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

Annual Report for 2008
Federal Aid Project F-113-R-7

Scott Opitz

December 2008

Montana Fish, Wildlife & Parks
1400 South 19th Ave.
Bozeman MT 59715

Table of Contents

List of Figures

List of Tables

Abstract

This report documents current trends for rainbow, brown and Yellowstone cutthroat trout populations in the Yellowstone River and the Shields River. Results from netting of Dailey Lake are presented for rainbow trout, yellow perch, and walleye. Overall, fish populations are in good shape. Impacts of continued drought appear to minimal at this time. Drought conditions have limited the ability to sample Yellowstone River populations

Objectives

Funds for this project are provided by grants from the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777k) supporting the Montana Statewide Fisheries Management Program. This program consists of two elements: Fisheries Management in Montana, and Statewide Program Coordination. The Fisheries Management element includes four activities, each with associated objectives:

State Program Activities and Objectives

1. Survey and Inventory

   To survey and monitor the characteristics and trends of fish populations, angler harvest and preferences, and to assess habitat conditions in selected waters.

2. Fish Population Management

   To implement fish stocking programs and/or fish eradication actions to maintain fish populations at levels consistent with habitat conditions and other limiting factors.

3. Technical Guidance

   To review projects by government agencies and private parties that have the potential to affect fisheries resources, provide technical advice or decisions to mitigate effects on these resources, and provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources.

4. Aquatic Education

   To enhance the public's understanding, awareness and support of the state's fishery and aquatic resources and to assist young people to develop angling skills and to appreciate the aquatic environment.

   Statewide activities and objectives are addressed locally by ongoing fisheries investigations and management activities intended to enhance aquatic habitats and recreational fisheries in the upper Yellowstone and Shields River basins.

Local Project Objectives

In fiscal year 2008 (July 1, 2007 to June 30, 2008), project objectives for state project number 3350 (the Yellowstone and Shields drainage areas) were identical to the statewide objectives listed above. Project objectives are intended to guide continuing efforts to maintain and enhance local fisheries. In support of these efforts, the following data collections, compilations, and analyses are reported here under separate headings:

A. Monitoring of trout abundance in two sections of the Yellowstone River based on spring sampling in 2008.

B. Monitoring of trout abundance in three sections of the Shields River based on spring sampling in 2008.

C. Summary of gillnet catches at Dailey Lake: spring 2008.

State survey, inventory, and fish population management objectives are addressed under headings A through C. Technical guidance and aquatic education objectives are addressed on an ongoing basis by meetings with various angler groups, school groups, journalists, and the public. In fiscal year 2008 these meetings included work supporting the Shields Valley Watershed and the Upper Yellowstone Watershed Basin, educational seminars for local school children, and meetings with local angling groups such as Trout Unlimited Upper Yellowstone Walleyes Unlimited, and Federation of Fly Fishers to discuss a variety of fisheries topics. Landowner contacts and consultations occurred routinely each month in conjunction with administration of the Montana Natural Streambed and Land Preservation Act and the Montana Stream Protection Act.

Electrofishing Procedures

We used the mark-recapture method of electrofishing to sample trout populations in the Yellowstone and Shields Rivers. This method consists of a marking run and a recapture run. Both the marking and recapture run consist of electrofishing the entire section or reach of river. This is typically done in subsections to prevent overstressing fish. During the marking run all fish that are collected in the section are given a fin clip, which can be detected later. The fish are then released back into the section and allowed to redistribute themselves for 7-10 days. After this redistribution period the recapture run is completed. The entire section is electrofished again. Fish are examined and those that have the first fin clip are noted as recaptured. All fish collected during the recapture run are given a second fin clip on a different fin so they are not counted twice if they are captured again during the recapture run.

Yellowstone River Procedures

In spring 2008, trout were sampled in the Corwin Springs and Springdale Sections of the Yellowstone River (Table 1and Figure 1). Both of these sections are long-term monitoring sections on the Yellowstone River.

Electrofishing of these sections was completed through the use of a raft mounted with boom electrofishing equipment. Both sections were completed with a 16-foot Maravia raft, a Coffelt 22-M, and 5,000-watt Honda EV5000 generator. The anodes were steel droppers suspended from twin booms at the bow and steel droppers off the rear of the boat served as the cathode.

A mark-recapture, without replacement, effort was made on each section. Fish were netted and held in live cars. After anesthetizing the fish we identified 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 marking run, the recapture effort was made in each section.

I was unable to estimate fish abundance for either section because of poor recapture numbers. This is the result of significant movement of fish between the marking and recapture efforts, especially rainbow trout that are moving as part of spawning in the spring.

• Table 1: Survey Sections where trout abundance was sampled in the Yellowstone River in 2008.

Section Name	Survey Date	Length (ft)	Approximate Location		
Corwin Springs	04/22/08	29,040	Upper Boundary	North West	45.10827 110.78957
			Lower Boundary	North West	45.16649 110.85159
Springdale	04/17/08	26,730	Upper Boundary	North West	45.69487 110.28185
			Lower Boundary	North West	45.74196 110.23265

• Coordinates in decimal degrees are NAD83 datum.

Corwin Springs

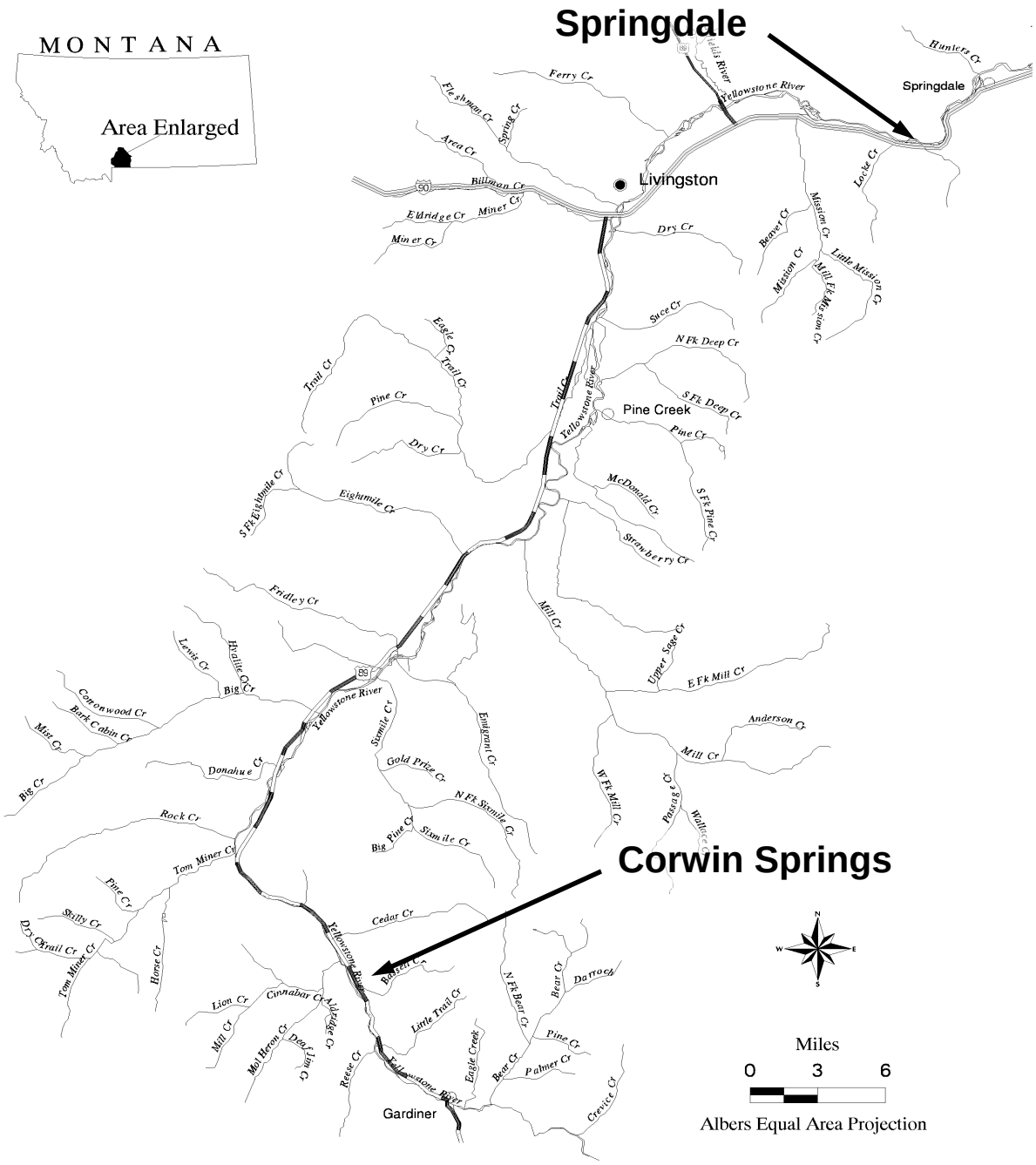
We completed our marking runs in the Corwin Springs Section on April 22 and 23, 2008. The left bank was sampled on April 22 and the right bank on April 23. All captured trout were given a left pelvic fin clip. Scale samples were taken from trout for aging. Genetic samples were collected from Yellowstone cutthroat trout for later analysis. The sample consisted of a small clip of one of the pelvic fins that was stored in 100% denatured ethanol. Captured Yellowstone cutthroat that were twelve inches and longer in total length were tagged with a yellow, numbered floy tag to allow for large scale monitoring of movement.

