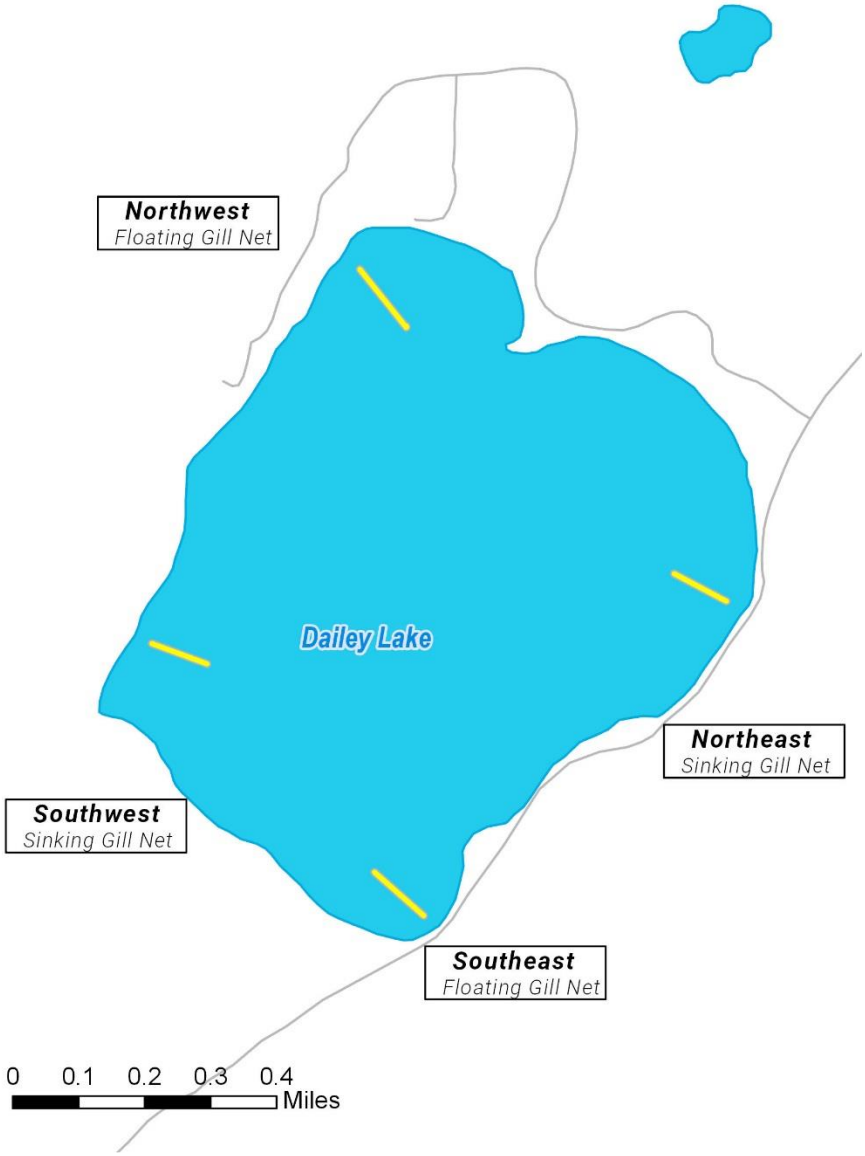

Figure 13: Map of Dailey Lake showing locations of gill nets in 2019 and 2020.

Catch-Per-Unit-Effort

Rainbow Trout

In 2019, CPUE for Rainbow Trout in all nets increased to 0.71 fish/net hour, from 0.69 fish/net hour in 2018 (Figure 14). In 2020 the CPUE decreased to 0.25 fish/net hour. The CPUE for Rainbow Trout in floating nets also increased from 0.53 fish/net hour in 2018 to 0.56 fish/net hour in 2019 and then decreased to 0.39 fish/net hour in 2020 (Figure 15). CPUE in sinking nets decreased from 0.86 fish/net hour in 2018 to 0.85 fish/net hour in 2019 (Figure 16). It then decreased close to the levels see in 2014 and 2015 at 0.12 fish/net hour in 2020.

There is no obvious cause for the decreases in Rainbow CPUE in 2020, but they may be the result of reduced capture efficiency as declines in all other species were noted as well.

