Synthesis of Fishery and Angler Surveys in the Blackfoot River: Recommendations for the 2023 Statewide Fisheries Management Plan




Patrick Uthe

Montana Fish, Wildlife & Parks

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Introduction

The Blackfoot River is an important trout fishery. It is a stronghold for migratory Westslope Cutthroat Trout and Bull Trout, and also supports a valuable sport fishery of Rainbow Trout and Brown Trout. Brook Trout are present in many of the tributaries with very low densities in the mainstem river, except for high densities in the upper Blackfoot River above the Landers Fork. Despite the significant declines in Bull Trout abundance, the Blackfoot River supports one of the most stable and robust metapopulations (Kovach et al. 2018) in the upper Clark Fork Geographic Region of the Columbia River Headwaters Recovery Unit (USFWS 2015).

The Blackfoot River flows 132 miles from its source near Roger's Pass to its confluence with the Clark Fork River near Bonner, MT. The river's outstanding natural resources and diversity of recreational opportunities, combined with its proximity to Missoula, contribute to its popularity. The 2,320 square mile watershed is a topographically, geologically, and geographically diverse basin with elevations ranging from 9,414 feet at Red Mountain to 3,280 feet near Bonner, Montana. The drainage contains over 1,900 miles of perennial stream length (Pierce et al. 2005), including more than 60 direct tributaries to the Blackfoot River. The Blackfoot River has a 1972-appropriated "Murphy" instream flow water right of 700 cfs during the summer at the USGS Bonner (#12340000) gage station. This value represents the minimum flow necessary for maintaining high habitat potential and food production during the trout growing season based on the wetted perimeter inflection point method (reviewed in Leathe and Nelson 1986). In 2015, this 700 cfs water right received a 1904 priority date associated with the Milltown Water Right when the Montana Legislature ratified the Confederated Salish Kootenai Water Compact with Senate Bill 262 (Pierce et al. 2019a).

The Blackfoot River is managed as a wild trout fishery, emphasizing natural reproduction of native and nonnative trout. In response to perceived declines in trout abundance and fishing quality in the Blackfoot River, a Blackfoot-specific fisheries program was developed in the late-1980s to identify potential limiting factors and opportunities to address those issues (Peters and Spoon 1989). Fisheries inventories were limited prior to this time, and assessments had not been completed since 1972 (Peters and Spoon 1989).

These initial investigations established recommendations for future management and research needs and catalyzed the extensive conservation and habitat restoration program in the drainage. Harvest restrictions were some of the first actions implemented to address declines in native trout abundance. Regulations to restrict harvest of Bull Trout and Westslope Cutthroat Trout were implemented in 1990 in response to detailed fisheries investigations (Peters and Spoon 1989; Peters 1990). After angler studies and creel surveys in the late-1990s and early-2000s, further restrictions were implemented that required artificial lures in key Bull Trout tributaries and artificial lures within the mainstem Blackfoot river within 100-yard radius of the mouths of those key Bull Trout tributaries. Tributaries with these regulations include Gold Creek, Belmont Creek (only near mouth), Monture Creek, Copper Creek, and the North Fork Blackfoot River. To facilitate further Bull Trout recovery in 2002, the Fish and Wildlife Commission adopted regulations to restrict harvest of Brook Trout in the mainstem river to prevent incidental harvest of Bull Trout due to misidentification (Schmetterling and Long 1999), which was identified as a pervasive problem from creel surveys and angler interviews (Pierce et al. 2002). More recently in 2016, additional special regulations were enacted in the North Fork Blackfoot River to limit tackle to single point barbless hooks between North Fork Falls and the Highway 200 bridge.