The recapture runs in this section were completed on April 30 and May 1, 2008. The left bank was sampled on April 30 and the right bank on May 1.

Springdale

The Springdale Section was marked on April 17 and April 21, 2008. The right bank was marked on April 17 and the left bank on April 21. Scale samples were taken from trout for aging. Genetic samples were collected from Yellowstone cutthroat trout for later analysis. The sample consisted of a small clip of one of the pelvic fins that was stored in 100% denatured ethanol. Captured Yellowstone cutthroat that were twelve inches and longer in total length were tagged with a yellow, numbered floy tag to allow for large scale monitoring of movement.

On April 24, April 29, and May 2, 2008 the recapture runs were completed on this section. The right bank was done on April 24 and the left bank was done on April 29. A third recapture effort was done on May 2 in an effort to increase the number of recaptured fish in our sample. The best habitat on both the left and right bank was sampled during this effort.



- Figure 1: Map of the Upper Yellowstone River drainage displaying the location of the 2008 sampling sections.

Yellowstone River Results

Yellowstone River Trout Abundances

Limited recapture data prevented the production and analysis of trout abundance estimates with the exception of brown trout in the Springdale Section. Summary data was collected for all other species in both sections and is presented by species and section below.

I estimated population abundance for brown trout in the Springdale Section using FA+ (MFWP 2004). This program uses partial log-likelihood to calculate estimates. The population estimate is for fish ≥ 7 inches in total length. It should be noted that this estimate is biased as a resulted of limited numbers of recaptured fish and should be used with caution.

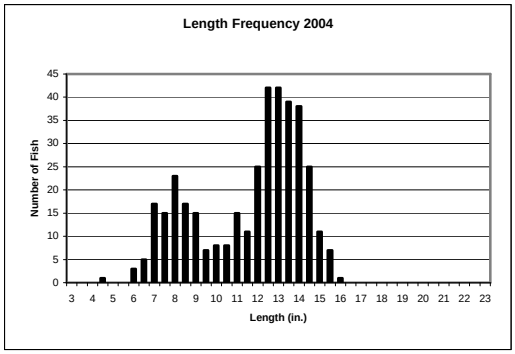
- Table 2: Population abundance model results for the Springdale Section for 2008. N represents the number of fish (≥7 inches) per mile.

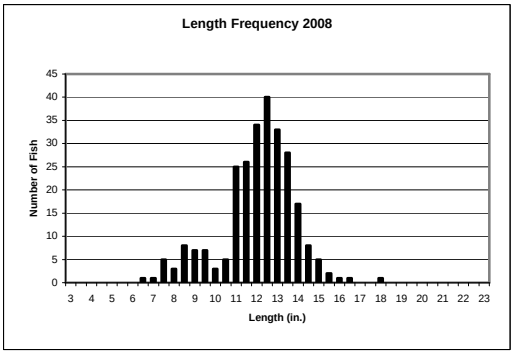
Section (mark date)				Overall model			Pooled model	
Fish Species	N	SD	DF	Chi-square	P	DF	Chi-square	P
Springdale (3/13)								
Brown Trout	646	24.9	8	7.65	0.469	6	6.90	0.331

Yellowstone Cutthroat Trout

Corwin Springs Section

We captured a total of 261 Yellowstone cutthroat trout that ranged from 6.9-18.3 inches in total length in 2008. In 2004, the last time a mark-recapture effort was completed for this section, a total of 375 Yellowstone cutthroat trout that ranged from 4.9-16.3 inches in total length were captured. The length-frequency histograms show that abundance of fish less than 11inches and greater than 13 inches in length have decreased. The length-frequency distribution for 2008 indicates that the population is weighted toward larger, older fish (Figure 3). This may be a result of limited recruitment in this population or a change in sampling efficiency due to the change from a jet boat with a boom system to a raft with a boom system.

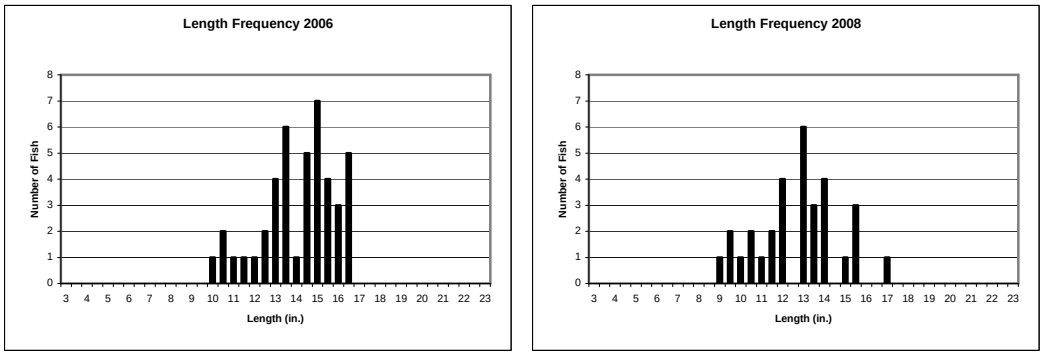




- Figure 2: Length-frequency distributions for captured Yellowstone cutthroat trout in the Corwin Springs Section for 2004 and 2008.

Springdale Section

In 2008, 31 Yellowstone cutthroat trout were captured. They ranged from 9.3-17.2 inches in total length. Forty-three Yellowstone cutthroat trout that ranged from 10.2-16.6 inches in total length were captured in 2006. The length-frequency histograms show a decrease in abundance of fish greater than 12 inches in length from 2006 to 2008. There continues to be a lack of fish less 9 inches in length (Figure 3). There appears to be limited abundance and recruitment of Yellowstone cutthroat in this section of the river. This may be a result of habitat limitations in this portion of the river. It may be a result of limited spawning success or reduced survival and recruitment of fry in tributaries that are used for spawning and rearing of fry. The lower abundance could be a result of lower sampling efficiency caused by the switch for a jet boat with booms in 2006 to a raft with booms in 2008.

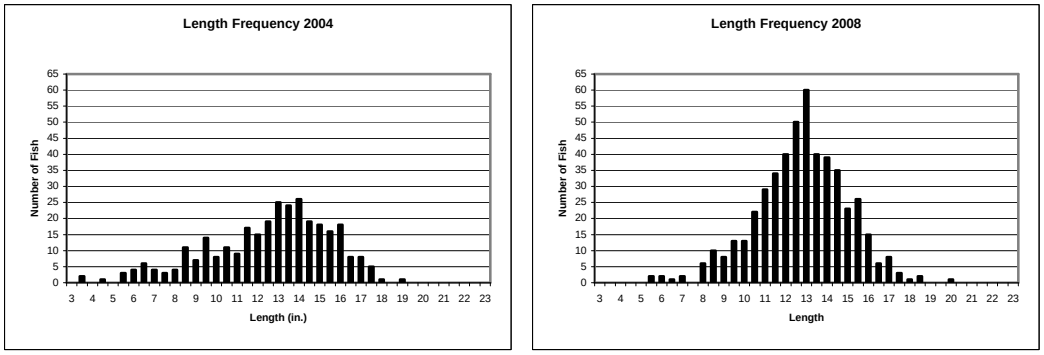


- Figure 3: Length-frequency distribution for captured Yellowstone cutthroat trout in the Springdale Section for 2006 and 2008.

Rainbow Trout

Corwin Springs Section

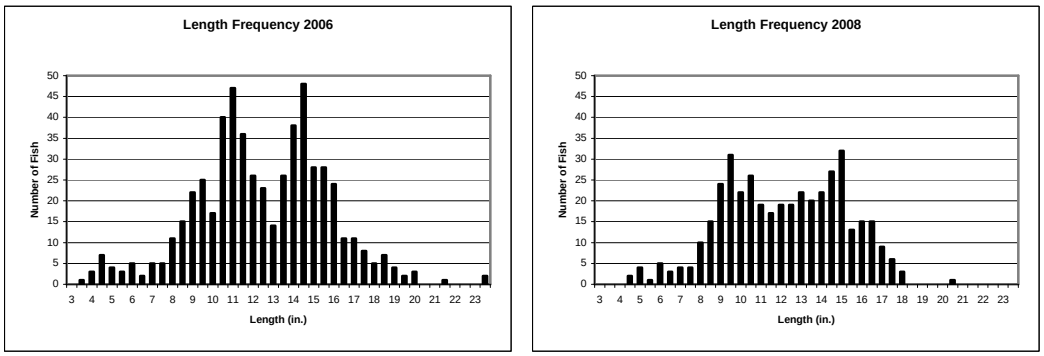
In 2008, we captured 490 rainbow trout in the Corwin Springs Section that ranged from 5.6-20.3 inches in total length. This is higher than the 307 rainbow trout that ranged from 3.5-19.1 inches in total length that were captured in 2004. The length-frequency histograms show a large increase in abundance of fish from 10.0-15.5 inches in length (Figure 4). These increases may be the result of rainbow movement as part of spring spawning or an increase in recruitment and survival in this population.



