FISHERIES DIVISION

Federal Aid Job Progress Report

Montana Statewide Fisheries Management

Federal Aid Project Number:F-113while 1, 2017while 20, 2010

July 1, 2017 – June 30, 2019

Project Title: Job Title: Montana Statewide Fisheries Management Bitterroot River Drainage Fisheries Management

ABSTRACT

Population estimates of trout populations in the Hamilton and Hannon Memorial study reaches of the Bitterroot River are discussed. In general, trout numbers have declined in the Hamilton section and remained stable in the Hannon Memorial section. The decline in the Hamilton section is probably exacerbated by channel changes within the study reach that made a long side channel unavailable to sampling. Single pass sampling on the Hamilton and Hannon Memorial sections indicate that Mountain Whitefish, which are the most common species captured, have declined, however the sampling method is not a good indicator of population trends. Brown Trout populations in the East Fork Bitterroot River continue to increase in density as well as range. Rainbow Trout populations remain lower than in the past between Sula and Conner.

Westslope Cutthroat spawning migrations in Skalkaho Creek are not as extensive as for Bull Trout, but some individuals do migrate into Railroad Creek, a small tributary. Hieronymous Pond offers a varied angling opportunity for local anglers in Hamilton.

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BACKGROUND

The Bitterroot River flows in a northerly direction from the confluence of the East and West Forks near Conner, Montana. The river flows 84 miles through irrigated crop and pastureland to its confluence with the Clark Fork River near Missoula, Montana. Five major diversions and numerous smaller canals remove substantial quantities of water from the river during the irrigation season (Spoon 1987). In addition, many of the tributaries, which originate on the Bitterroot National Forest (BNF) are diverted for irrigation during the summer months and contribute little streamflow to the river during that time. Therefore, many tributaries and the mainstem of the Bitterroot River are chronically dewatered during the irrigation season. Streamflow characteristics vary along the Bitterroot River, with the most critically dewatered reach between Hamilton and Stevensville (Spoon 1987). To help alleviate the mainstem dewatering, the MFWP annually supervises the release of 15,000 acre-feet of water from Painted Rocks Reservoir on the West Fork of the Bitterroot River and 3,000 acre-feet of water from Lake Como. The most dewatered reach of the river, north of Hamilton is the target for the Painted Rocks water. Urbanization and associated development of the floodplain is increasing in the Bitterroot Valley (Javorsky 1994).

The Bitterroot River is an important sport fishery for anglers in western Montana. Pressure estimates from the statewide survey indicate that the Bitterroot River routinely exceeds 100,000 angler days per year. Due to the high fishing pressure, fishing regulations became more restrictive in the 1980's and 1990's. The population estimates on the Bitterroot River focus on trout. Due to the length of the study sections and the large number of fish required to calculate population estimates, the other species of fish are not censused. It has been evident during electrofishing that several other species are fish are present in the river, therefore, beginning in spring, 2011; we began to sample all of the species in the river on a limited basis.

Hieronymous Pond is a small pond in Hamilton that supports moderate fishing pressure, mostly from families. It is stocked annually with rainbow trout.

METHODS

Fish population estimates on the Bitterroot River were collected on several reaches over the past 30 years. Study reaches were selected based on historical data, streamflow patterns and fishing regulations. The reaches are 2.2-5.1 miles in length. The long term study reaches are illustrated in Figure 1. Electrofishing was conducted from a 14-foot long aluminum drift boat fitted with a boom shocking system. The system was powered by a 5000-watt generator and current was modified through a Coffelt Mark XXII or Smith Root VVP 15B electrofishing unit. Smooth direct current was used to capture fish. The Peterson mark-recapture method using log likelihood was used to calculate population estimates as modified through the Montana Fish, Wildlife and Parks Fisheries Analysis + program. Several mark and recapture runs were required to obtain sufficient sample size to estimate fish populations in some reaches. While these methods are broadly accepted and can be accurate (Peterson and Cederholm 1984, Rosenberger and Dunham 2005) mark-recapture population estimates are not always accurate (Cone et. al. 1988, Nordwall 1999). In large rivers it can be difficult to detect trends in fish populations (Russell et al 2012). In recent years, most of the fish collections downstream of Hamilton have occurred at night to facilitate handling of more fish. The population estimates were collected during September and October each year. Brown trout may be migrating by October, therefore, their estimates may be inflated.