Fish population monitoring, along with period creel surveys to understand angler use, provide valuable information to inform management strategies to maximize angling opportunity while maintaining the quality of the fishery and protecting native species. The purpose of this report is to inform management direction in the 2023 Statewide Fisheries Management Plan. This report describes trends in abundance and size structure of Rainbow Trout, Westslope Cutthroat Trout, and Brown Trout populations. Bull Trout represent 1-10% of the total catch in mainstem surveys and are present at low densities that preclude precise estimates (Uthe et al. 2021), so their trends are better assessed using redd counts in spawning tributaries (see Uthe et al. 2021 for long-term data set). Brook Trout are present in the mainstem, but are very limited in the lower and middle Blackfoot River, and comprise less than 1% of the total trout composition. Therefore, Brook Trout are not included in this report. The primary objective is to synthesize long-term trends in trout abundance, size structure, angler pressure, and angler habits to evaluate the effectiveness of past management changes and inform current management strategies.

Methods

Blackfoot River surveys were conducted using two drift boat electrofishing units operating separately along each bank. A single marking event and recapture event were conducted in each section. Surveys were conducted on the ascending and descending limbs of the hydrograph. The Johnsrud section is representative of the lower Blackfoot River and the Scotty Brown section is representative of the middle Blackfoot River. Sampling personnel differentiated Westslope Cutthroat Trout from Rainbow Trout and hybrids based on phenotypic characteristics (e.g., slash and spotting patterns). Hybrid trout with predominately Westslope Cutthroat Trout characteristics were included in the Cutthroat Trout abundance estimates. However, hybrid trout with predominately Rainbow Trout characteristics and only a slash, were included in the Rainbow Trout abundance estimates.

Abundance estimates were calculated with Fisheries Analysis Plus software (FA +), using a Chapman estimator (Seber 1982) as follows:

$$N = \frac{(m+1)\,(c+1)\,-1}{r+1} ,$$

where N is the population estimate, m *is* the number of marked fish, c is the number of fish captured in the recapture sample, and r is the number of marked fish captured in the recapture sample. Abundance estimates were limited to trout with lengths of 7 inches and greater.

Creel surveys were conducted using in-person interviews. Specific survey methods are described in Peters and Spoon (1989), Peters and Workman (1996), Schmetterling and Bohnemann (2000), and Pierce and Podner (2006). Creel surveys in 2019 were associated with ongoing river user surveys for river recreation management. Fisheries-related questions were added to the interviews in 2019 to compare angler habits and gear use to previous creel surveys. These interviews focused on river users encountered in the middle and lower Blackfoot River, as well as interviews at the Clearwater Junction AIS check station (Oschell 2020).

Results and Discussion

Total trout abundance in the Blackfoot River has been relatively stable over the last few decades, although some periodic trends and variability exist among species (Figure 1). Rainbow Trout abundance declined through the 1990s, likely due to the cessation of stocking in Seeley Lake in the 1980s (Peters 1990), and a high prevalence of whirling disease during the 1990s and early 2000s in many spawning and rearing tributaries used by Rainbow Trout (Pierce et al. 2002). Following the initial decline, Rainbow Trout abundance has remained relatively stable with harvest restricted to up to three fish (in combination with brown trout) and only one over 14