- Figure 4: Length-frequency distributions for captured rainbow trout in the Corwin Springs Section for 2004 and 2008.

Springdale Section

In this section, 410 rainbow trout were collected in 2008. They ranged from 4.7-20.6 inches in total length. In 2006, 557 rainbow trout that ranged from 3.9-23.8 inches in total length were collected. The length-frequency histograms for this section show a similar distribution for both years with a decrease in abundance from 2006 to 2008 (Figure 5). The reduced abundance may be a result of lower sampling efficiency caused by the switch for a jet boat with booms in 2006 to a raft with booms in 2008.

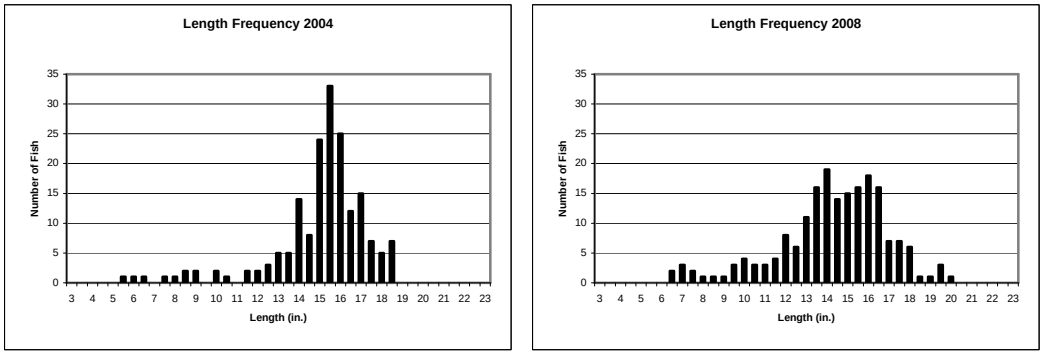


- Figure 5: Length-frequency distributions for captured rainbow trout in the Springdale Section in 2006 and 2008.

Brown Trout

Corwin Springs Section

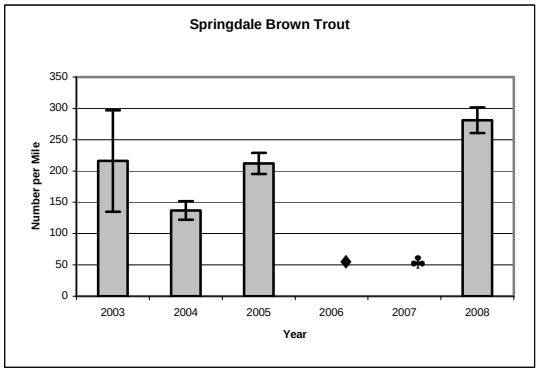
In 2008, a total of 192 brown trout were collected in the Corwin Springs Section. They ranged from 6.0-20.1 inches in total length. A total of 180 brown trout that ranged from 5.7-21.7 inches in total length were captured in 2004. The length-frequency histograms for brown trout show an increase in abundance of fish from 6.5-14.5 inches in length and a decrease in fish from15-18.5 inches in length (Figure 6).



- Figure 6: Length-frequency distributions for captured brown trout in the Corwin Springs Section for 2004 and 2008.

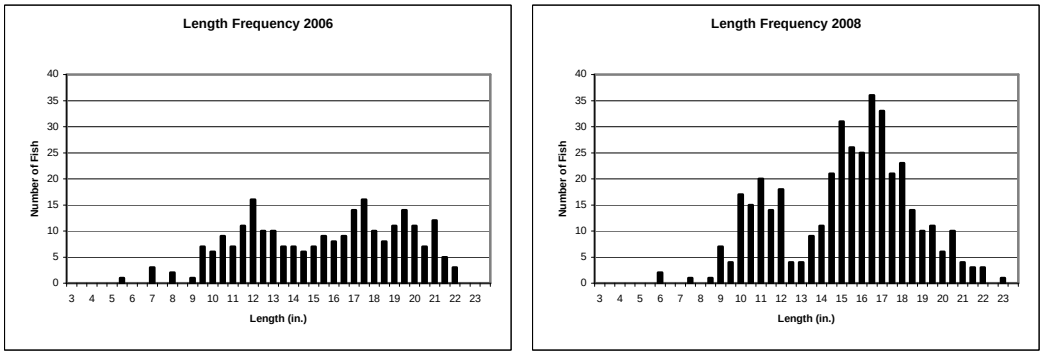
Springdale Section

In 2008, the abundance estimate for brown trout in the Springdale Section was 281 fish/mile (≥ 7 in.) (Figure 7). It should be noted that this estimate is biased as a resulted of limited numbers of recaptured fish and should be used with caution. This is an increase from 212 fish/mile (≥ 7 in.) in 2005 and 137 fish/mile (≥ 7 in.) in 2004. This section was not sampled in 2006 and no abundance estimate for brown trout was completed in 2007.



- Figure 7: Abundance estimates for brown trout (≥ 7 in.) in the Springdale Section from 2003-2008. Error bars represent +/- 1 SD. ♦ Section was not sampled this year. ♣ No abundance estimate was made this year.

In 2008, a total of 405 brown trout were collected. They ranged from 6.0-23.2 inches in total length. This is much higher than the 247 brown trout were collected in 2006. These trout ranged from 5.5-22.4 inches in total length. The length-frequency histograms show similar distributions for both years and there is a large increase in abundance in 2008 (Figure 8). This may be the result of increased recruitment and survival or movement of brown trout from over wintering areas.



- Figure 8: Length-frequency distribution for captured brown trout in the Springdale Section for 2006 and 2008.

Eastern Brook Trout

Corwin Springs

Two Eastern brook trout with total lengths of 9.0 and13.1 inches were captured in 2008. It is apparent that Eastern brook trout are rare in this section in the spring.

Shields River Procedures

In spring 2008, we surveyed the Convict Grade, Zimmerman, and Chadbourne Sections of the Shields River (Table 2 and Figure 5).

A fiberglass drift boat mounted with mobile electrofishing gear was used to sample the Convict Grade and Chadbourne Sections of the Shields River. The gear included a 3,500-watt Honda EG3500X generator and a Leach direct current rectifying unit. The cathode was a steel plate attached to the bottom of the drift boat and the anode was a single hand-held (mobile) electrode connected to the power source by 30 feet of cable.

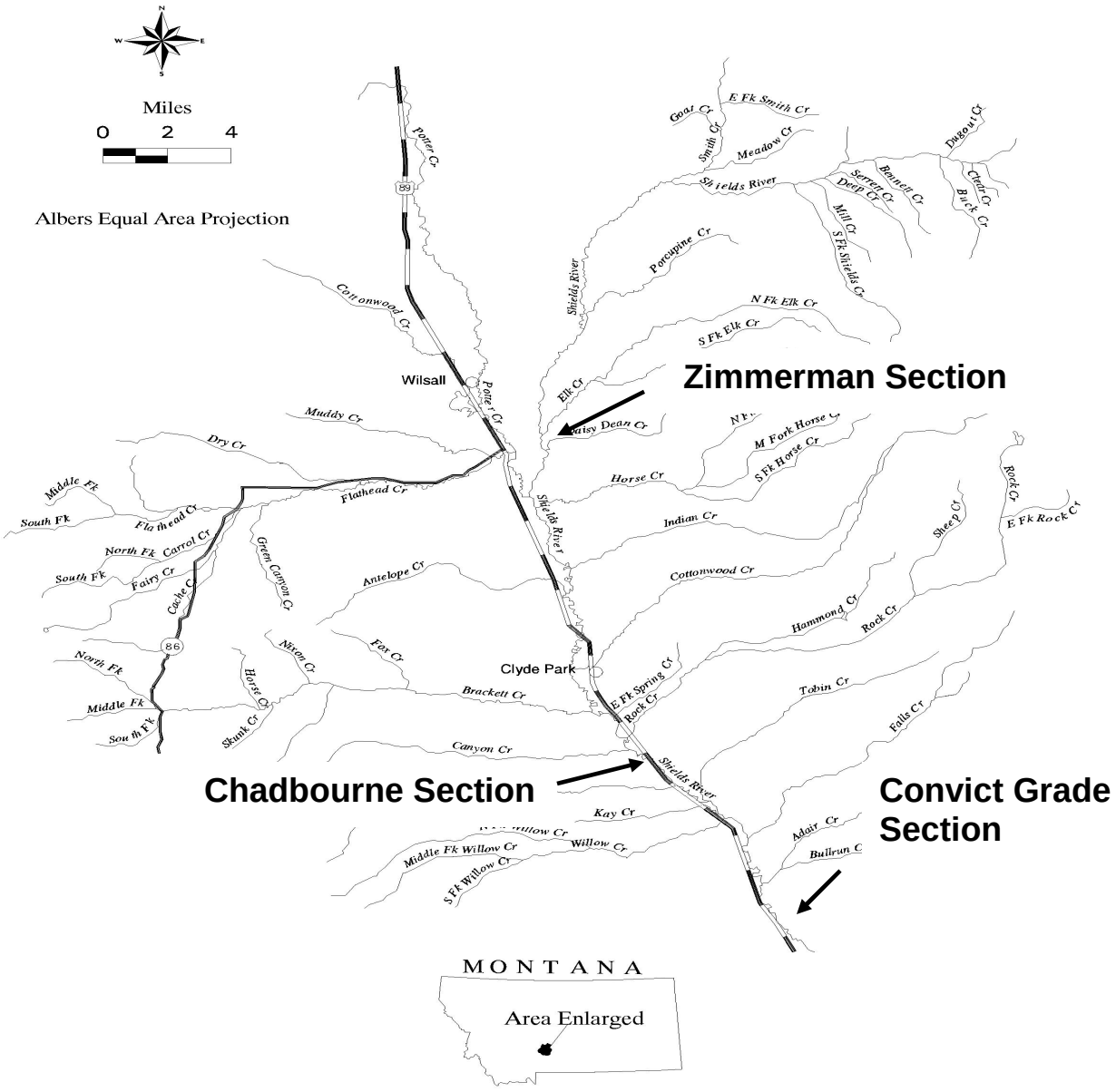
We used a Coleman Crawdad boat mounted with mobile electrofishing gear to sample the Zimmerman Section. The gear included a 3,500-watt Honda EG3500X generator and a Coffelt VVP-15. The cathode consisted of two braided steel cables that were hung over each side of the boat and the anode was a single hand-held (mobile) electrode connected to the power source by 30 feet of cable.