During the spring of 2016-2017 we electrofished 2-mile long reaches of the Bitterroot River to assess the status of as many species as we could capture (Figure 1). We used the same boat and technique as described above, and we netted all of the fish that we encountered that were capable of capture with 2 netters. All fish were measured and weighed.

In Hieronymous Pond fish were captured by electrofishing using smooth direct current. Northern Pikeminnow, Longnose and Largescale Sucker and Yellow Perch were removed from Hieronymus Pond during the spring of 2016 and 2017. The native fish were released into the adjacent ditch and the Yellow Perch were destroyed. Each time out, a drift boat with a boom shocker was rowed around the edge of the pond and fish were captured, measured and removed. Generally, two passes were made each day.



Figure 1. Map of study areas with study sections labeled. The bolded, italicized reaches are sampled during routine population estimates and single pass sampling for all specie

RESULTS AND DISCUSSION

Bitterroot River Trout Populations

The Hamilton and Hannon Memorial study sections were monitored during 2017 and 2018 respectively. The population estimates in the Hamilton section indicate a general decline in the number of trout. Particularly large Brown Trout (Figures 2-5). Some of this decline is due to the fact that a 1.25 mile western side channel, just downstream of Veteran's Bridge was inaccessible to our boat for the past few sampling periods. In 2018 due to channel changes, much of this side channel will be accessible, but accessibility of the eastern channel is unknown. The number of Westslope Cutthroat Trout is not as well documented due to low sample sizes. We have handled fewer Westslope Cutthroat in 2017 than in previous years (Figure 6).



Figure 2. Population estimate of smaller Brown Trout in the Hamilton section of the Bitterroot River during the year indicated.



Figure 3. Population estimate of larger Brown Trout in the Hamilton section of the Bitterroot River during the year indicated.



Figure 4. Population estimate of smaller Rainbow Trout in the Hamilton section of the Bitterroot River during the year indicated.



Figure 5. Population estimate of larger Rainbow Trout in the Hamilton section of the Bitterroot River during the year indicated.



Figure 6. The number of Westslope Cutthroat Trout handled during mark and recapture runs in the Hamilton section of the Bitterroot during the year indicated.

The trout population estimates in the Hannon Memorial section indicate that the population is relatively stable. Large Brown Trout declined in 2018 compared to past years, but small Brown Trout and Rainbow and Westslope Cutthroat Trout have remained stable or increased slightly (Figures 7-11).



Bitterroot River-Hannon Memorial

Figure 7. Population estimate of smaller Brown Trout in the Hannon Memorial section of the Bitterroot River during the year indicated.



Figure 8. Population estimate of larger Brown Trout in the Hannon Memorial section of the Bitterroot River during the year indicated.



Figure 9. Population estimate of smaller Rainbow Trout in the Hannon Memorial section of the Bitterroot River during the year indicated.



Figure 10. Population estimate of larger Rainbow Trout in the Hannon Memorial section of the Bitterroot River during the year indicated.



Figure 11. Population estimate of Westslope Cutthroat Trout in the Hannon Memorial section of the Bitterroot River during the year indicated.

During spring of 2018 two single pass sections were sampled, the Hamilton and Hannon sections (Figures 12 and 13). The most common species captured is the Mountain Whitefish. The number of Mountain Whitefish captured declined over the years in both sections. Since this is a single pass effort, the number of fish captured is probably not a valid indication of population size. The mean length and weight of Mountain Whitefish in these sections does not show any obvious trend (Table 1). This is probably due to the fact that varying year classes and survival conditions are not well understood. This data can be analyzed, in more detail, after many years of data collection to try and detect any obvious trends.



Figure 12. The number of each species of fish captured in the Hamilton single pass reach during the year indicated.



Figure 13. The number of each species of fish captured in the Hannon Memorial single pass reach during the year indicated.

Hamilton	Length	Weight
2011	290	243
2014	285	183
2018	308	296
Hannon Memorial		
2012	322	333
2015	301	260
2018	310	285

Table 1. Length and Weight of Mountain Whitefish captured in single pass electrofishing in the Hamilton and Hannon Memorial sections during the years indicated.

East Fork Bitterroot River Trout Populations

During 2017 and 2018 three study sections of the Bitterroot River were sampled. Population estimates of trout at East Fork Bitterroot River 2.5 are summarized in Figures 14-16. Brown Trout populations are characterized by high numbers of small (6-7 inch) fish and very few large fish. The Rainbow Trout population has been declining for many years. We expect it is due to whirling disease, since very high infection rates were detected here. Westslope Cutthroat Trout numbers are generally low in this reach, possibly due to warm water temperatures.