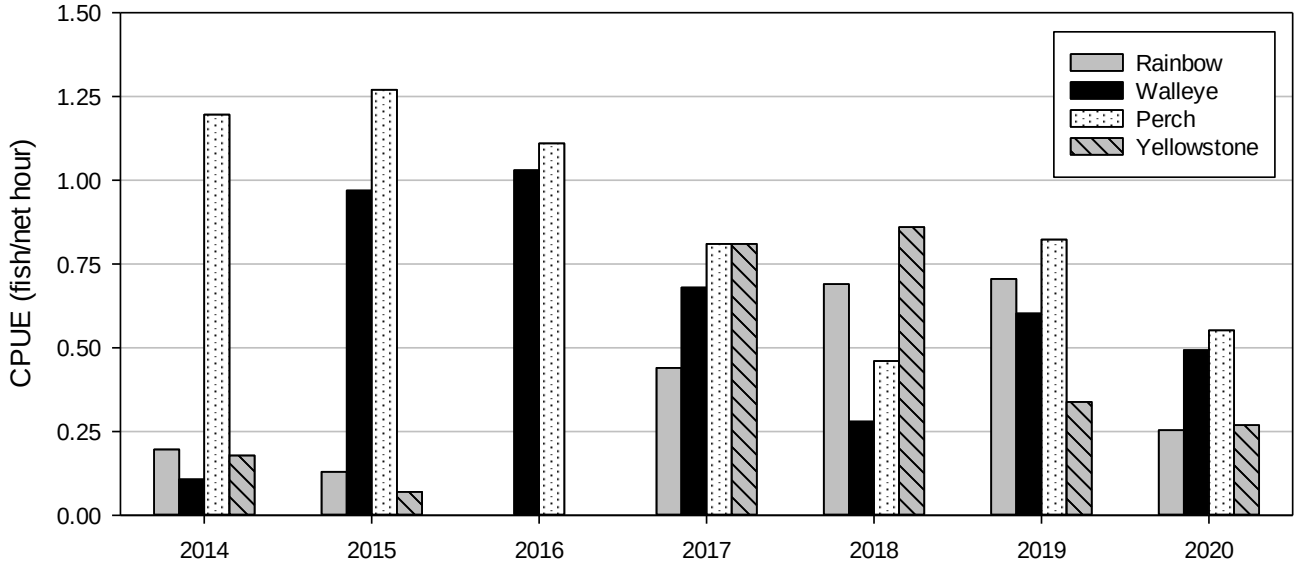

Figure 14: Catch-per-unit-effort for Rainbow Trout, Walleye, Yellow Perch, and Yellowstone Cutthroat Trout in all gill nets for 2014-2020.

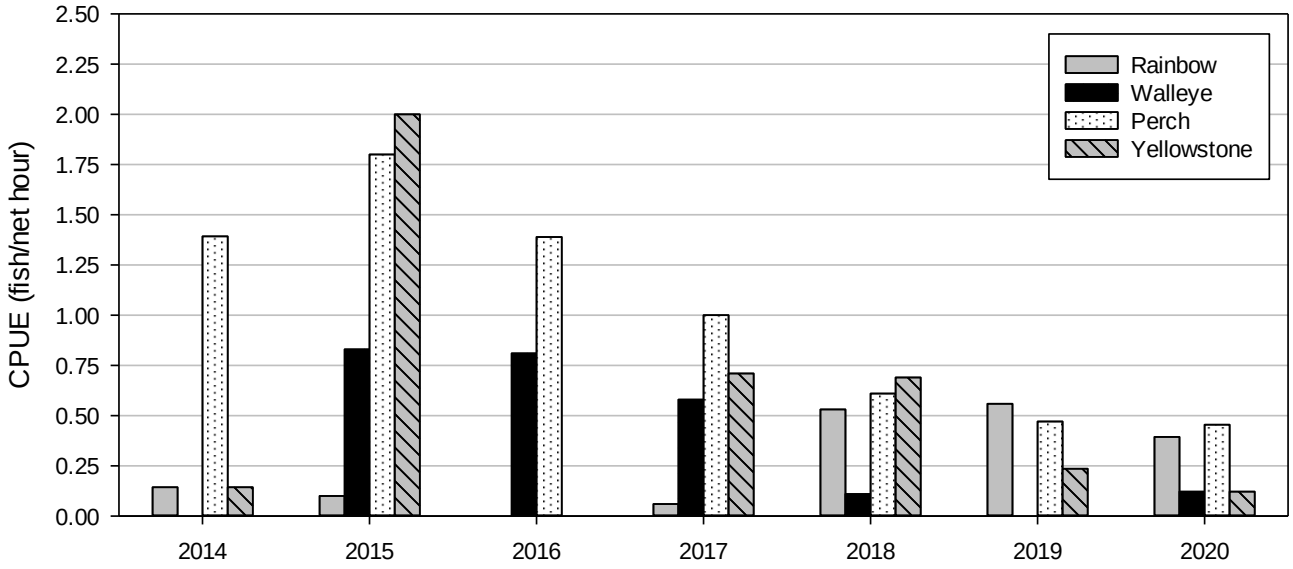

Figure 15: Catch-per-unit-effort for Rainbow Trout, Walleye, Yellow Perch, and Yellowstone Cutthroat Trout in floating gill nets for 2014-2020.

