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

Annual Report for 2009

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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 continued to be in good shape. Declines in abundance of Yellowstone cutthroat trout in the Yellowstone River and walleye in Dailey Lake were noted.

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 2009 (July 1, 2008 to June 30, 2009), 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 three sections of the Yellowstone River based on spring sampling in 2009.

B. Monitoring of trout abundance in two sections of the Shields River based on spring sampling in 2009.

C. Summary of gillnet catches at Dailey Lake: spring 2009.

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 2009, 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 2009, trout were sampled in the Springdale, Mill Creek, and Corwin Springs Sections of the Yellowstone River (Table 1and Figure 1). All of these sections are long-term monitoring sections on the Yellowstone River.

Electrofishing of the Springdale and Corwin Springs sections was completed through the use of a raft and a drift boat mounted with boom electrofishing equipment. The raft was a 16-foot Maravia with a Coffelt 22-M VVP and a 5,000-watt Honda EV5000 generator. The drift boat had a Coffelt VVP-15 with a 5,000-watt Honda EV5000 generator. The anodes on both boats were steel droppers suspended from twin booms at the bow and steel droppers off the rear of the raft and a steel band around the bottom of the drift boat served as the cathode. Electrofishing of the Mill Creek Section was completed through the use of two jet boats mounted with boom electrofishing equipment. The boats were both 22-foot aluminum Wooldridge outboard jet boats. Both were equipped with a Coffelt VVP-15 and a 7,000-watt Honda EM7000is generator. The The anodes were stainless steel droppers suspended from twin booms at the bow and the hull 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 were identified to 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.

• Table 1: Survey Sections where trout abundance was sampled in the Yellowstone River in 2009.

Section Name	Survey Date	Length (ft)	Approximate Location		
Corwin Springs	04/22/09	29,040	Upper Boundary	North West	45.10827 110.78957
			Lower Boundary	North West	45.16649 110.85159
Springdale	04/7/09	32,736	Upper Boundary	North West	45.69688 110.30244
			Lower Boundary	North West	45.74432 110.23278
Mill Creek	5/7/09	24,816	Upper Boundary	North West	45.41981 110.64209
			Lower Boundary	North West	45.46176 110.62133

• Coordinates in decimal degrees are NAD83 datum.

Corwin Springs

We completed our marking runs in the Corwin Springs Section on April 22 and 23, 2009. One boat sampled the left bank and the other boat sampled the right bank on April 22. The boats then switched banks 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, 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 May 5 and 6, 2009. One boat sampled the left bank and the other boat sampled the right bank on May 5. The boats then switched banks on May 6.

Springdale

The Springdale Section was marked on April 7, 9, and 10, 2009. One boat sampled the left bank and the other boat sampled the right bank on April 7. The boats then alternated banks on April 9 and 10. 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, twelve inches and longer in total length, were tagged with a yellow, numbered floy tag to allow for large scale monitoring of movement.