In all cases, fish were collected in live cars, identified, measured to the nearest 0.1 inch, and weighed to the nearest 0.01 pound. Trout were marked with fin clips and returned to the stream. Recapture sampling in each section occurred 14 days after the marking effort.

I produced trout and whitefish abundance estimates in the Convict Grade, Zimmerman, and Chadbourne Sections using FA+, a computer program developed by FWP for processing electrofishing data (MFWP, 2004). Rainbow trout abundance in the Convict Grade Section was estimated using the modified Peterson model (Chapman 1945). The partial log-likelihood model was used for the remaining estimates. For the partial log-likelihood model, I separated fish into one-inch length groups for analysis and evaluated estimate reliability at alpha = 0.05.

- Table 3: Survey Sections where trout abundance was sampled in the Shields River in 2008.

Section Name	Survey Date	Length (ft)	Approximate Location		
Convict	03/13/08	6,758	Upper Boundary	North West	45.74036 110.48224
			Lower Boundary	North West	45.72618 110.46231
Zimmerman	03/26/08	4,224	Upper Boundary	North West	46.02599 110.64086
			Lower Boundary	North West	46.01728 110.64012
Chadbourne	03/14/08	2,444	Upper Boundary	North West	45.83548 110.56183
			Lower Boundary	North West	45.82974 110.55934



• Figure 9: Map of the Shields River drainage displaying the location of the 2007 sampling locations

Convict Grade

On March 13, 2008, we completed our marking run on the Convict Grade Section. Captured trout and whitefish were marked with a left pelvic fin clip and a scale sample for aging was collected from trout. Genetic samples were collected from Yellowstone cutthroat for later analysis. The sample consisted of a small clip of one of the pelvic fins that was stored in 100% denatured ethanol. Captured Yellowstone cutthroat that were twelve inches and longer in total length were tagged with a red, numbered floy tag to allow for large scale monitoring of movement.

We recaptured the section on March 20, 2008 and marked all captured trout and whitefish with an anal fin clip.

Zimmerman

The Zimmerman Section was marked on March 26, 2008. We marked captured trout and whitefish with a left pelvic clip and took a scale sample from trout for aging. Genetic samples were collected from Yellowstone cutthroat for later analysis. This consisted of a small clip of one of the pelvic fins that was stored in 100% denatured ethanol. Captured Yellowstone cutthroat that were twelve inches and longer in total length were tagged with a red, numbered floy tag to allow for large scale monitoring of movement.

We completed the recapture on April 04, 2008. Captured trout and whitefish were marked with an anal fin clip.

Chadbourne

We marked the Chadbourne Section on March 14, 2008. Captured trout were marked with a left pelvic fin clip and a scale sample for aging was collected from trout. Genetic samples were collected from Yellowstone cutthroat for later analysis. The sample consisted of a small clip of one of the pelvic fins that was stored in 100% denatured ethanol. Captured Yellowstone cutthroat that were twelve inches and longer in total length were tagged with a red, numbered floy tag to allow for large scale monitoring of movement. Captured rainbow trout that were twelve inches and longer in total length were tagged with a red, numbered floy tag and were released downstream of the Chadbourne diversion. The diversion is at the bottom end of the section and is a channel wide concrete structure that appears to act as at least a partial barrier to fish passage. The tagged rainbow trout will be used to study movement of fish over the structure.

The section was recaptured on March 21, 2008. Captured trout were marked with an anal clip.

Shields River Results

Shields River Abundances

I used electrofishing data to calculate trout abundance estimates and monitor population trends. I estimated population abundance using FA+ (MFWP 2004). This program uses partial log-likelihood to calculate estimates. If the electrofishing data does not fit the partial log-likelihood model a Modified Peterson (Chapman 1945) estimate is used. I used the partial log-likelihood model for all of the estimates with the exception of rainbow trout in the Convict Grade Section (Table 4). A Modified Peterson (Chapman 1954) was used to produce the abundance estimate for rainbow trout in that section. This data did not fit the partial log-likelihood model, as a result of low numbers of recaptured fish. The population estimates are for fish ≥ 7 inches for brown and rainbow trout in the Convict Grade Section and brown trout in

the Zimmerman Section. The estimate for whitefish in the Zimmerman Section is for fish ≥ 10 inches and the estimate for brown trout in the Chadbourne section is for fish ≥ 9 inches. Results, by species and section, are presented below.

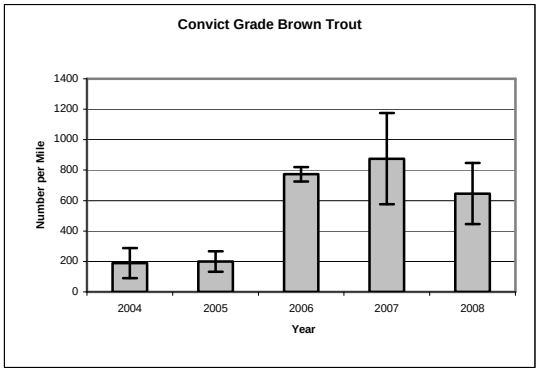
- Table 4: Population abundance model results for the Shields River by section and species for 2008. N represents the number of fish (≥7 inches) per mile for Convict Grade and per 1,000 ft. for Zimmerman. N for Mountain Whitefish is number of fish (≥10 inches) per 1,000 ft. N represents the number of fish (≥9 inches) per 1,000 ft. for Chadbourne. * indicates that the Modified Peterson estimator was used.

Section (mark date)			Overall model			Pooled model		
Fish Species	**N**	**SD**	**DF**	**Chi-square**	**P**	**DF**	**Chi-square**	**P**
Convict Grade (3/13)								
Brown Trout	646	24.9	8	7.65	0.469	6	6.90	0.331
Rainbow Trout	486	78.3	*	*	*	*	*	*
Zimmerman(3/26)								
Brown Trout	83	4.8	7	7.87	0.344	5	5.91	0.315
Mountain Whitefish	120	11.6	4	2.22	0.695	4	2.22	0.695
Chadbourne(3/14)								
Brown Trout	89	4.7	6	6.30	0.390	5	4.39	0.495

Brown Trout

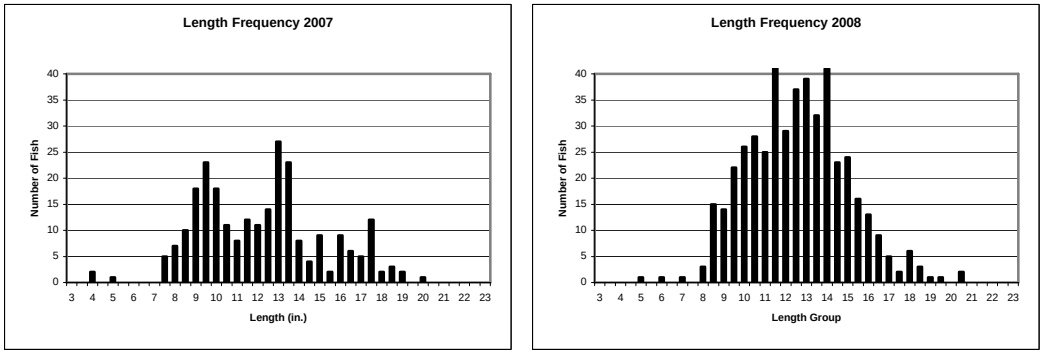
Convict Grade Section

In 2008, the abundance estimate for brown trout in the Convict Grade Section was 646 fish/mile (≥ 7 in.) (Figure 10). This is a decrease from 875 fish/mile (≥ 7 in.) in 2007and 773 fish/mile (≥ 7 in.) in 2006. The 2008 abundance still remains about three times as high as those for 2003-2005.



- Figure 10: Abundance estimates for brown trout (≥ 7 in.) in the Convict Grade section from 2004-2008. Error bars represent +/- 1 SD.