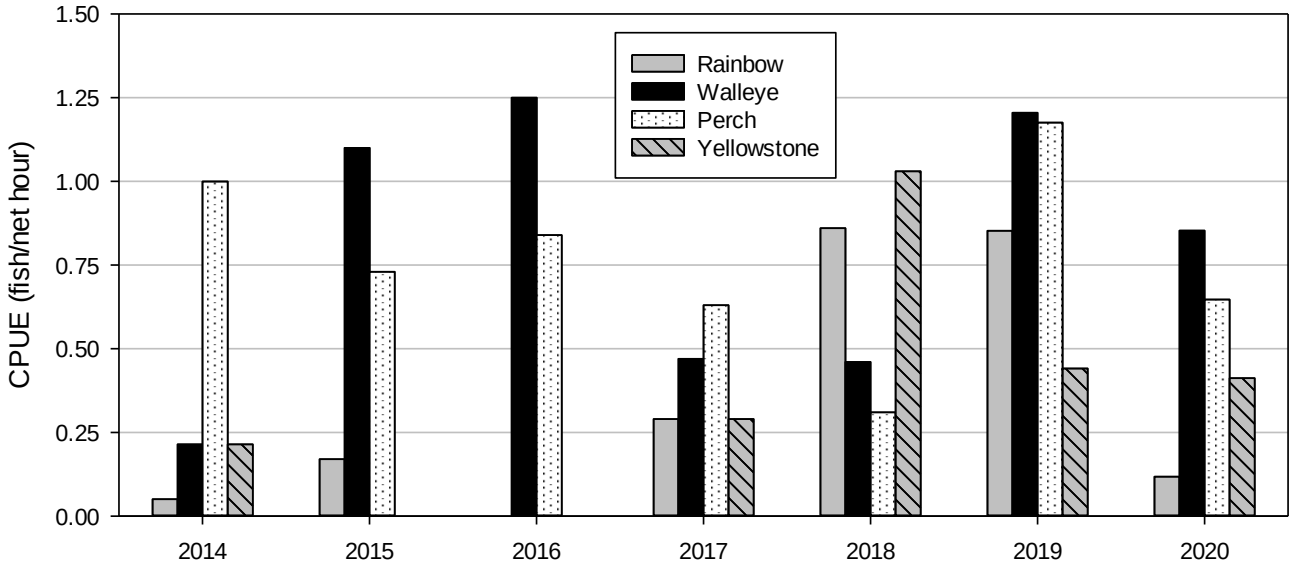

Figure 16: Catch-per-unit-effort for Rainbow Trout, Walleye, Yellow Perch, and Yellowstone Cutthroat Trout in sinking gill nets for 2014-2020

Yellow Perch

In 2019, the CPUE for Yellow Perch in all nets was 0.82 fish/net hour and increased from 0.46 fish/net hour in 2018 (Figure 14). In 2020, the CPUE for all nets decreased to 0.55 fish/net hour but remained above the 2018 low of 0.46 fish/net hour. In 2019, CPUE for Yellow Perch in the floating nets was 0.47 fish/net hour, it decreased to 0.45 fish/net hour in 2020 and remained below the 0.61 fish/net hour in 2018 (Figure 15). The CPUE for sinking gill nets was 0.44 fish/net hour in 2019, an increase from 0.31 fish/net hour in 2018 (Figure 16). It then increased to 0.65 fish/net hour in 2020. Some of the decline in CPUE for Yellow Perch in 2020 may be the result of larger Walleye present in the lake.

Walleye

CPUE for Walleye in all nets increased from 0.46 fish/net hour in 2018 to 0.60 fish/net hour in 2019 and then deceased to 0.49 fish/net hour in 2020 to (Figure 14). In 2019, no Walleye were captured in floating nets (Figure 15). In 2020, the CPUE in the floating nets was 0.12 fish/net hour. This was up slightly from 0.11 fish/net hour in 2018. The CPUE of Walleye in sinking gill nets was 1.21 fish/net hour in 2019 and decreased to 0.85 fish/net hour in 2020 (Figure 16). The lower 2020 CPUE for sinking gill nets remained above the lows of 2014, 2017, and 2018. Some of the decline in Walleye CPUE may be related to the reduced number of Walleye stocked in 2017.

Yellowstone Cutthroat Trout

The CPUE for YCT in all nets has increased since hitting a low of 0.00 in 2016 but is on a declining trend for 2019 and 2020 (Figure 14). In 2019, the CPUE for all nets decreased to 0.34 fish/net hour. It then decreased to 0.27 fish/net hour in 2020. In 2019, CPUE for floating nets was 0.24 fish/net hour and decreased to 0.12 fish/net hour in 2020 (Figure 15). The CPUE for the sinking nets in 2019 was 1.18 fish/net hour and decreased to 0.41 fish/net hour in 2020 (Figure 16). The decrease in CPUE in both 2019 and 2020 are likely the result of decreases in the numbers of stocked YCT in 2018 and 2019 that were the result of hatchery cutbacks. Less than half of the requested 5,000 fish were available for stocking both years. In 2020, 5,000 YCT were stocked and will hopefully help increase the CPUE for this species.

Length

Rainbow trout

No Rainbow Trout were captured in gill nets during 2016 (Figure 17). In 2019, the maximum length was 18.1 inches, the mean was 15.5 inches, and the minimum was 5.9 inches. The maximum and mean were higher than 2018. In 2020, the maximum length for Rainbow Trout continued to increase to 20.5 inches. The mean and minimum lengths also increased to 19.5 and 16.6 inches, respectively. The increases in 2019 and 2020 are likely the result of the Rainbow Trout re-establishing after their absence in 2016 and very low numbers in 2017.

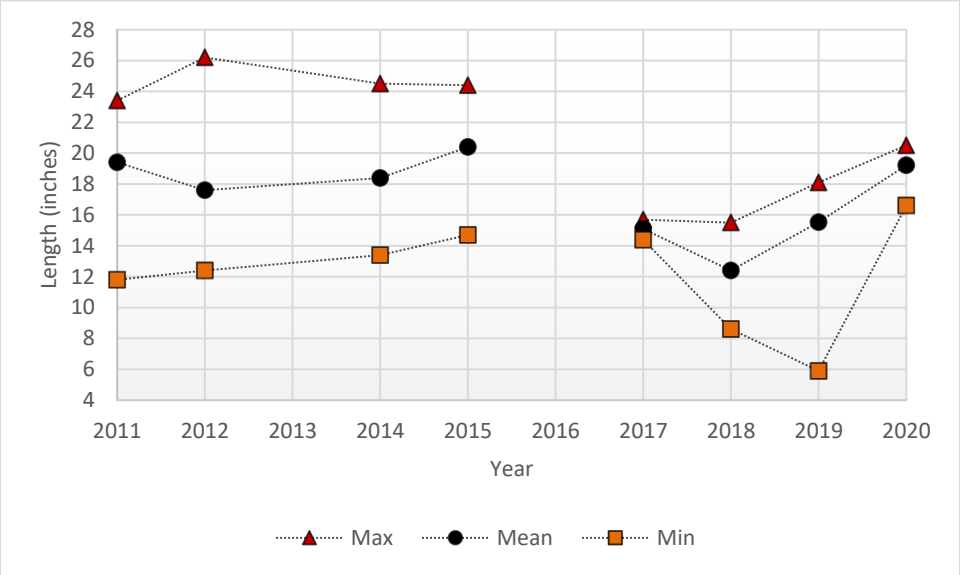

Figure 17: Maximum, mean, and minimum lengths of Rainbow Trout captured in gill nets in Dailey Lake in 2011-2020. Nets were not set in 2013 and no Rainbow Trout were captured in 2016.

