### FISHERIES DIVISION Federal Aid Job Progress Report

## **Montana Statewide Fisheries Management**

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#### ABSTRACT

Results from electrofishing in 2007 and 2008 indicate no significant changes in trout populations in the Bitterroot River. In the past few years rainbow trout have declined in the upper Bitterroot River. In the East Fork of the Bitterroot River the latest population estimates indicate a slight increase in rainbow trout numbers, but estimates remain well below the number present in the late 1990's. The parasite associated with whirling disease, *Myxobolus cerebralis* was found in higher densities in the upper river particularly the East Fork Bitterroot. It may be the cause of declining rainbow trout numbers. Populations of rainbow trout are stable downstream of Darby at this time. Westslope cutthroat populations have increased since restrictive fishing regulations were imposed in 1990, but have decreased slightly in recent years in the Darby area. However they remain well above the number present before restrictive regulations. Population estimates of brown trout in the Bitterroot River are likely not accurate, but seem to be stable. Trout populations in the Bitterroot River are highest in the upper river near Darby and decline in a downstream direction.

During 2007 radio transmitters were implanted in adult rainbow trout to assess the spawning patterns in the lower West Fork Bitterroot River. Most of the fish remained in the river during the assumed spawning period.

Fish population monitoring on the Bitterroot National Forest indicates that population trends vary throughout the drainage. As a general rule, westslope cutthroat trout populations are stable and bull trout populations are stable to declining. Summertime water temperatures in Bitterroot National Forest streams have been increasing since measurements began in 1993.

Hieronymus Pond is located in Hamilton and has been managed as a fishing resource for local children. Stocking of rainbow trout and removal of yellow perch, longnose and largescale suckers and northern pikeminnows has been pursued to increase the size of desirable fish for the public. Conductivity readings from Skalkaho Creek verify that the siphons built to carry ditch water under the creek have resulted in effectively separating ditch and creek water. Most likely, this results in more Skalkaho Creek fish accessing the Bitterroot River instead of ditches.

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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 it's 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 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. 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 1990's.

Streams within the Bitterroot National Forest support widespread populations of native westslope cutthroat and bull trout. Due to the importance of streams within the Bitterroot National Forest (BNF), we have also monitored fish populations there. Within Montana, the BNF is the headwaters of the Bitterroot River.

Fisheries monitoring in the Bitterroot basin focuses on long term monitoring sites both on the Bitterroot River and tributaries, primarily on the Bitterroot National Forest.

#### **METHODS**

Fish population estimates on the Bitterroot River were collected on several reaches over the past 25 years. Study reaches were selected based on historical data, streamflow patterns and fishing regulations. The reaches are 2.2-5.1 miles in length. Electrofishing was conducted from a 14-foot long aluminum drift boat fitted with a boom shocking system. The system was powered by 5000-watt generator and current was modified through a Coffelt Mark XXII electrofishing unit. Smooth direct current was used to capture fish. The Peterson mark-recapture method 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. 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 2007 and 2008 sentinel cages were used to assess the presence and degree of whirling disease. Personnel from the Bozeman office of MFWP installed the cages with the help of regional personnel. During this study period we concentrated on the East Fork and upper Bitterroot River.

During spring, 2007 we implanted radio transmitters in 12 adult rainbow trout from the West Fork Bitterroot River. The fish were tracked through early summer to assess any movements that could be associated with spawning.

We monitored fish populations in some streams on the Bitterroot National Forest. Background work that went into selection of the study sites is described in previous reports (Clancy 1993, 1996). During 2008, we concentrated on sites that in the past that supported the more robust populations of bull trout.

Fish were captured by electrofishing using smooth direct current. On larger streams a bank electrofishing unit is used powered by a 4500 watt generator and current is controlled through a Coffelt VVP-15 unit. On small streams a backpack shocker, the Coffelt Mark 10, was used. We estimated trout populations on monitoring reaches using a mark-recapture technique. Monitoring sections are usually 1000 feet long. On the marking run, fish are released as close to their capture site as possible and approximately one week is allowed between mark and recapture. Population estimates are calculated using the Montana Department of Fish Wildlife and Parks Fisheries Analysis + program.

Fish were removed from Hieronymus Pond during the spring of 2007 and 2008. Each time out, the river boom shocker was rowed around the edge of the pond and fish were captured, measured and removed. Generally, two passes were made each day.

#### **RESULTS AND DISCUSSION**

#### East Fork, West Fork Bitterroot River and Bitterroot River

During 2007 trout population estimates were collected from two sections of the lower East Fork of the Bitterroot River. During 2007 population estimates were collected on the Conner section of the West Fork Bitterroot River and the Hamilton Sections. During 2008 population estimates were collected on the Darby and Stevensville sections of the Bitterroot River (Figure 1). During 2007 and 2008 fish population data was collected at the Missoula (Bunkhouse Bridge) section by another FWP crew. Due to the time of year it was collected, comparisons to the other sections, where data is collected during the fall, may not be valid.



