Missouri-Smith-Sun Rivers Fish Movement Study
(2008) MOTAC project 021-08

Progress Report

Submitted to

PPL-Montana
336 Rainbow Dam
Great Falls, Mt. 59404

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Introduction

In March 2007, Montana Fish, Wildlife & Parks (MFWP) conducted experimental trap netting in the Sun River near its mouth to evaluate the fish community. Fisheries crews sampled thousands of white suckers, several burbot, walleye, rainbow trout and brown trout. Several of the game fish were tagged with Floy brand T tags. In late 2007 anglers harvested two of the walleye tagged in the Sun River, 85 miles away in the Missouri River below Holter Dam. In March 2008 trapping continued in the Sun River and similar catches of suckers and game fish were observed in the spring, but few fish in the fall. A brown trout and burbot were surgically implanted with radio transmitters. The brown trout was eventually tracked to its spawning location 7 miles up Little Prickly Pear Creek; 92 miles from the implant site. These findings led MFWP to investigate the relative importance of the Smith and Sun Rivers to the Missouri River game fish populations. In 2008 MFWP was awarded $43,291 from PPL-Montana MOTAC to purchase remote telemetry receiver stations and 13 radio transmitters to investigate these interactions.

Methods

Fish were captured from the Sun River near the Fort Shaw irrigation diversion using angling and in the Smith River near the Truly FAS and Eden Bridge by angling. We also used fish captured in trap nets in the Sun River set between the 6th Street Bridge and the mouth. Remote receivers were installed on the Sun River at the mouth and near the Fort Shaw FAS. Remote receivers were installed on the Smith River at the mouth and near the Eden Bridge FAS. Fish from the Missouri River were sampled with hoop nets during burbot monitoring program in the spring and one walleye was sampled by angling. Movements of radioed fish were monitored by truck, airplane, boat and remote receiver stations located throughout the study area. We used Floy brand T tags to evaluate harvest and movement of walleye, burbot and trout captured in the Missouri and Sun rivers.

Results

We radio tagged four trout and a burbot in the Sun River, three trout and a whitefish in the Smith River, and five trout and a walleye from the Missouri River (Table 1).

Table 1. Fish species and location of radio tagging for the Sun, Smith and Missouri Rivers, 2009-09.

Stream	Location	Species	Freq	Length(in)	Sex	Date
Sun River	Fort Shaw div	Rainbow	760-20A	18.8	F	8/18/08
	Fort Shaw div	Rainbow	720-29	13.2	F	8/18/08
	Fort Shaw div	Rainbow	720-27	12.9	F	8/18/08
	Mouth	Brown	890-11	20.2	M	3/21/08
	Mouth	Burbot	720-26	28.9	---	3/21/08
Smith River	Truly Bridge	Rainbow	890-12	13.3	F	8/26/08
	Eden Bridge	Rainbow	890-13	13.5	F	8/26/08
	Eden Bridge	Brown	890-14	16.4	F	8/26/08
	Eden Bridge	Whitefish	890-15	14.9	---	8/26/08
Missouri R.	River mile 60.3	Brown	890-16	19.5	M	3/25/08
	River mile 63.9	Brown	890-17	21.4	M	3/27/08
	River mile 63.9	Rainbow	890-18	16.8	F	3/27/08
	River mile 61.5	Brown	890-19	20.8	M	3/25/08
	River mile 61.5	Rainbow	890-20	17.2	F	3/25/08
	River mile 42.5	Walleye	890-13A	17.4	M	10/30/08

A-radio recovered from fish and reinstalled

Sun River

Two of the three fish tagged in the Sun River near the Fort Shaw irrigation diversion displayed movements from the tagging site. Because these fish were tagged in the fall and all were rainbows, we did not expect any significant movements until the next spring.

Rainbow trout 760-20A began its upstream migration in mid March and moved through the Fort Shaw FAS ground station (river mile 34.5) on March 19, 2009. During a flight on April 23 it was found at river mile 46 and was believed to have spawned in that area. This fish soon descended the river and was found at river mile 37 and 42 on May 12 and May 26, respectively. Its radio ran out of battery life in mid June.

Rainbow trout 720-29 made no movements from its area of implant (river mile 31). No conclusions can be made as to whether it spawned in this area. The area it was tagged at is considered a stronghold for trout in the middle section of the Sun River.

Rainbow trout 720-27 stayed in the area it was tagged over the winter of 2008-09. During a flight on May 12 it was discovered at river mile 23.5 near the Lewis FAS and again on May 26 at river mile 21. No conclusions can be made about whether it spawned in this area, although its movements are consistent with the rainbow trout spawning times, and there is suitable spawning habitat in the Sun River between river mile 21-23.5. Analysis of the data from the remote receiver located at the Sun River mouth showed this fish did not move through this site by September 21, 2009.