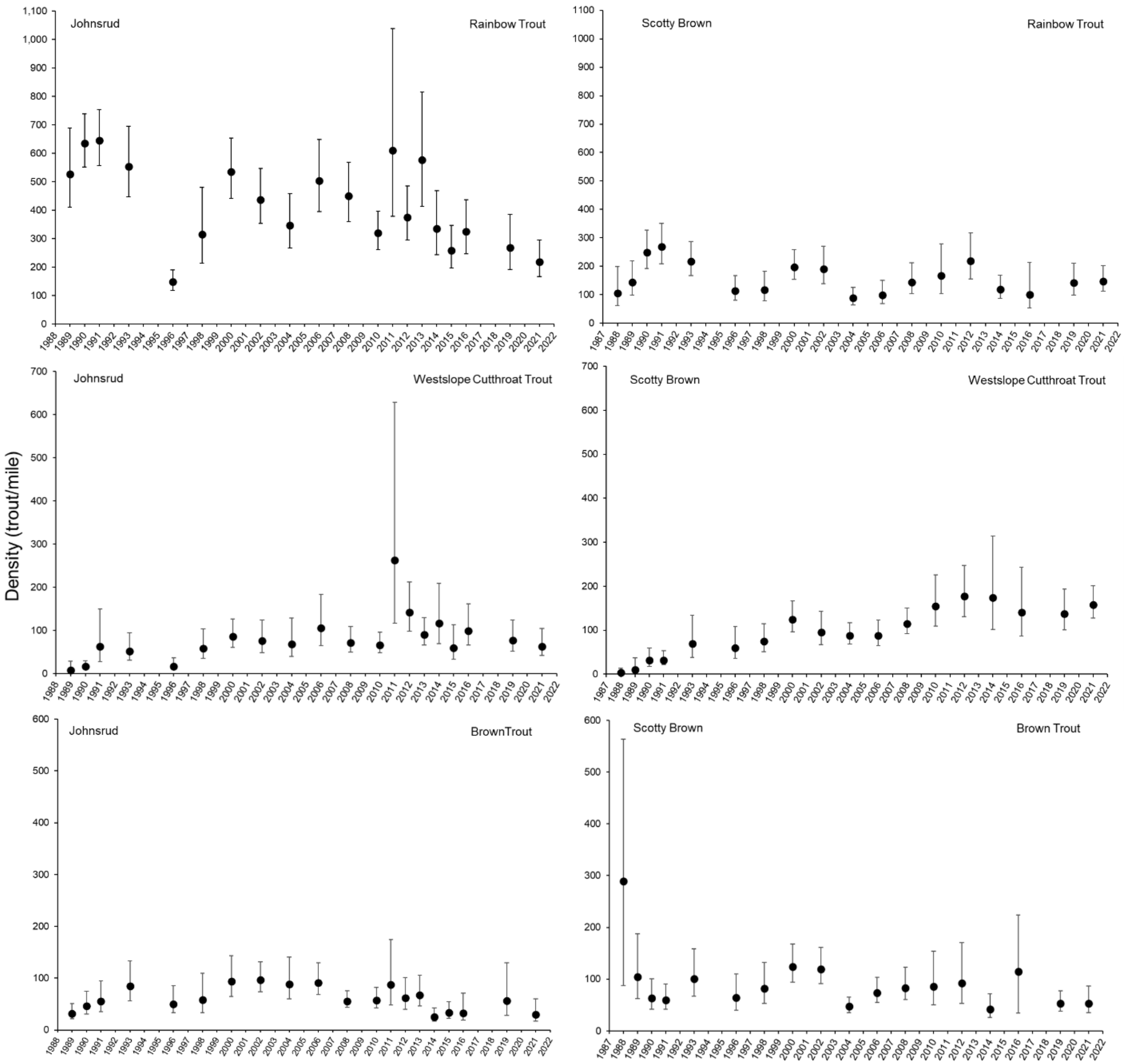

Figure 1. Abundance estimates of trout ≥ 7 inches in the Johnsrud section, 1989-2021 and the Scotty Brown section, 1988-2021.

inches. There has been a clear positive trend in Westslope Cutthroat Trout abundance from 1988 to 2021 in the Scotty Brown section, which is the primary monitoring section for assessing Westslope Cutthroat Trout status and trends. This increase is due to a combination of harvest restrictions enacted in the early 1990s and comprehensive restoration actions over the last three decades. Brown Trout abundance has generally been stable, except for a decline from 2011 until 2014. However, abundance has been stable or slightly increasing since then, but differences are not statistically significant.

Creel surveys have demonstrated a pronounced shift in the recreational fishery from harvest-oriented bait fishing towards artificial lures with little or no harvest component (Table 1). The use of spinning tackle has significantly decreased as well, creating a recreational fishery comprised primarily of fly anglers or anglers using both fly and spin tackle.

Table 1. Summary of angler gear type and harvest habits from creel surveys in the Blackfoot River, 1988-2019.