Figure 14. Population estimate of Brown Trout in the East Fork Bitterroot River 2.5 section during the year indicated.



Figure 15. Population estimate of Rainbow Trout in the East Fork Bitterroot River 2.5 section during the years indicated.



Figure 16. Population estimate of Westslope Cutthroat Trout in the East Fork Bitterroot River 2.5 section during the years indicated.

Population estimates of trout at East Fork Bitterroot River 12.0 are summarized in Figures 17-19. Brown Trout populations have been generally increasing and Rainbow Trout populations have been decreasing since sampling began. This may be due to whirling disease. Westslope Cutthroat populations have been low and stable.



East Fork Bitterroot River 12.0 Brown Trout

Figure 17. Population estimate of Brown Trout in the East Fork Bitterroot River 12.0 section during the years indicated.



Figure 18. Population estimate of Rainbow Trout in the East Fork Bitterroot River 12.0 section during the years indicated.



Figure 19. Population estimate of Westslope Cutthroat Trout in the East Fork Bitterroot River 12.0 section during the years indicated.

The Jennings Camp section of the East Fork Bitterroot River has been sampled 5 times since 1992 (Figure 20). The fishery is primarily Westslope Cutthroat Trout with lesser numbers of other salmonids. The 2018 population estimate indicates a large population than in the past. However, during sampling there may have been some movement between the mark and recapture runs, which would inflate the estimate. The distribution of recaptures was uneven throughout the section. There has been an increased ratio of Brown Trout to Bull Trout handled since sampling began (Figure 21)



Figure 20. Population estimate of Westslope Cutthroat Trout in the East Fork Bitterroot River 25.6 section during the years indicated.



Figure 21. Number of Brown Trout and Bull Trout handled during sampling in the East Fork Bitterroot River 25.6 section during the years indicated.

Skalkaho Creek Westslope Cutthroat Movement Patterns

On March 30-31, 2017 we implanted radio transmitters in resident Westslope Cutthroat Trout in 3 locations in the Skalkaho Creek drainage (Figure 22). These locations were similar to the locations where Bull Trout were implanted with radio transmitters in 2016. The purpose for the study in 2017 was to learn how much migration takes place and where resident Westslope Cutthroat spawn in the Skalkaho Creek drainage. Individual fish moved significant distances, but not as far as Bull Trout had migrated the previous year. Some confusion was caused by signals of radio transmitters from the previous year's Bull Trout that continued beyond their expected life. The company that built the transmitters said that the Bull Trout transmitters could not still be transmitting a signal, but it was clear that several were.

Despite the problems with the transmitters, we could describe the movement of Westslope Cutthroat in Skalkaho Creek. In general, the movement patterns were similar to Bull Trout that were studied in 2016. Many of the fish did not migrate a significant distance. Some Bull Trout migrated further upstream in Daly Creek than Westslope Cutthroat, but 2 Westslope Cutthroat migrated into Railroad Creek, a small tributary of South Fork Skalkaho Creek (Figure 23).

Redds were difficult to see due the high streamflows, but the peak of spawning seems to be the first or second week of June, which is when most migrating fish reached their upstream most locations. One fish that entered Railroad Creek reached the upstream most location around 6/26, which is 2-3 weeks later than the fish in Skalkaho and Daly Creeks.



Figure 22. Three locations where Westslope Cutthroat were implanted with transmitters during April, 2017.



Figure 23. Movement patterns of Westslope Cutthroat Trout, implanted with radio transmitters in the Skalkaho Creek drainage, during April-June, 2017.

Hieronymous Pond

The average length of the most common species captured during sampling can vary significantly between years (Figure 24). Fish have been removed from Hieronymous Pond with the goal of increasing the size of Yellow Perch and stocked Rainbow Trout. Since removals began, Largemouth Bass have become more common in the catch, particularly in the past 5 years. We don't know if that is due to the removal efforts of other species in previous years. Certainly, there are complex interactions occurring between the fish species in Hieronymous Pond and what effect continued removal of fish from the pond will haves on Rainbow Trout and Yellow Perch is unknown.



Figure 24. Mean Length of fish captured in electrofishing samples in Hieronymous Pond during the years indicated.

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<u>Stream</u>	<u>Code Number</u>	Key Words
Bitterroot River drainage	2-03-8865	Trout populations Whirling Disease Fishing regulations Westslope cutthroat Water Temperature Rainbow trout Brown trout Bull trout

Bitterroot River Hieronymous Pond