Figure 1. Location of East Fork, West Fork and Bitterroot River electrofishing sections discussed in this report.

#### Rainbow Trout

Overall, the rainbow trout population estimates indicate a negative trend in the number of rainbow trout in the upper river and a stable population in the downstream sections (Figures 2-8.). The long term trends of population estimates in the East Fork Bitterroot and Darby have been declining. However, the 2006 and 2007 estimates in the East Fork Bitterroot River have indicated a slight increase. The East Fork Bitterroot Sula section (12.0) population estimate indicates declining rainbow trout numbers the past few years. This decline may be due to the presence of whirling disease. Whirling disease is discussed later in the report. The rainbow trout numbers in the lower West Fork Bitterroot River have been stable (Figure 4)

Population estimates of rainbow trout in the Darby section of the Bitterroot indicate a declining population (Figure 5). This is possibly related to whirling disease similar to the East Fork Bitterroot River. Populations in the Hamilton, Stevensville and Missoula (Bunkhouse Bridge) sections are near the long term average (Figures 6-8).



# East Fork Bitterroot River 12.0 Rainbow Trout



Bitterroot 12.0 section during the years indicated.

## West Fork Bitterroot River Conner Rainbow Trout



Figure 4. Population estimates of rainbow trout in the West Fork Bitterroot 1.2 section during the years indicated.

# Bitterroot River-Darby Rainbow Trout



Figure 5. Population estimates of rainbow trout in the Darby section of the Bitterroot River during the years indicated.



Figure 6. Population estimates of rainbow trout in the Hamilton section of the Bitterroot River during the years indicated.

# Bitterroot River-Stevensville Rainbow Trout



# Bitterroot River-Missoula Rainbow Trout



Figure 8. Population estimates of rainbow trout in the Missoula section of the Bitterroot River during the years indicated.

#### Brown Trout

Trout population estimates in the Bitterroot and East Fork Bitterroot River are collected in September and October. It is likely that spawning migrations of brown trout have begun and this could bias our population estimates. Therefore, brown trout population estimates are more of an index than numeric estimate. The data indicate that brown trout populations have remained stable in the study sections (Figures 9-15). Although rainbow trout numbers have declined in the East Fork, the brown trout numbers have increased slightly. This would be consistent with other streams where whirling disease is having an impact.



# East Fork Bitterroot River 12.0 Brown Trout



Figure 10. Population estimate of brown trout in the East Fork Bitterroot 12.0 section during the years indicated.





Figure 11. Population estimate of brown trout in the West Fork Bitterroot 1.2 section during the years indicated.



the Bitterroot River during the years indicated.

# Bitterroot River Hamilton Brown Trout



Figure 13. Population estimate of brown trout in the Hamilton section of the Bitterroot River during the years indicated.

## Bitterroot River-Stevensville Brown Trout



# Bitterroot River-Missoula Brown Trout



#### Westslope cutthroat

The population estimates of westslope cutthroat indicate a stable population. Westslope cutthroat are the least numerous of the three species of trout common to the river. Therefore, population estimates are not always possible to collect, particularly in the lower river where their numbers are low and hybridization obscures their identity. In the five study sections where estimates were collected during 2007 and 2008, populations are near or slightly below the long term mean. However, westslope cutthroat are more numerous than before restrictive regulations were imposed in the early 1990's.



Figure 16. Population estimates of westslope cutthroat in the lower East Fork Bitterroot during the years indicated.









#### Bitterroot River Trout Population Profile

The population of trout in the Bitterroot River is highest in the upper river near Darby and declines in a downstream direction (Figure 21). All three species are more numerous in the upper reaches of the river with cutthroat trout most numerous in the Hannon section and brown trout most numerous in the Darby section. The reasons for the decline downstream is likely due to dewatered tributaries and mainstem as well as high summer water temperatures from Hamilton downstream.



Trout/Mile

Figure 21. Average of the last 3 population estimates for rainbow (Rb), brown (LL) and cutthroat (CT) trout per mile on study reaches of the West Fork and Bitterroot River. The number at the top of the chart indicates the population estimate per mile for all three species in that study section.