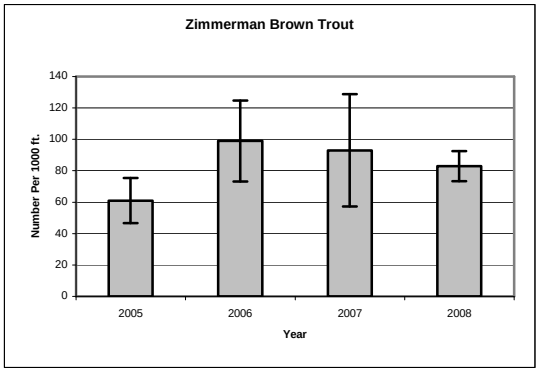
The length-frequency distribution for brown trout in the Convict Grade Section suggests good recruitment of fish in the 8.5-10.5 inch range from 2007 to larger length groups in 2008. There was a drop in the abundance of fish in the 17-20.5 inch range from 2007 to 2008 (Figure 11). This may be an indication of increased mortality among the largest and oldest fish in the population.



- Figure 11: Length-frequency distributions for all brown trout sampled in the Convict Grade Section in 2007 and 2008.

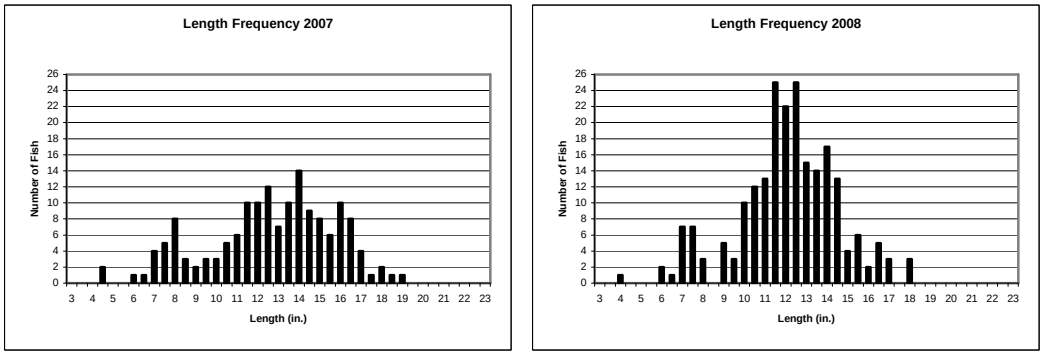
Zimmerman Section

The abundance estimate for brown trout in the Zimmerman Section was 83 fish/1,000 feet (≥7 in.) (Figure 12). This is down from 93 fish/1,000 feet (≥7 in.) in 2007 and 99 fish/1,000 feet (≥ 7 in.) in 2006. Prior to 2005, this section had not been sampled since 1995. In 1995, the abundance estimate for brown trout was 102 fish/1,000 feet (≥ 7 in.). More data needs to be collected to determine what the current trends in abundance of brown trout in this section really are.



- Figure 12: Abundance estimates for brown trout (≥ 7 in.) in the Zimmerman Section from 2005 - 2008. Error bars represent +/- 1 SD.

The length-frequency distribution for brown trout in the Zimmerman Section shows a large increase in abundance of fish in the 9-18 inch ranges from 2007 to 2008(Figure 13). This could be an indication of strong recruitment or low sampling efficiency in 2007.

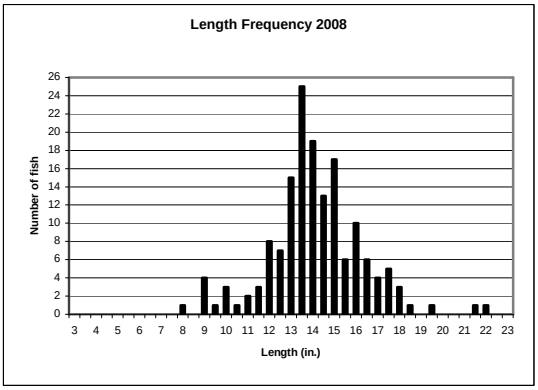


- Figure 13: Length-frequency distributions for all brown trout sampled in the Zimmerman Section in 2007 and 2008.

Chadbourne

In 2008, the abundance estimate for brown trout was 89 fish/1,000 ft. (≥ 7in.) This is the first time this section has been sampled and there are no prior estimates to compare to.

The section appears to hold primarily adult fish as seen in the length-frequency distribution (Figure 14). Few fish less than 9 inches in total length were captured.



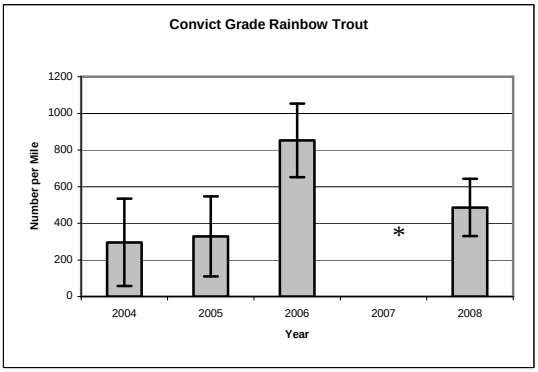
- Figure 14: Length-frequency distribution for all brown trout sampled in the Chadbourne Section in 2008.

Rainbow Trout

Convict Grade

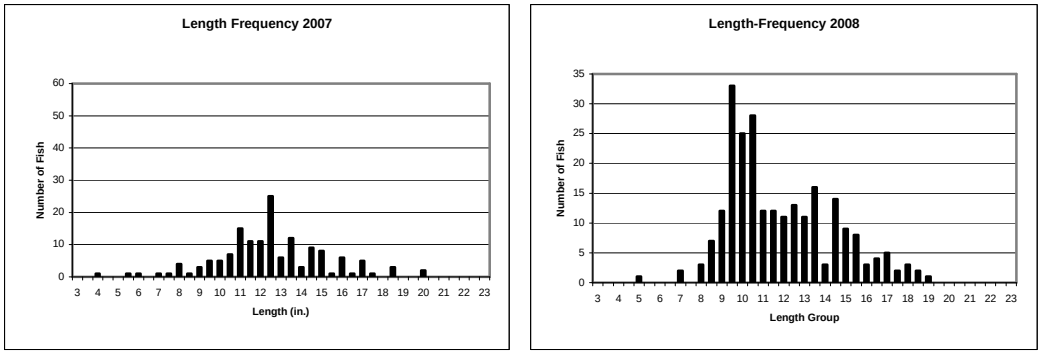
The abundance estimate for rainbow trout in 2008 was 486 fish/mile (≥ 7in.). This is slightly more than half of the 852 fish/mile (≥ 7in.) in 2006 and remains higher than the 2004 and 2005 estimates (Figure 15).

Abundance estimates for this section include rainbow trout that are moving from the Yellowstone River into the lower Shields River to spawn. This movement positively biases the abundance estimate and should be expected to be variable between years. As such abundances of resident fish are likely lower than indicated, especially for larger, sexually mature fish.



- Figure 15: Abundance estimates for rainbow trout (≥ 7in.) in the Convict Grade section from 2004-2008. Error bars represent +/- 1 SD. * There was not enough data to produce an estimate for 2007.

There was a large increase in the abundance of fish in each length group of rainbow trout from 2007 to 2008(Figure 16). This is especially true for the 8-11.5 inch group. The increase is likely the result of sampling efficiency in relation to spawning movements of rainbow trout in this section.

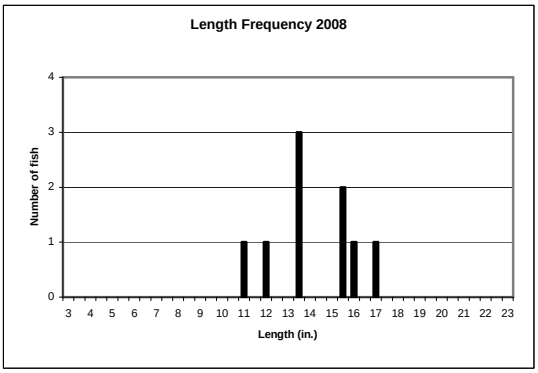


- Figure 16: Length-frequency distributions for rainbow trout sampled in Convict Grade in 2007 and 2008.

Chadbourne

A total of nine rainbow trout were captured and tagged with a floy tag in 2008. An abundance estimate was not made because all of the rainbow trout were released below the Chadbourne diversion at the bottom of the sample section. None of the fish that were released below the diversion were recaptured above the diversion.

All of the rainbow trout captured in the section were larger than 11 inches in total length. The largest fish captured was 19.7 inches in total length (Figure 17).

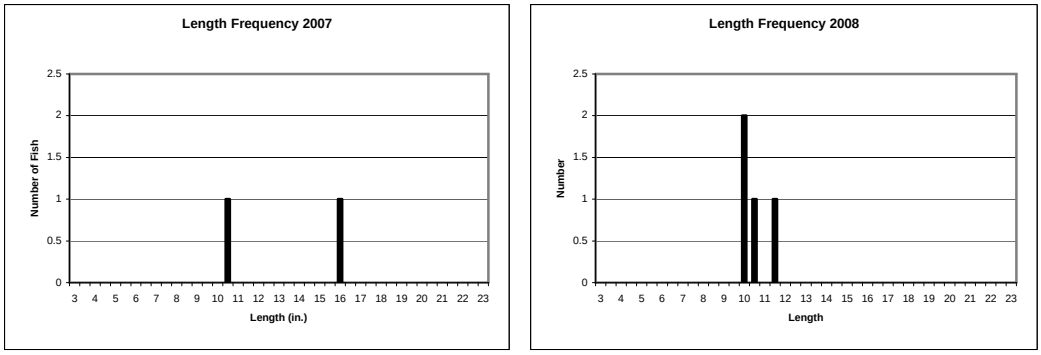


- Figure 17: Length-frequency distribution for all rainbow trout sampled in the Chadbourne Section in 2008.