Burbot 720-26 was tagged in the Sun River on March 21, 2008. This fish entered the Missouri River in May and stayed in the general vicinity of Broadwater Bay throughout the summer. It was located at the Central West Bridge on November 25. On December 31, (36 days later) it was found 1 mile upstream of the Ulm Bridge and was believed to have spawned in that general vicinity in early January. On March 23 it returned to the mouth of the Sun River and was eventually captured in the Sun River in a trap net on April 17. In one years time, this fish was tagged, moved into the Missouri River, made a spawning run 28.7 miles upstream and returned to the site where it was initially tagged. Upon recapture, the radio was surgically removed and the fish was released. The incision from the radio implant was perfectly healed and this fish apparently suffered no ill effects from the implant.

Brown trout 890-11 was tagged in the Sun River on March 21, 2008. Contact was lost until July 18 when it was discovered 73.4 miles away in the Missouri River near Spite Hill FAS. On September 2 it moved through the ground station located at the Craig Bridge. On September 24 it staged at the mouth of Little Prickly Pear Creek and was detected by the ground station there intermittently for 20 days before entering the stream. On November 7, it was found 7.3 miles up Little Prickly Pear Creek where it was believed to have spawned. On November 25, it descended to stream mile 4.9 and by December 19 , it had moved upstream to stream mile 6.9. This fish stayed in the general vicinity of stream mile 6.9 through May 14, 2009 until the battery was exhausted. Total distance traveled from its tagging site to its spawning site was 92 miles.

Smith River

Only one of the fish tagged in the Smith River displayed notable movements. Rainbow trout 890-12 was tagged near the Truly Bridge FAS (river mile 9.5) on August 26, 2008. Because it was tagged in the late summer, we did not expect any significant movements until spawning season the next spring. This fish was relocated three times between

August 2008 and May 12, 2009 and it stayed in the general vicinity of the tagging site. During a tracking event by truck on May 23, 2009, it was located 12.5 miles upstream (river mile 22) just below the Eden Bridge, where it was believed to have spawned. On June 11, it was found 12.4 miles downstream near the site where it was tagged. Based on timing and location of the movements, we believe this fish made a spawning run and returned to its summer habitat location.

Both rainbow trout 890-12 and brown trout 890-14 displayed very small range of movements (± 1.5 miles) during 2008-09. No conclusions can be made about their behavior. It is likely they did not survive the radio implant, or they have a very narrow home range.

Rainbow trout 890-13 was tagged near the Eden Bridge on 8/26/08. During a tracking event by truck on 9/9/08, this radio was tracked to an osprey nest located 0.2 miles south of the Ulm Bridge. The radio was recovered at no cost by lineman Don Johnson from Northwestern Energy and subsequently reinstalled in a walleye in the Missouri River.

Missouri River

Brown trout 890-16 was tagged on March 25, 2008 at river mile 60.3 (below Smith River confluence). On July 17 it was found 58.3 miles upstream in the Missouri River near the Wolf Creek Bridge. It stayed in this area through September 24 until it moved downstream 0.5 mile to the mouth of Little Prickly Pear Creek where it stayed for 25 days. It entered Little Prickly Pear Creek on October 20 and traveled 5 miles upstream over 2 days. It likely spawned at stream mile 5.0 on October 22. On October 24 it left Little Prickly Pear Creek and was recorded at the Craig Bridge ground station on October 25. Contact was lost with this fish until it was discovered during a flight on January 21, 2009 at river mile 61.5. It stayed in this area until March 31. On May 1, it was discovered downstream at river mile 74.5, then on June 11, it was found upstream at river mile 61.5. This fish was tagged in an area not typically considered good trout habitat. It traveled 62.8 miles upstream during a spawning run in Little Prickly Pear Creek, then returned very close to its tagging location within 90 days. The total round trip was 154 miles.

Brown trout 890-17 was tagged on March 27, 2008 at river mile 63.9. Contact was lost until it was discovered during a tracking sequence by truck on October 29 near the mouth of Sheep Creek (river mile 23.5). We conducted ground tracking on November 7 and located this fish in a deep pool approximately 0.3 miles from the mouth where we believe it spawned on a nearby riffle. Contact with this fish was lost until it was discovered during a flight on January 12, 2009 at river mile 64, which is the same location it was tagged. The fish stayed in this location through February 17. During a flight on June11 it was found 6.2 miles downstream.

Rainbow trout 890-18 was tagged on March 23, 2008 at river mile 63.9. Over the next year and three months it stayed within a 13.2 mile reach of river between river mile 58.3 and 71.5. No conclusions can be made about spawning or other notable behavior.

Brown trout 890-19 was tagged in the Missouri River on March 23, 2008 at river mile 61.5. Contact with this fish was lost for nearly one year until it was discovered during a

flight on February 17, 2009 at river mile 67. By April 22 it had moved 43.8 miles upstream near the intake of the Chestnut Valley irrigation system. It stayed in this area through June 11. It's movements did not coincide with the brown trout spawning season and no conclusions can be made about its behavior, other than its ability to travel long distances within this river system.