#### Whirling Disease

Sampling fish for the presence of *Myxobolus cerebralis* was first undertaken in the Bitterroot River in 1995 (Clancy 2003). Since then, continuous sampling has occurred by Fish Wildlife and Parks personnel from Bozeman and region 2. We have used a combination of grab samples and sentinel cages to assess the presence and distribution of the parasite. Prior to 2000 we found that the parasite was present in the Bitterroot River where a few infected fish were found at scattered locations (Clancy and Javorsky 2001). Recent sampling has indicated that the upper Bitterroot River, and particularly the East Fork Bitterroot River, have high infection rates (Clancy 2003). Therefore, sampling has concentrated in these reaches (Figure 22). As previously reported in this document, the population of rainbow trout in the East Fork Bitterroot declined significantly in recent years and this may be due to the effects of whirling disease. The highest infection rates in the East Fork Bitterroot River have been found between Conner and Sula (Figure 23). These are sites where high numbers of *T. tubifex* have been located. (Clancy 2005). The infection rate of the sentinel fish has been increasing each year to levels that are considered high enough to impact the trout population (Figure 23). In 2008 the infection rates were similar to past years. Infection rates at Charlos Heights, Hamilton and Stevensville have been low or absent. .



Figure 22. Locations of sentinel cages used for assessing whirling disease.

#### Whirling Disease Infection Rate



Figure 23. Average infection rates of sentinel fish in cages set at various sites during fall through 2007. Sites G, H and I are Charlos Heights, Hamilton and Stevensville, respectively.

#### Radio Telemetry

During 2007 we implanted radio transmitters in 12 adult rainbow trout in the lower West Fork Bitterroot River. This effort was an attempt to understand the movement and spawning patterns of rainbow trout in this reach. Of the 12 fish, 7 showed no appreciable movement. They may have migrated but generally stayed between the Trapper Creek Bridge and Conner Bridge. Of the remaining 5 fish, 1 ascended Lower Trapper Creek and may have spawned, 1 migrated upstream into the Nez Perce Fork and Watchtower Creek. One Fish migrated upstream approximately 4 miles and then returned to the original location. Two fish migrated downstream about 3 miles and eventually returned to their original location.

Only 2 of the 12 fish were found to have entered a tributary stream. If all 12 fish spawned, this data indicates that most of it was in the mainstem of the West Fork Bitterroot River.

### **Bitterroot National Forest**

During 2007 and 2008, we continued to monitor fish populations at established sites within the Bitterroot National Forest (Figures 24-34). The following discussion is for sites that were sampled by MFWP unless otherwise noted.

#### Westslope Cutthroat

Westslope cutthroat populations on the Bitterroot National Forest are stable overall. While individual study sections may indicate a decline or increase in the short term, the populations overall are stable. Sleeping Child and Skalkaho Creek have been monitored annually since 1989. On both study reaches the population has been stable, however, changes have occurred. In Sleeping Child Creek, debris flows after the 2000 fires caused significant declines in the fish population. The population has fully recovered and the 2008 estimate was within the normal range (Figure 24). On the Skalkaho Creek 16.8 study section the population structure has shifted from smaller fish to larger fish (Figure 26). This is probably due to the catch and release fishing regulations instituted in the early 1990's.

Two other streams of note are Moose Creek and Camp Creek. Moose Creek may be affected by angling pressure. The creek is very accessible and the number of larger cutthroat has declined over the years (Figure 28). The reach of Camp Creek we sampled was restored several years ago and the number of larger westslope cutthroat x rainbow trout continues to increase (Figure 34).



## Daly Creek 0.7 Cutthroat Trout



Figure 25. Population estimates of westslope cutthroat trout in the Daly Creek 0.7 monitoring reach during the years indicated.





Figure 27. Population estimates of westslope cutthroat trout in the Burnt Fork 19.7 monitoring reach during the years indicated.







Figure 29. Population estimates of westslope cutthroat trout in the East Fork Bitterroot 31.4 monitoring reach during the years indicated.



Figure 30. Population estimates of westslope cutthroat trout in the Meadow Creek 5.6 monitoring reach during the years indicated.



Figure 31. Population estimates of westslope cutthroat trout in the Tolan Creek 5.1 monitoring reach during the years indicated.







Figure 33. Population estimates of westslope cutthroat trout in the Piquett Creek 1.3 monitoring reach during the years indicated.



### Bull Trout

Bull trout population estimates are more difficult to collect due to the lesser number of bull trout in the study sections. During 2007 and 2008 bull trout population estimates were obtained in several streams (Figures 35-43). A common finding in our comparisons of recent data with older data is that the number of bull trout was lower than past estimates at several sites. At the Sleeping Child 10.2 site, brown trout have increased in the study reach and bull trout have declined (Figure 35). Upper Warm Springs Creek, had a much lower population than in the early 1990's (Figure 43).

Some of the sites appear to be stable but at some sites bull trout numbers have declined. A summary of sites is presented in Figure 44. An analysis of recent population estimates indicate that bull trout populations have declined and cutthroat populations have remained stable. A decline was defined as the most recent population estimate at least 20% lower than the average of previous estimates.







Figure 38. Population estimates of bull trout in the Burnt Fork Bitterroot 19.7 monitoring reach during the years indicated.