Yellow Perch

In 2019, the maximum, mean, and minimum lengths of Yellow Perch were 11.1, 9.5, and 6.2 inches, respectively (Figure 18). The maximum and mean lengths increased when compared to 2018 and the minimum length decreased. The decrease in the minimum length was likely due to successful spawning and recruitment of young fish. The maximum length decreased to 10.9 inches in 2020, the second lowest since 2011. The mean length decreased to 9.2 inches and the minimum increased to 6.8 inches in 2020.

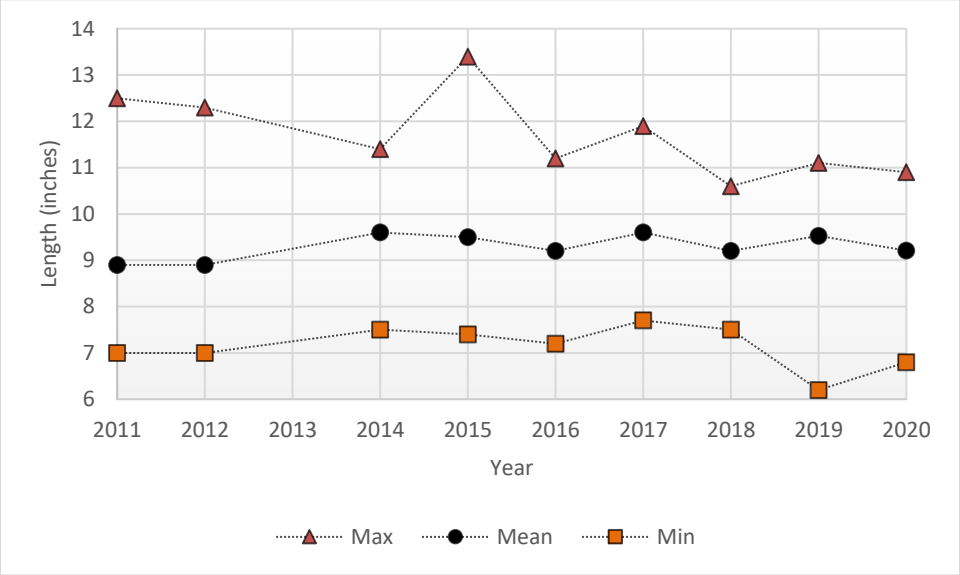

Figure 18: Maximum, mean, and minimum lengths of Yellow Perch captured in gill nets in Dailey Lake in 2011-2020. Nets were not set in 2013.

Walleye

The maximum length of Walleye in 2019 was 25.6 inches (Figure 19). This was an increase from 25.0 in 2018. The mean length in 2019 was 15.4 inches and the minimum length was 10.5 inches. In 2020, the maximum length declined to 24.4 inches. The mean decreased to 14.0 inches and the minimum increased to 11.5 inches. The overall increases in maximum sizes of Walleye are likely the result of the stocking change that was implemented in 2012 to increase survival and reduce competition among Walleye. The recent declines may be related to the reduced number of fish stocked in 2017.

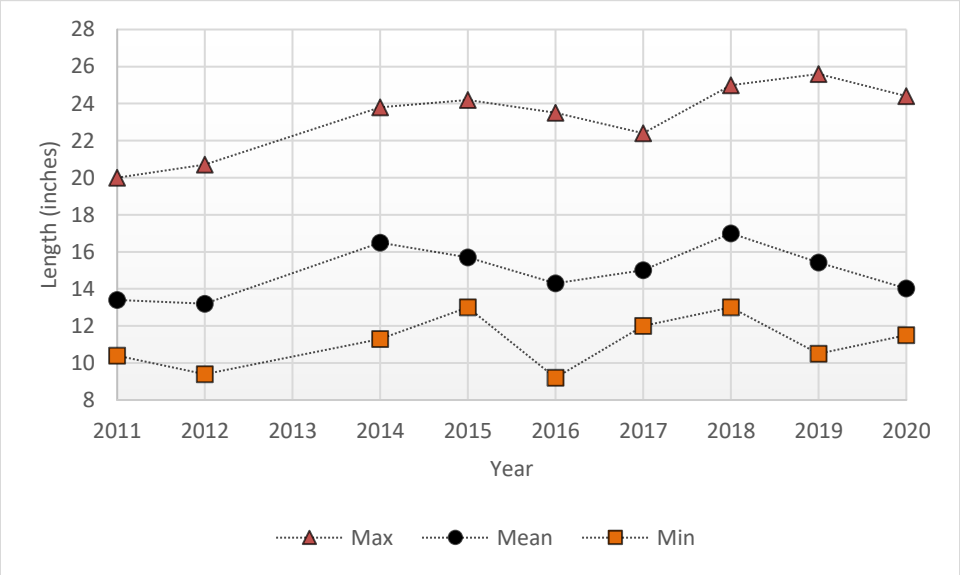

Figure 19: Maximum, mean, and minimum lengths of Walleye captured in gill nets in Dailey Lake in 2011-2020. Nets were not set in 2013.