Year	Anglers interviewed	Harvest rate (%)	Gear type			
			Fly fishing (%)	Hardware (%)	Bait fishing (%)	Combination (%)
1988	106	37	20	17	42	21
1994	1,116	16	42	21	30	7
1999	570	5	69	11	6	14
2004	145	2	79	9	8	4
2019	214	0	89	8	0	3

Creel surveys in 1988 documented a strong angler propensity to harvest fish greater than 12 inches (Peters and Spoon 1989). Furthermore, anglers were more likely to harvest trout with lengths of 9-12 inches than lengths of 6-9 inches. This was reflected in the size structure of the Westslope Cutthroat Trout and Rainbow Trout populations at the time, with a size structure skewed towards fish less than 12 inches (Figure 2).

Cutthroat Trout are more vulnerable to angling compared to nonnative trout species (Paul et al. 2003). Although Westslope Cutthroat Trout were less abundant in the late 1980’s and early 1990s, they comprised a disproportionately high amount of the total catch by anglers. Shortly after Westslope Cutthroat Trout abundance started to increase after harvest restrictions, they only comprised about 10% of the total trout population in the river but represented 20% of the total trout catch by anglers (Peters and Workman 1996). In a 2004 creel survey, Westslope Cutthroat Trout represented 49% of the total catch, despite Rainbow Trout being significantly more abundant (Pierce and Podner 2006). In 1999, Westslope Cutthroat Trout had the highest catch rate despite having a smaller population size than rainbow trout (Schmetterling and Bohnemann 2000).

The early creel surveys, along with fish population data, demonstrated that harvest was a primary limiting factor for Westslope Cutthroat Trout. Therefore, when harvest pressure was removed, a rapid increase in abundance was documented along with a concurrent increase in size structure since harvest had diminished the portion of the population with lengths of 12 inches and greater. Similar rapid increases in Westslope Cutthroat Trout abundance have been documented in other popular fisheries that restricted harvest (Mallet and Thurow 2022). Following initial increases in size structure for Westslope Cutthroat Trout and Rainbow Trout due to removal of the harvest stressor, interannual fluctuations in size structure were primarily influenced by environmental and demographic factors.

The size structure of the Brown Trout population has fluctuated, but exhibits a relatively flat long-term trend from 1988 to 2021. The lack of trend associated with management changes and regulation changes is probably due to a lower susceptibility to angling and, therefore, lower