Figure 40. Population estimates of bull trout in the East Fork Bitterroot River 31.4 monitoring reach during the years indicated.



Figure 41. Population estimates of bull trout in the Meadow Creek 5.6 monitoring reach during the years indicated.





# Warm Springs Creek 7.4 Bull Trout





Figure 44. Status of Bull and Westslope Cutthroat trout population estimates in 9 study reaches as compared to long term average.

### Water Temperature

Data analyzed by personnel of the Bitterroot National Forest indicates that air and water temperatures have been increasing over the past decade. (Figure 45 and 46). Bull trout are particularly vulnerable to warming water temperatures, so this may be a factor in some of the declines cited previously.



1993-2006. Note that most years the deviation is warmer than in the years 1960-1990.

#### 7- Day maximum mean



Figure 46. The 7-day maximum mean water temperature at 9 sites that support bull trout on the Bitterroot National Forest from 1993-2008.

#### **Hieronymus Pond**

Hieronymus Pond is located in Hieronymus Park on the north end of the city of Hamilton. The Park is managed by the city of Hamilton. In the past few years, efforts have been made to make the pond more accessible to the public. A new bridge was built across the Corvallis Canal which bisects the Park. The bridge was paid for by funding from Fish, Wildlife and Parks along with generous donations from local businesses and volunteer help from members of the Bitterroot Chapter of Trout Unlimited.

We surveyed the pond and have tried to improve the fishery. We stock the pond with rainbow trout each year. In 2004 we set an experimental gillnet in the pond overnight and captured a large number of yellow perch. longnose and largescale suckers, northern pikeminnows and a few rainbow trout. Based on this data, we decided to attempt to remove some of these fish to improve the growth of yellow perch and rainbow trout. A drain was installed in the pond to allow us to lower the water level during spring to facilitate fish removals. Discussions with City of Hamilton personnel indicated that the use of toxicants would not be allowed. Therefore, electrofishing was selected as the most efficient method for removing fish In 2007, more than 800 fish were removed from Hieronymus Pond during 4 sampling days . In 2008, due to the late ice cover and poorer sampling efficiency, only about 200 fish were removed during 2 sampling days. Yellow Perch were removed from the system and native suckers and northern pikeminnows were released into the adjacent Corvallis Canal. Rainbow trout and largemouth bass were returned to the pond. The average size of yellow perch and rainbow trout measured indicates a slight increase between 2007 and 2008 (Table 1). The average size of largemouth bass decreased but this is a result of capturing more juvenile fish in 2008.

Table 1. The number, mean length and size range of some of the fish captured in Hieronymus Pond during spring of 2007 and 2008.

	Sample Nunber	Mean Length	Size Range
Yellow perch	100	6.4	2.7-9.2
Rainbow Trout	9	12.2	5.0-14.0
Largemouth Bass	11	9.5	6.0-16.0

2	A	A	7
4	υ	υ	1

2008				
	Sample Number	Mean Length	Size Range	
Yellow Perch	169	6.9	4.5-10.4	
Rainbow Trout	4	13.0	12.3-13.4	
Largemouth Bass	12	8.1	2.7-14.7	

2000

35

#### **Skalkaho Creek Restoration**

During 2008 the Republican and Hedge Ditches were siphoned under Skalkaho Creek for the first time. The siphons were built to separate ditch water from Skalkaho Creek water. The siphons transport ditch water from the Bitterroot River under Skalkaho Creek without mixing the two. A study had shown that westslope cutthroat trout migrating downstream were entrained into the Hedge and Republican Ditches where most of them died (Gale 2005). This project should also assure that more Skalkaho Creek water enters the Bitterroot River during summer. To test the effectiveness of the project we compared conductivity of the water in 2008 to that collected in 2004 (Gale, 2005). The conductivity of Bitterroot River water is usually 100 micromhos or less. The conductivity of Skalkaho Creek water is generally over 200 micromhos. Separating the ditch water at the two sites has resulted in more Skalkaho Creek water remaining in the creek (figure 47). The conductivity of Skalkaho Creek upstream of the siphons and in the Hedge and Republican Ditches remained similar. The conductivity of Skalkaho Creek downstream of the siphons increased, indicating a higher proportion of Skalkaho Creek water in the stream.



#### Skalkaho Conductivity

Figure 47. Midsummer conductivity in Skalkaho Creek, Hedge and Republican Ditches before (2004) and after (2008 installation of siphons.

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Stream	Code Number	Key Words
Bitterroot River drainage	2-03-8865	Trout populations
		Whirling Disease
		Fishing regulations
		Westslope cutthroat
		Rainbow trout
		Brown trout
		Bull trout
		Brook trout
		Radio Telemetry
		Lake Como
		Bitterroot River
		Bitterroot National Forest