Yellowstone Cutthroat Trout

Like Rainbow Trout, no YCT were captured in the gill nets in 2016 (Figure 20). In 2019, the maximum length was 16.6 inches. The mean and the minimum length both decreased to 11.1 inches and 7.7 inches, respectively. The maximum length continued to increase in 2020 to 18.2 inches. The mean and minimum lengths both decreased in 2020 to 10.0 and 7.5 inches, respectively. YCT have been stocked in Dailey Lake since 2008 and appear to be recovering from their absence from the sampling effort in 2016.

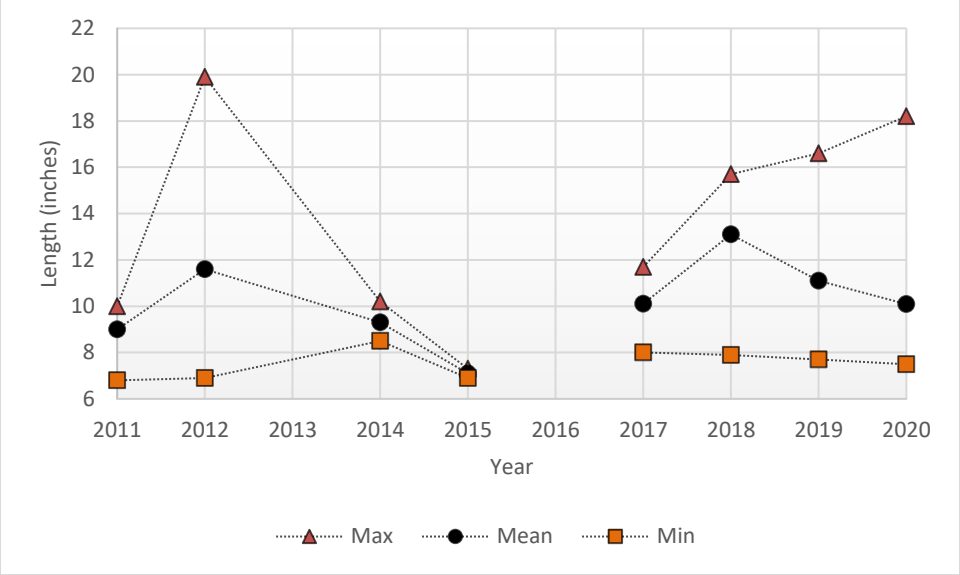

Figure 20: Maximum, mean, and minimum lengths of Yellowstone Cutthroat Trout captured in gill nets in Dailey Lake in 2011-2020. Nets were not set in 2013 and no Yellowstone Cutthroat Trout were captured in 2016.

Length-Frequency

Rainbow Trout

In 2018, the length-frequency distribution was concentrated in the 8.5 to 15.5-inch range (Figure 21). In 2019, the length-frequency shifted almost exclusively to larger fish with only two fish less than 14.0 inches in length. It appears that many of the fish from 2018 continued to grow and recruit well into larger size classes. It also appears that survival and recruitment of Rainbow Trout stocked in 2018 was poor. In 2020, the trend of recruitment to larger fish size continued with all the fish captured being 17.0 inches and larger. There was no indication of recruitment of fish stocked in 2019. It is unclear if predation by Walleye is affecting the survival of Rainbow Trout. Monitoring will continue to determine if fish recruit to the missing smaller length groups and if a stocking change in needed.