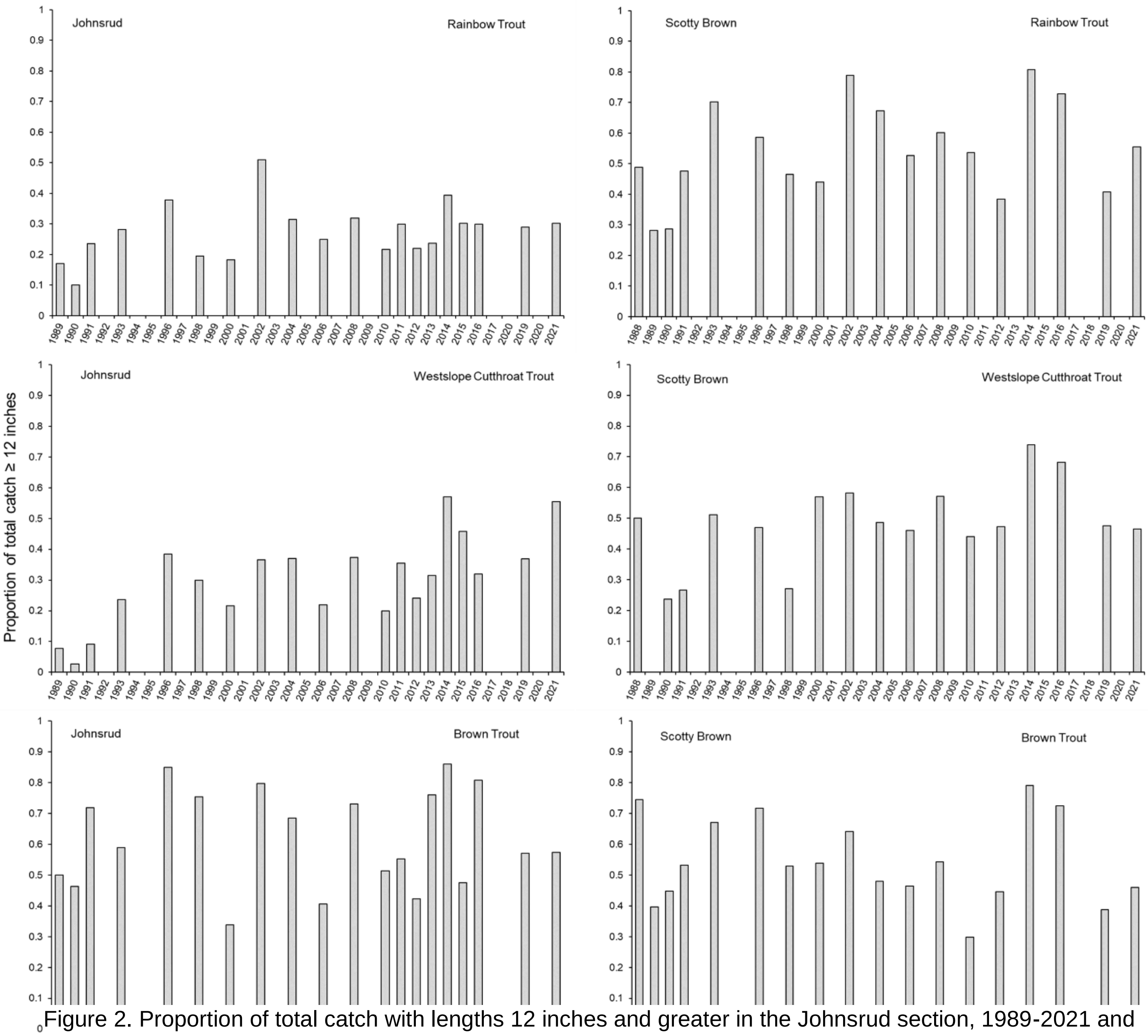

Figure 2. Proportion of total catch with lengths 12 inches and greater in the Johnsrud section, 1989-2021 and the Scotty Brown section, 1988-2021.

harvest during the timeframe when anglers preferred to harvest fish. Brown Trout represent 10-15% of total trout composition in the lower and middle Blackfoot River, but only represented 2% and 7% of the total estimated catch in 1994 and 1999, respectively (Peters and Workman 1996; Schmetterling and Bohnemann 2000).

Angling pressure has increased significantly since 1989 (Figure 3). Total annual fishing pressure increased from 16,000 angler days/year in 1989 to over 90,000 angler day/year in 2020. Public concerns regarding the health of the fishery have grown in recent years with unprecedented levels of angling pressure.