Rainbow trout 890-20 was tagged in the Missouri River at river mile 61.5 on March 25, 2008. There have been no subsequent relocations of this fish.

Walleye 890-13A was tagged in the Missouri River on October 30, 2008 at river mile 42.5 (near Little Muddy Creek) using a radio recovered from an osprey nest. This fish stayed in the general vicinity of Little Muddy Creek through April 15, 2009. During a flight on September 18, it was discovered 14.1 miles upstream near the irrigation pump at the lower end of the Pelican Point electrofishing section. No conclusions can be made about it s behavior other than it ability to travel relatively long distances in this river system.

T-Tagging

In 2008 we tagged 114 fish using T-tags (61 walleye, 43 burbot, 7 brown trout and 3 rainbow trout). Of these, 10 walleye and 6 burbot were harvested by anglers. Sixteen percent of the walleye tagged in 2008 were harvested by anglers within one year. Most of the walleye were tagged in the Craig electrofishing section and all but two were harvested near the BLM campground downstream of Holter Dam. Walleye 4-0906 was tagged in the Sun River on March 21, 2008 at river mile 0.5. It was harvested on December 1, 2008 85.5 miles away in the Missouri River at the BLM campground. Walleye 4-0907 was tagged on March 21, 2008 in the Sun River at river mile 0.5. It was harvested on September 28, 2008 85.2 miles away in the Missouri River at the BLM campground. Both of theses walleye were tagged in the Sun River, entered the Missouri River and traveled 85 miles upstream in 6-9 moths time.

Fourteen percent of the burbot tagged in 2008 were harvested by anglers. All but one of these was harvested within one mile of the location they were tagged at. One burbot (tag 4-0559) was tagged in the Sun River at river mile 0.5 on March 24, 2008 and was harvested on December 12, 2009 85.2 miles away in the Missouri River at the BLM campground.

Conclusions

Based on the results of fish movements in the Sun River, resident rainbow trout make their spawning movements between April 23 and May 12 and likely spawn in a reach of river between river mile 22 and 46. Due to a low sample size, we were not able to discern if rainbow trout tagged in the middle Sun River (river mile 31) return to the Missouri River for any portion of their life cycle. Perhaps a larger sample size would provide more detailed information on resident rainbow and brown trout in the Sun River.

The trapping of the Sun River in the spring and fall demonstrated a dramatic difference in the number of fish species captured and the total number of fish captured. Based on the

trapping results in the Sun River, it is clear that white suckers and longnose suckers use the Sun River in the spring for spawning. Staging of fish for the spawning run begins in April when water temperature reaches 50^{o}F. The presence of predator fish such as walleye and burbot in the Sun River in the spring suggests that these are likely following the suckers as a forage base. It is unclear why trout are congregating in the Sun River in the spring of the year other than responding to warm water after ice melt. Trapping in the fall of 2008 resulted in only a few perch and spot tail shiners being captured, which indicates that the majority of fish using the lower Sun River is seasonal.

Based on the movements of radioed fish, it is clear that the entire 90 mile reach of the Missouri River between Holter Dam and Black Eagle dam is used by rainbow trout, brown trout, walleye and burbot. The lower portion of the Missouri River and Sun River confluence area are much more important to trout than previously thought. The Smith River appears to be used as a spawning tributary for rainbow trout from the Missouri River. Trout tagged in the lower reaches of the Missouri River are able to travel long distances upstream and into tributaries to spawn, then return to their tagging sites in the lower river. Further investigations of trout radio tagged in the Smith River will help determine the importance of interactions of trout between these two rivers.

During this study we observed one instance of burbot spawning from a fish radio tagged in the Sun River. It spawned in the Missouri River near Ulm and returned to the tag site in the Sun River where it was captured in a trap and its radio removed. Further investigations on burbot behavior will help determine the likely causes of the decline in burbot numbers observed over the past decade in the this area.

The sample size of radio tagged fish in this study was small. Nevertheless we discovered some notable behavior in both timing and distance traveled by radio tagged fish. The placement of radio receiver stations will lay the foundation for future studies on fish movements in the is system.

The sample size of T-tagged fish was also small, but the movements of burbot 4-0559 support the findings of the 2007 tagging of walleye and shows burbot also use the entire 90 mile reach of the Missouri River as well as seasonal interchange between the Missouri and Sun rivers. Movements of T-tagged walleye based on angler tag returns shows mostly short distance movements from the Craig electrofishing section to the BLM campground below Holter Dam ($\pm$ 6 miles). The two walleye tagged in the Sun River and harvested 85 miles away in the Missouri River further supports the important interaction of fish between the Sun and Missouri rivers as well as the capability for longdistance movements of this species.