Yellowstone Cutthroat Trout

Convict Grade

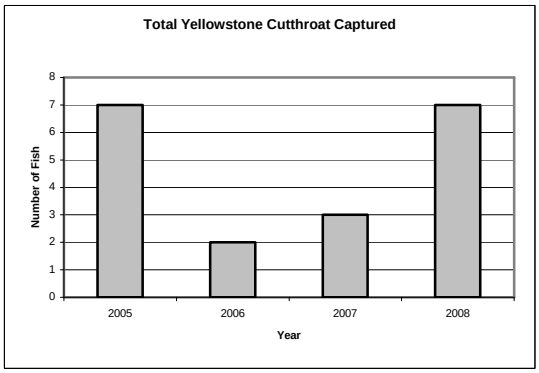
In 2007, only two Yellowstone cutthroat trout were captured in the Convict Grade Section. They were 10.5 and 16.3 inches in total length. Four Yellowstone cutthroat trout were captured in 2008. They were ranged from 10.1 to 11.6 inches in total length (Figure 18). There were not enough captured fish to produce an abundance estimate. There were no Yellowstone cutthroat captured in this section in 2004 or 2005 and seven were captured in 2006.



- Figure 18: Length-frequency distributions for Yellowstone cutthroat trout sampled in the Convict Grade Section in 2007 and 2008.

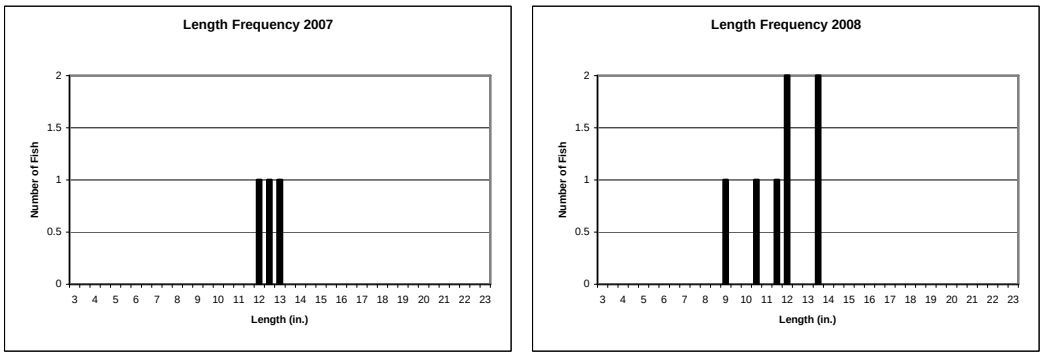
Zimmerman Section

In 2008, seven Yellowstone cutthroat trout were captured in the Zimmerman Section. This is up from three in 2007 and two in 2006 (Figure 19). Fish that did not morphologically appear to be unhybridized were not included. It is apparent that Yellowstone cutthroat are rare in this section in early spring.



- Figure 19: Number of Yellowstone cutthroat trout captured in the Zimmerman Section for 2005-2008.

The length-frequency distributions for Yellowstone cutthroat in this section are presented below (Figure 20). Fish from 9.5-13.5 inches were collection in 2008 and fish from 12-13 inches were collected in 2007.



- Figure 20: Length-frequency distributions for Yellowstone cutthroat trout sampled in the Zimmerman Section in 2007 and 2008.

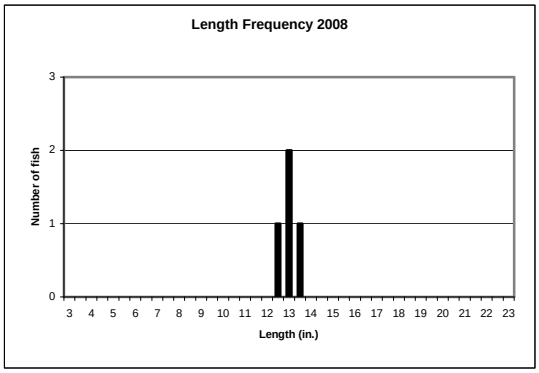
Chadbourne

Only one Yellowstone cutthroat was captured in 2008. This fish was 11.8 inches in length. Further monitoring will determine is Yellowstone cutthroat are truly this rare in the Chadbourne section.

Eastern Brook Trout

Chadbourne

In 2008, four eastern brook trout were captured in the Chadbourne Section. These fish ranged in length from12.9-13.8 inches (Figure 21). This is the only monitoring section on the Shields that eastern brook trout were captured in for 2008.

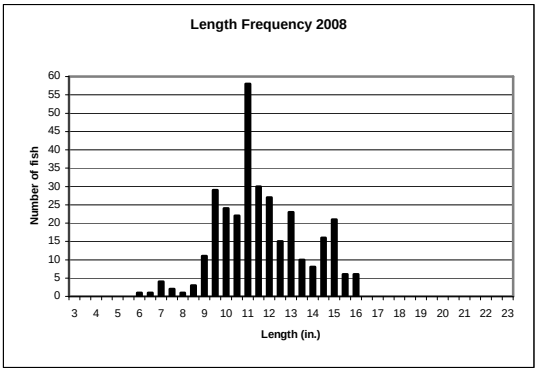


- Figure 21: Length-frequency distribution for all eastern brook trout sampled in the Chadbourne Section in 2008.

Mountain Whitefish

Zimmerman Section

The abundance estimate for mountain whitefish in 2008 was 486 fish/1,000 feet (≥ 10in.). A group of fish that ranged from 6.4-9.9 inches was sampled, but there were not enough recaptures to include these fish in the abundance estimate. Abundance estimates on whitefish have not been made in the past on this section. The length frequency distribution is presented below (Figure 22). The distribution shows the expected gradual decrease in abundance as size increases. The lack of a high abundance of fish less than 9 inches is likely the result of poor sampling efficiency.



- Figure 22: Length-frequency distribution for mountain whitefish sampled in the Zimmerman Section in 2008.

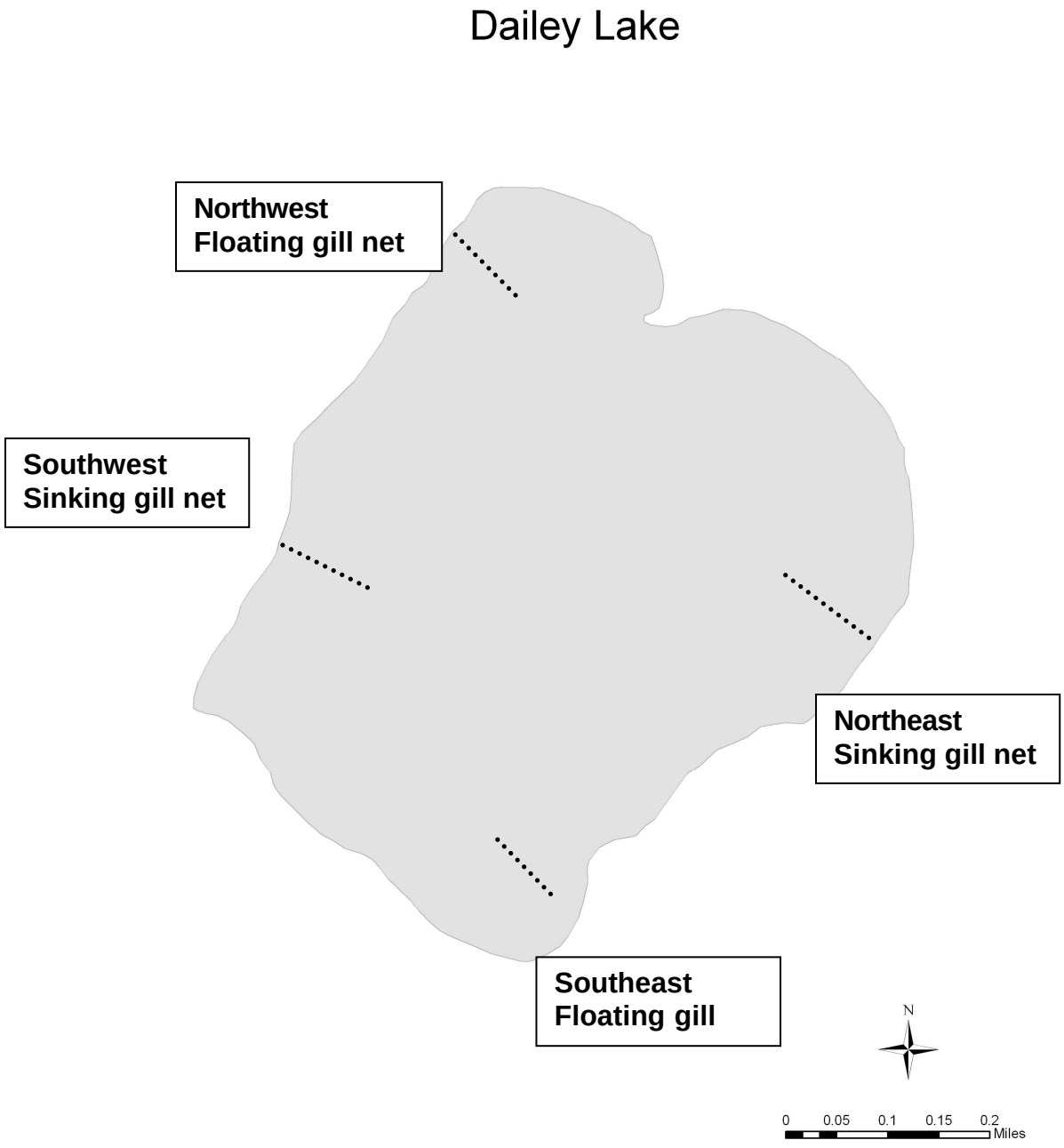
Dailey Lake Procedures

Gillnetting

Gillnet sampling in 2008 was similar to previous years in regard to timing and location of nets in the lake (Figure 23).