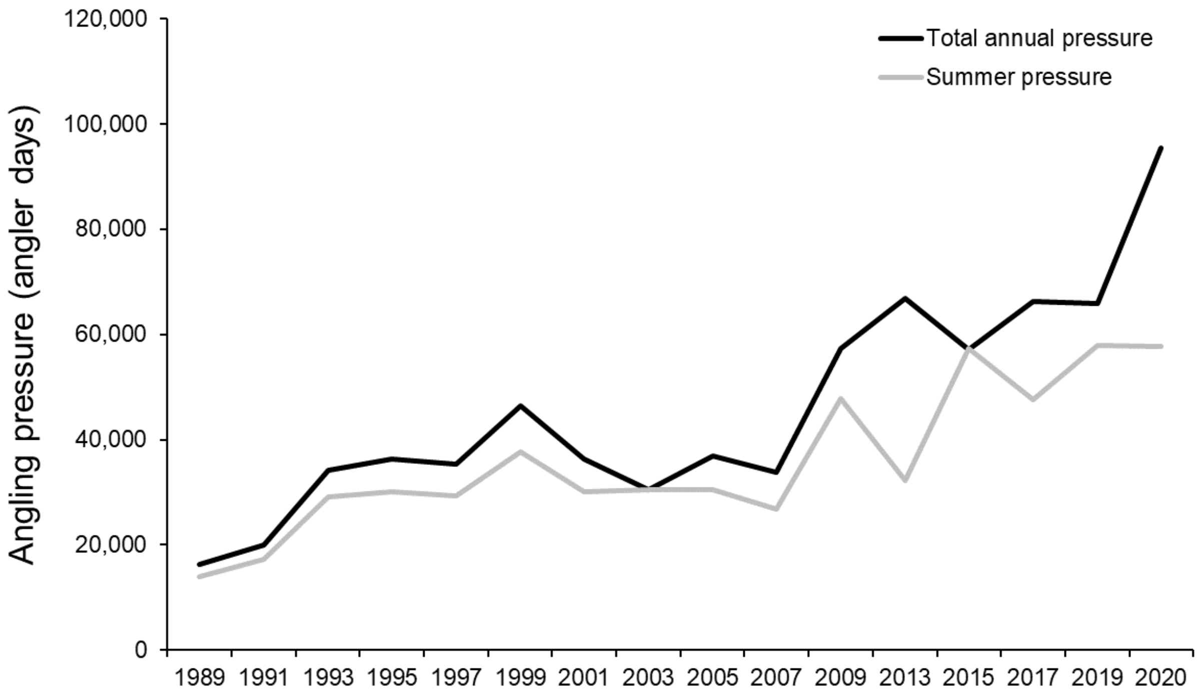

Figure 3. Biannual estimates of summer (grey line) and total annual (black line) fishing pressure in the Blackfoot River, 1989-2020.

Westslope Cutthroat Trout provide a useful index to the overall health of the fishery because they are the most likely species to be impacted by angling due to their susceptibility to angling compared to other trout species. Moreover, the late-1980s provide a valuable baseline when overharvest was identified as the primary limiting factor. Therefore, if high angling pressure caused excessive mortality, it would manifest as overharvest and result in similar size structure and levels of abundance that were observed in 1989. However, Westslope Cutthroat Trout abundance increased while angling pressure increased. There are no indications in the long-term population monitoring to suggest increased pressure has resulted in excessive trout mortality. Given the gear used by anglers in the Blackfoot River (Table 1), and the mortality rates associated with that type of terminal tackle (Schill 1996; Schill and Scarpella 1997; Dubois and Dubielzig 2004; Dubois and Kuklinkski 2004), post release mortalities are not expected to cause population-level effects.

Management Considerations

Overall, the size structure and abundance of trout in the Blackfoot River indicate that the current management paradigm of allowing unrestricted angling pressure in this popular fishery is compatible with maintaining diverse fishing opportunities for those anglers that wish to harvest fish or use bait in non-Bull Trout conflict areas. The current level of harvest is so low that it went undetected during the most recent creel survey in 2019. Therefore, harvest is expected to be negligible from a population-level standpoint. The small amount of post-release, single capture mortality from artificial lures (< 5%; Schill and Scarpella 1997), combined with the limited amount of harvest, is not expected to elicit population-level impacts. The limited amount of bait angling is expected to result in negligible mortality given bait-fishing is slightly higher than artificial lures, but very few anglers are participating in this type of angling experience. Natural annual mortality rates of wild trout in streams of the interior Northwest range from 30-70% (Schill 1991; Budy et al. 2007; Uthe et al. 2016; Uthe et al. 2021). Therefore, the current level of harvest and post-release mortality is expected to be compensatory and not result in reduced abundance of trout in the Blackfoot River.

The current strategy of catch and release of Bull Trout and Westslope Cutthroat Trout, and bait-fishing restrictions in Bull Trout conflict areas, provide protective measures to achieve native species conservation goals while still providing diverse opportunities for anglers. These measures have contributed to the long-term increase in Bull Trout and Westslope Cutthroat Trout since the late 1980s (Uthe et al. 2021). Additional research investigating encounter rates and cumulative catch and release mortality of Westslope Cutthroat Trout would be beneficial to inform management strategies as the Blackfoot River experiences unprecedented levels of angling pressure. Ongoing monitoring is essential to assessing population status and trends, especially as angler pressure is expected to continue increasing.

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