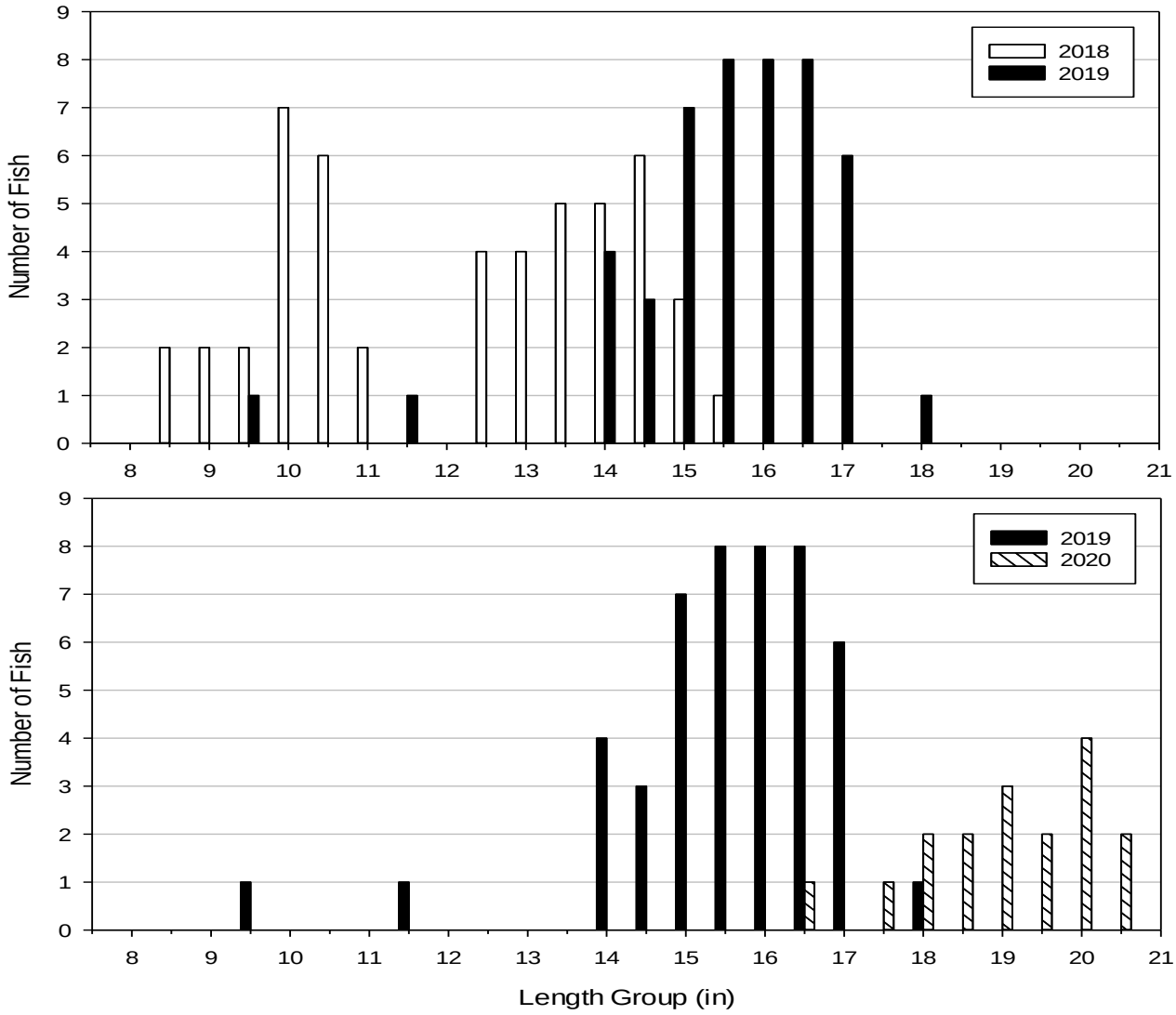

Figure 21: Length-frequency distribution for Dailey Lake Rainbow Trout for 2018-2020.

Yellow Perch

The length-frequency distribution for Yellow Perch in 2019 saw an increase in numbers of fish that were 9.0 inches and larger indicating good growth and recruitment (Figure 22). The Yellow Perch length-frequency distribution for 2020 had a decrease in the 8.5 to 9.5-inch range and increases in the 7.0 to 8.0 and 10. To 11.0 -inch ranges. Overall length-frequency distribution trends appear to be stable for Yellow Perch.

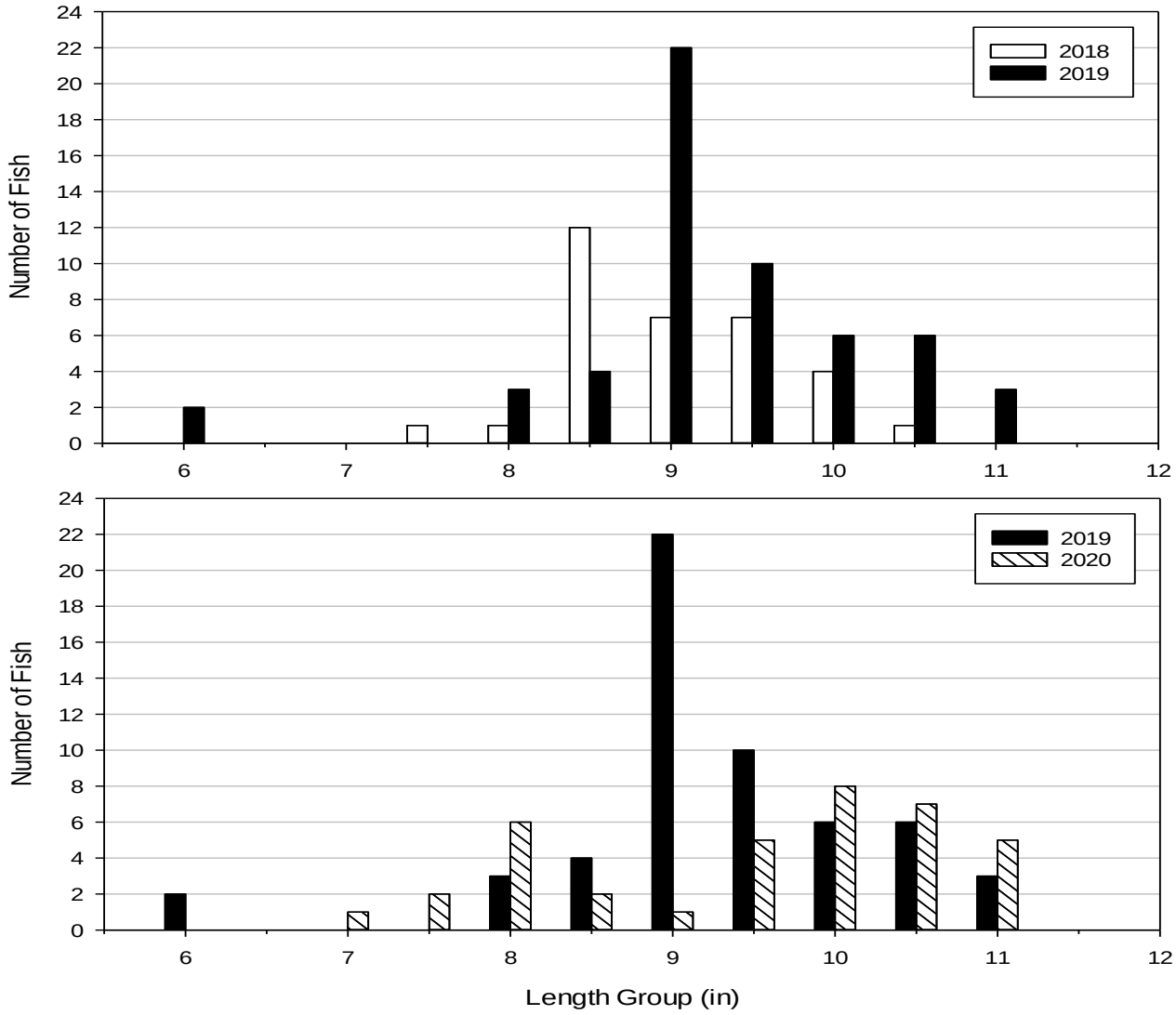

Figure 22: Length-frequency distribution for Dailey Lake Yellow Perch for 2018-2020.