We set the gill nets the evening of May 20, 2008. The set consisted of two sinking and two floating experimental gill nets. The southeast floating gill net that was set about 100 ft. off shore because of the large number of cattails in that area.

We pulled the nets on the morning of May 21, 2008. We recorded lengths of all fish to the nearest 0.1 inch and weights were recorded to the nearest 0.01 pound. All live fish were released back into the lake.



• Figure 23: Map of Dailey Lake showing locations of floating and sinking gill nets in spring 2008.

Dailey Lake Results

Gillnetting

Fisheries in Dailey Lake are primarily sampled using gill nets. This technique is prone to wide variability in sampling efficiency.

Catch-per-unit-effort

Rainbow Trout

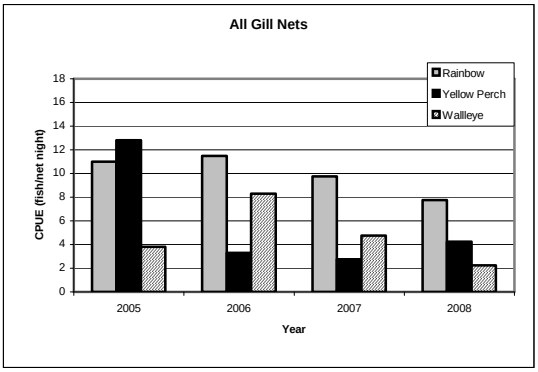
Catch-per-unit effort (CPUE) for rainbow trout in all nets was 7.75 fish/net night in 2008. This is down slightly from 9.75 fish/net night in 2007 (Figure 24). The average CPUE for rainbow trout in all nets was 12.76 fish/net night for 2003-2007. The CPUE of 6 fish/net night for rainbow in floating nets is the same as it was in 2007 (Figure 25). CPUE in sinking nets decreased significantly to 1.25 fish/net night from 13.5 fish/net night in 2007 (Figure 26).

Yellow Perch

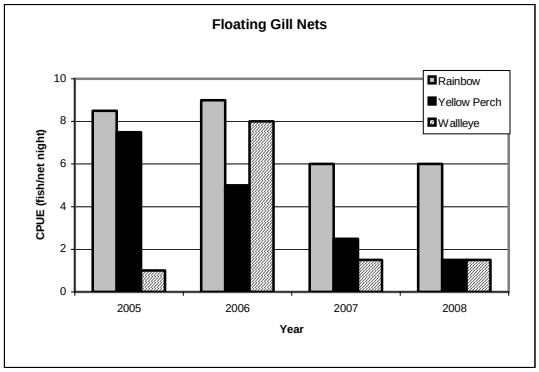
The CPUE of 4.25 fish/net night for yellow perch in all nets was up from 2.75 fish/net night in 2007. This is the first increase that has occurred in the decline that began between 2003 and 2004 and continued through 2007 (Figure 24). The average CPUE for yellow perch in all nets was 18.87 fish/net night for 2003-2007. In 2008, CPUE for yellow perch in the floating nets was 1.5 fish/net night compared to 2.5 in 2007 (Figure 25). The CPUE for sinking gill nets was 1.5fish/net night in 2008. This was a decrease from 3 fish/net night in 2007 (Figure 26).

Walleye

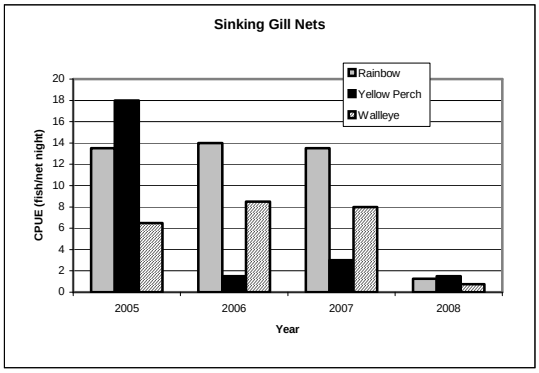
CPUE for walleye in all nets in 2007 was 4.75 fish/net night and decreased to 2.25 fish/net night in 2008 (Figure 24). The average CPUE for walleye in all nets is 8.49 fish/net night for 2003-2007. In 2007, CPUE in floating nets was 1.5 fish/net night and remained the same in 2008 (Figure 25). The CPUE of 0.75 fish/net night for the sinking nets was down significantly from 8 fish/net night in 2007 (Figure 26).



- Figure 24: Catch-per-unit-effort for rainbow, yellow perch, and walleye in all gill nets for 2005 - 2008



- Figure 25: Catch-per-unit-effort for rainbow, yellow perch, and walleye in floating gill nets for 2005 - 2008.



- Figure 26: Catch-per-unit-effort for rainbow, yellow perch, and walleye in sinking gill nets for 2005 - 2008.

Average Length

Rainbow trout

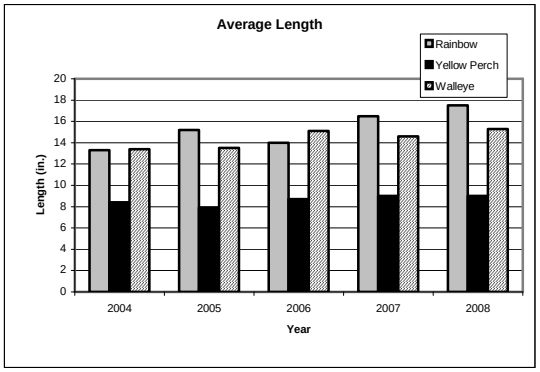
The average length of rainbow trout captured has continued to increase from 13.3 inches in 2004 to 17.5 in 2008(Figure 27). This is also higher than the average length of 15.3 inches for the previous 10 years. These increases are biased by the fact that no smaller rainbow trout were captured as in previous years. Captured rainbow trout ranged from 13.7-21.1 inches in total length.

Yellow Perch

The average length of yellow perch remained at 9.0 inches (Figure 27). This is higher than the average length of 8.37 inches for 1998-2006. Captured yellow perch ranged from 8.0-10.5 in. in total length.

Walleye

The average length of walleye in 2008 was 15.3 inches, which is slightly lower than the average length of 15.1 inches in 2006 (Figure 27). It is larger than the average length of 13.28 inches for the previous 10 years. Captured walleye ranged from 9.2-24.5 in. in total length.

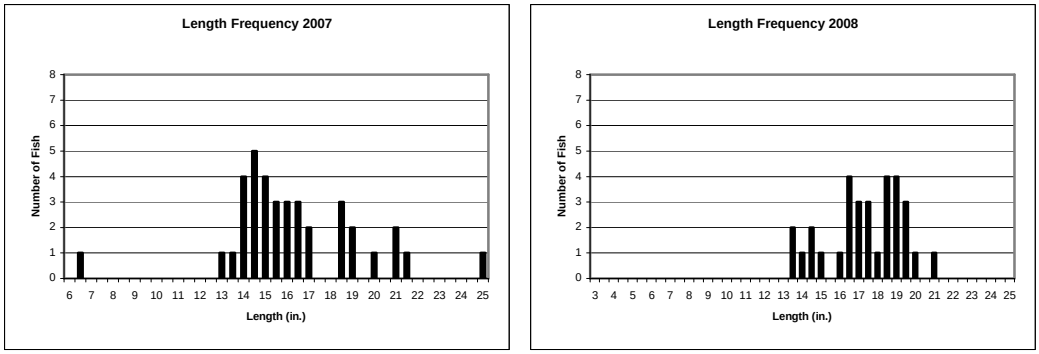


• Figure 27: Average length of rainbow, yellow perch, and walleye captured from 2004 - 2008.