Walleye

The length-frequency distribution of Walleye in 2019 showed an overall increase in the range of length groups fish were captured in when compared to 2018 (Figure 23). Walleye less than 12.0 inches in length were captured in 2019 indicating good recruitment. In 2020, the length-frequency distribution was similar to 2019 with the exception of a few obvious decreases in some length groups. In 2020, no fish less than 11.5 inches in length and no fish in the 18.5 to 23.5-inch range were captured. The lack of larger fish in 2020 could be the result of older Walleye aging out of the population.

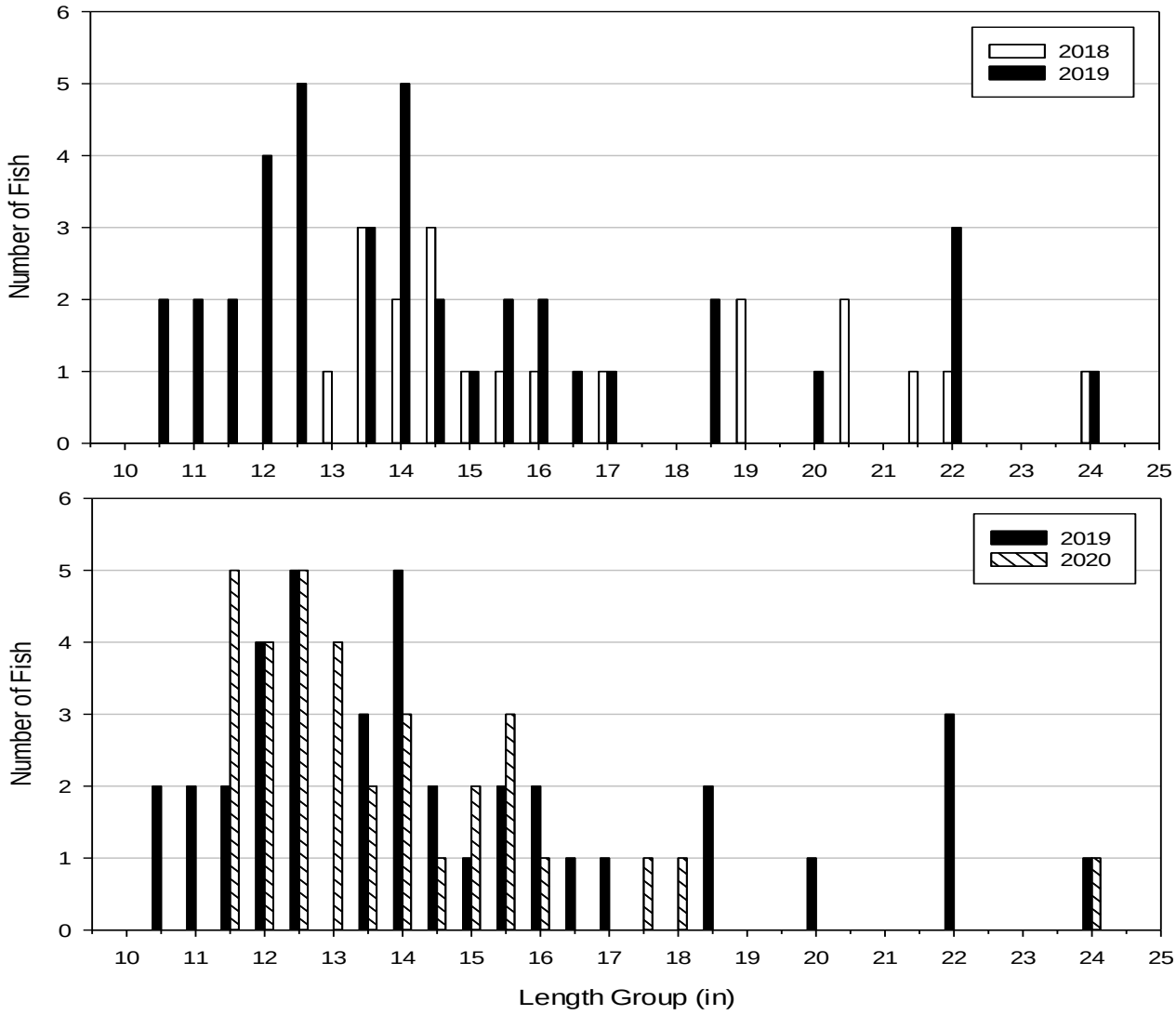

Figure 23: Length-frequency distribution of Dailey Lake Walleye for 2018-2020.

Yellowstone Cutthroat Trout

In 2019, the YCT length-frequency distribution was similar to 2018 for fish in the 7.5 to 10.0-inch range (Figure 24). There was only on fish in the 12.5 to 15.0- inch range in 2019. There was an increase in fish in the 15.5 to 16.5-inch range. The 2020 length-frequency distribution continued to indicate a lack of YCT in 10.0 to 17.5-inch range, indicating poor survival or very slow growth of stocked fish. One YCT that was 18.0 inches was captured, indicating that there is potential for larger YCT. Continued monitoring will take place to see if the YCT population recovers and if stocking changes are needed.

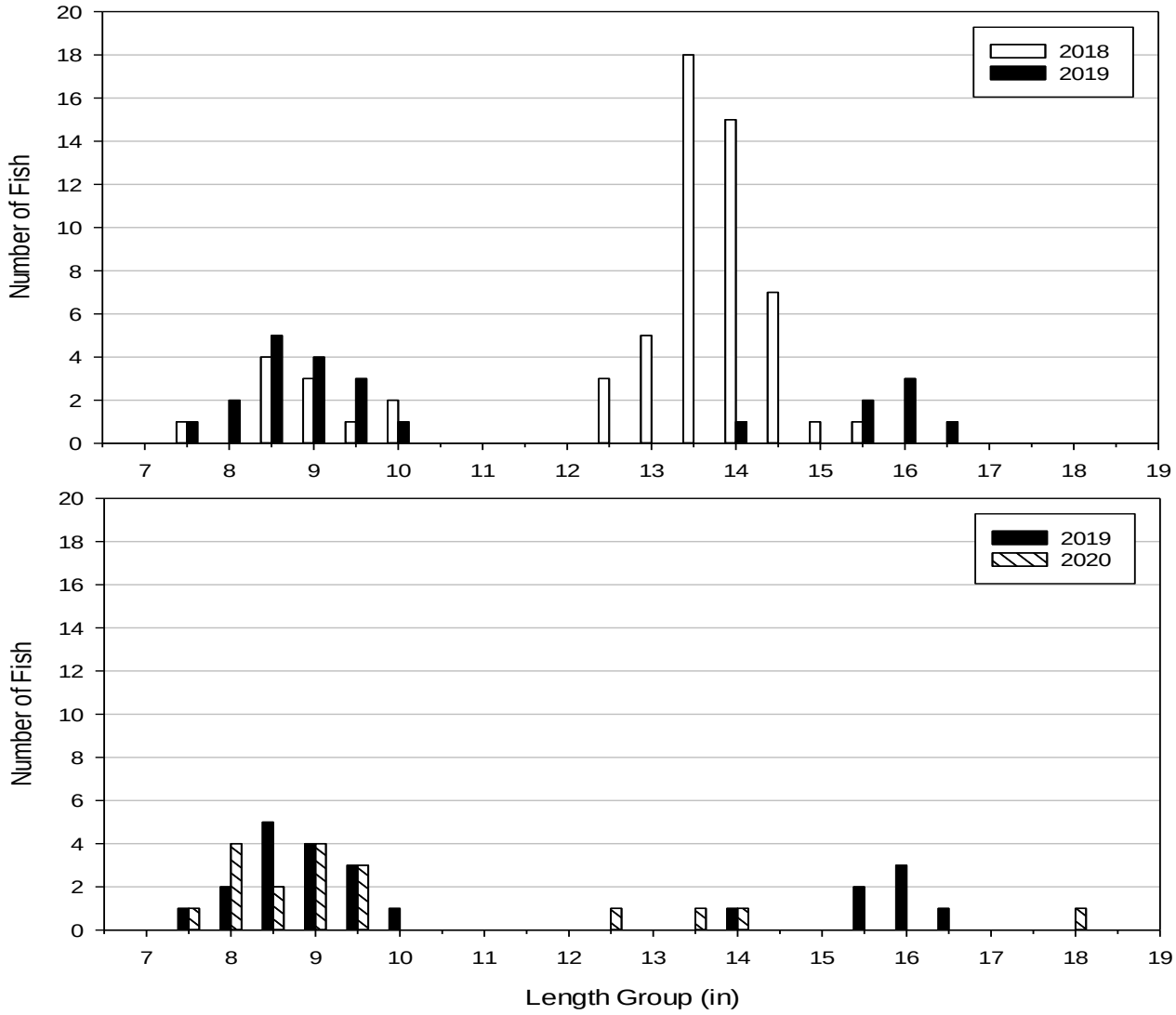

Figure 24: Length-frequency distribution of Dailey Lake Yellowstone Cutthroat Trout for 2018-2020.

Dailey Lake Summary

Both Rainbow Trout and Yellowstone Cutthroat Trout continue to recover from their low density and absence in the 2016 nets. They both continue to have missing length groups when compared to historic sampling. Further monitoring will provide the information needed to adjust the stocking for these two species if necessary. Walleye CPUE increased in 2019 but decreased in 2020. Some of the decline may be related to the reduced number of fish stocked in 2017. The recent dip in mean size of Walleye may also be related to the limited stocking in 2017. Yellow Perch continue to do well in the lake and remain stable.

Summary

Population monitoring on the Yellowstone River indicates that trout populations have decreased slightly the last two years except for YCT which have remained stable. MWF populations appear to be stable while continuing to remain below levels seen in the 1980s and 1990s. It is difficult to determine if the decline in MWF numbers is the result of PKD in 2016 or other causes and more monitoring will be needed to see if numbers return to prior levels.

In Dailey Lake, both Rainbow Trout and YCT are recovering from their low density and absence in the 2016 nets. Both species have missing age groups that will hopefully recover soon. If not, stocking adjustments may be needed to improve their survival and recruitment. The stocking adjustment made for Walleye in 2012 is producing larger fish in general. Recent declines in size and abundance may be related to limited stocking in 2017. Yellow Perch continue to be stable in the lake, even with the adjustments made to the Walleye stocking.

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