Length Frequency

Rainbow Trout

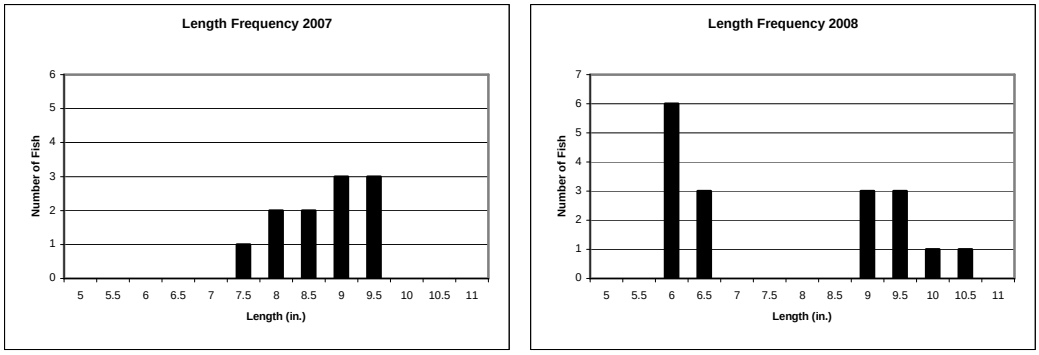
In 2008, the length-frequency distribution of rainbow trout in Dailey Lake was clearly weighted toward fish 13 inches and larger (Figure 28). The lack of fish less than 13 inches indicates a potential lack of survival and recruitment of smaller, younger fish. This may also be the result of sampling inefficiency on these smaller fish. Future monitoring should determine if there is a lack of recruitment.



• Figure 28: Length-frequency distribution for Dailey Lake rainbow trout in 2007 and 2008.

Yellow Perch

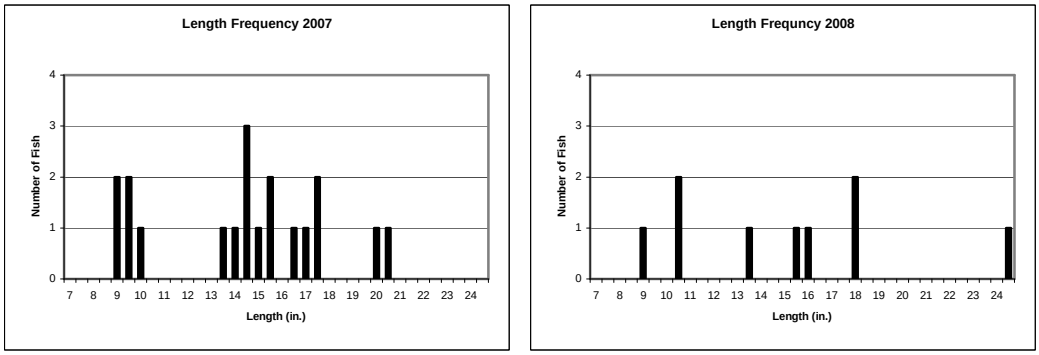
The length-frequency distribution for yellow perch in 2008 was made up of fish in the 6.0 to 6.5-inch range and 9.0 to 10.5-inch range. Smaller fish were present in the sample compared to 2007, but fish in the7.0 to 8.5-inch range are absent from the sample (Figure 29). Numbers of yellow perch remain low in the sample and there appears to be poor capture efficiency as well. It should be noted that there were angler reports of good number of fish around 12 inches in length taken through the ice in the winter of 2007-2008.



• Figure 29: Length-frequency distribution for Dailey Lake yellow perch in 2007 and 2008.

Walleye

The length-frequency distribution of walleye in 2008 shows an increased distribution and more missing length groups than 2007 (Figure 30). Abundance of fish captured in 2008 is down as well. It appears that there may be some recruitment or survival issues with walleye in the lake. Poor sampling efficiency may be affecting the results as well.



• Figure 30: Length-frequency distribution of Dailey Lake walleye in 2007 and 2008.

Fish Stocking

Dailey Lake has been stocked annually with rainbow trout and walleye in order to maintain a fishery for these species and meet goals of the Dailey Lake Management Plan (MFWP 1997). In 2008, Yellowstone cutthroat were stocked in place of 5,000 rainbow due to inability to continually secure the rainbow trout as a result of demand on other waters.

Dailey Lake was planted with approximately 20,000 rainbow trout and 5,000Yellowstone cutthroat trout in 2008. Official numbers, average lengths, and stocking dates for part of the rainbow plant were not available at the time of this report. This information will be presented in the 2009 annual report.

In 2008, approximately 10,000 walleye were planted in Dailey Lake. The fish were from the Miles City Fish Hatchery and were raised from eggs collected at Fort Peck Lake. Official numbers, average lengths, and stocking dates for the walleye plant were not available at the time of this report. This information will be presented in the 2009 annual report.

Walleye

- Table 5:Walleye stocking information from 2003-2008. * Approximate number of Walleye stocked. Official numbers, average length, and stocking date will be presented in the 2009 annual report.

Year	Date	Strain	Length (in.)	Number
2003	June 14	Fort Peck	1.1	5,000
	Aug. 20	Fort Peck	3.0	5,069
			Total	10,069
2004	June 24	Fort Peck	1.5	5,000
	Aug. 26	Fort Peck	2.4	5,000
			Total	10,000
2005	June 15	Fort Peck	1.3	5,000
	Sept. 8	Fort Peck	3.7	4,856
			Total	9,856
2006	June 21	Fort Peck	1.4	5,000
	Aug. 26	Fort Peck	3.6	5,000
			Total	10,000
2007	June 22	Fort Peck	1.5	5,000
	Oct. 3	Fort Peck	3.8	5,000
			Total	10,000
2008	N/A	Fort Peck	N/A	5,000*
	N/A	Fort Peck	N/A	5,000*
			Total	10,000*

Rainbow and Yellowstone Cutthroat

On April 29, Dailey Lake was stocked with 10,000 young-of-the-year rainbow trout from Giant Springs Trout Hatchery. The plant consisted of 10,000 Arlee strain rainbow trout that averaged 3.4 inches in length. Eagle Lake strain young-of-the-year rainbow from Bluewater Springs Trout Hatchery were planted as well. There were approximately 10,000 rainbow from this hatchery. Official numbers, average length, and stocking date were not available at the time of this report and will be presented in the 2009 report. On September 8, 5,000 Yellowstone cutthroat trout from the Yellowstone River Hatchery were planted. These fish had an average length of 4.4 inches (Table 6).

- Table 6: Trout stocking information from 2003-2008.

Year	Date	Strain	Length (in.)	Number
2003	May 7	W	6.3	5,227
	May 7	Arlee	3.8	10,000
	May 16	Eagle Lake	3.5	10,179
			Total	25,406
2004	Apr. 14	W	5.6	5,000
	Apr. 14	Arlee	3.5	10,000
	*	Eagle Lake	*	*
			Total	15,000
2005	May 10	Eagle Lake	3.5	10,000
	May 10	Arlee	5.0	10,850
	June 10	Eagle Lake	4.8	5,002
			Total	25,852
2006	May 09	Eagle Lake	3.0	10,028
	Apr. 12	Arlee	3.2	11,000
	Apr.12	W	7.4	5,861
			Total	26,889
2007	Apr. 25	Arlee	3.5	10,000
	Apr. 25	W	5.8	5,000
	May 22	Eagle Lake	3.9	9,660
			Total	24,660
2008	Apr. 29	Arlee	3.4	10,000
	Sept. 8	Yellowstone	4.4	5,000
	N/A	Eagle Lake	N/A	10,000*
			Total	25,000

Discussion

Spring conditions limited sampling of the Yellowstone River trout populations. The data that was collected showed no indications of dramatic change from past sampling efforts. Future sampling will determine the status of these populations.

The Shields River trout populations have over the long term remained stable. This is very encouraging in light of continued drought and dewatering of sections of the river.

Abundances for all species in Dailey Lake are down slightly compared to previous years. This may be the result of continued drought, poor recruitment, sampling efficiency, or a combination of the above. Continued monitoring will help determine if the drop in abundance is indicative of a downward trend or just a natural fluctuation.

Literature Cited

Chapman, D. G. 1951. Some properties of the hypergeometric distribution with applications to zoological censuses. University of California Publications in Statistics 1:131-160.

Fisheries Analysis+ Copyright © 2004 Montana Fish, Wildlife & Parks. Fisheries Information Services. 1400 S. 19th Ave., Bozeman, MT 59718.

MFWP 1997. Montana Warmwater Fisheries Management Plan: 11997-2006. Montana Fish, Wildlife & Parks. Fisheries Division. Helena, Montana

Opitz, S. 2005. Fisheries Investigations in the Yellowstone and Shields River Basins, Park County, Montana. Annual report for 2004. Progress report for Federal Aid Project F-113-R-4. Montana Fish, Wildlife & Parks, Bozeman, Montana.

Opitz, S. 2006. Fisheries Investigations in the Yellowstone and Shields River Basins, Park County, Montana. Annual report for 2005. Progress report for Federal Aid Project F-113-R-5. Montana Fish, Wildlife & Parks, Bozeman, Montana.

Opitz, S. 2007. Fisheries Investigations in the Yellowstone and Shields River Basins, Park County, Montana. Annual report for 2006. Progress report for Federal Aid Project F-113-R-6. Montana Fish, Wildlife & Parks, Bozeman, Montana.

Opitz, S. 2008. Fisheries Investigations in the Yellowstone and Shields River Basins, Park County, Montana. Annual report for 2007. Progress report for Federal Aid Project F-113-R-7. Montana Fish, Wildlife & Parks, Bozeman, Montana.