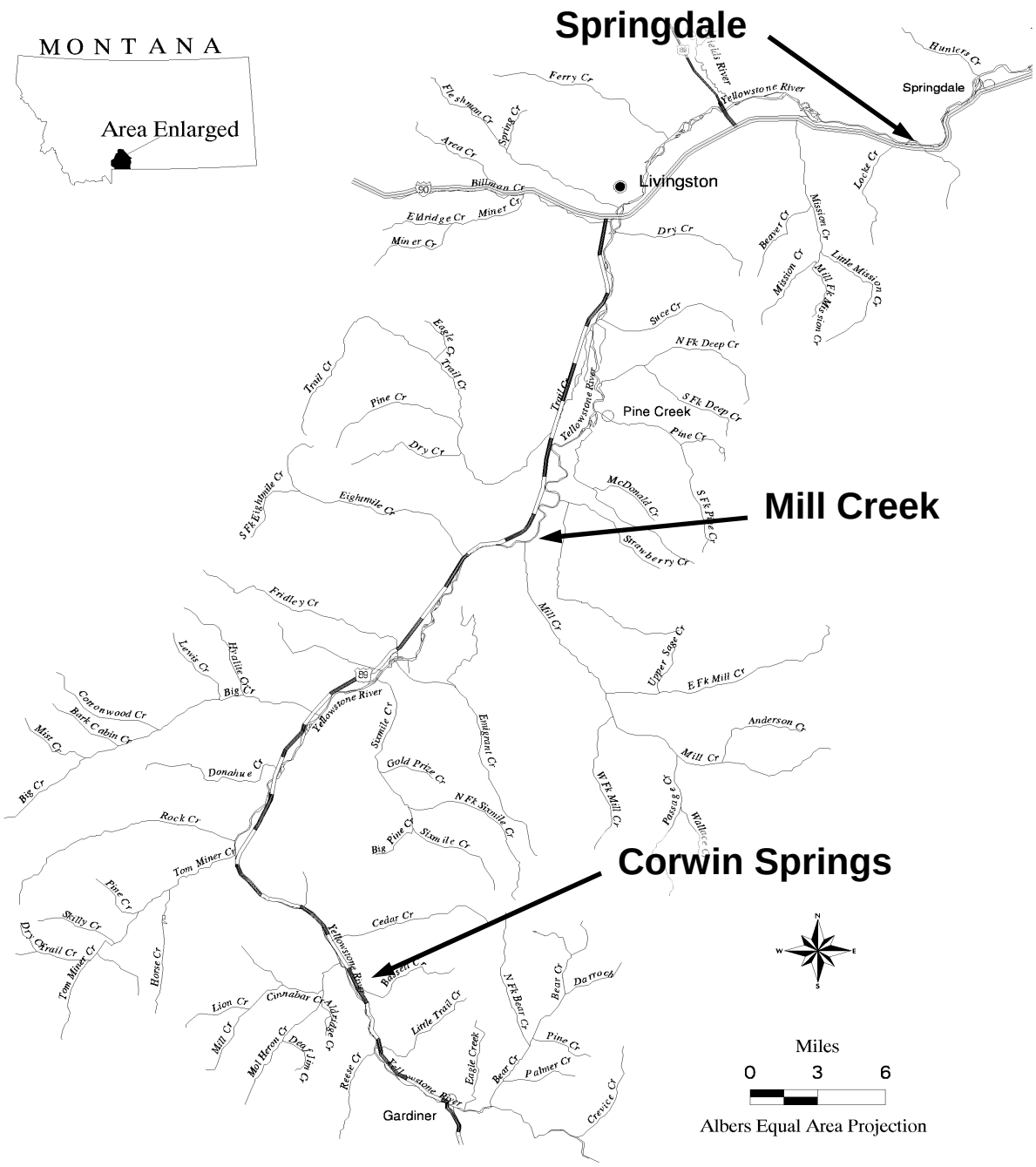
On April 16 and 17, 2009 the recapture runs were completed on this section. One boat sampled the left bank and the other boat sampled the right bank on April16. The boats then switched banks on April 17.

Mill Creek

The marking runs in the Mill Creek Section were completed on May 7 and 8, 2009. One boat sampled the left bank and the other boat sampled the right bank on May 7. The boats then switched banks on May 8. 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, 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 May13, 2009. One boat sampled the left bank and the other boat sampled the right bank.



- Figure 1: Map of the Upper Yellowstone River drainage displaying the location of the 2009 sampling sections.

Yellowstone River Results

Yellowstone River Trout Abundances

Abundance estimates were made for rainbow, brown, and Yellowstone cutthroat trout in all three sections with the exception of brown trout in the Mill Creek section and Yellowstone cutthroat in the Springdale section. This was due to limited recapture data. Abundance estimate data 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 Corwin Springs, Mill Creek, and Springdale Section for 2009. N represents the number of fish (≥7 inches) per mile for all estimates except Yellowstone cutthroat trout in the Mill Creek Section, which is (≥10 inches) per mile. No estimate was made for brown trout in the Mill Creek Section due to lack of sufficient data.

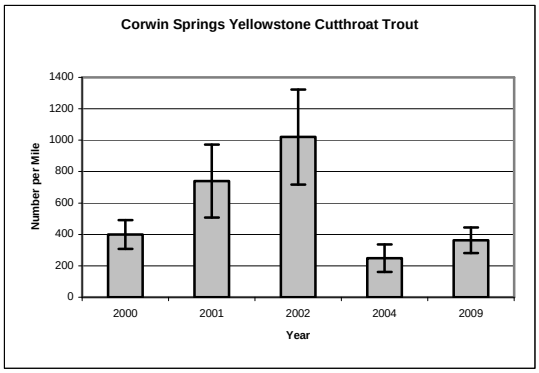
Section (mark date)			Overall model			Pooled model		
Fish Species	**N**	**SD**	**DF**	**Chi-square**	**P**	**DF**	**Chi-square**	**P**
Corwin Springs (4/22)								
Brown Trout	318	48.6	3	2.67	0.44	1	0.67	0.41
Rainbow Trout	681	36.2	6	9.21	0.16	6	9.21	0.16
Yellowstone Cutthroat Trout	363	40.6	4	3.34	0.50	2	2.11	0.35
Mill Creek (5/7)								
Rainbow Trout	463	18.3	7	6.63	0.47	6	6.40	0.38
Yellowstone Cutthroat Trout	20	1.7	5	2.21	0.82	4	1.44	0.84
Springdale (4/7)								
Brown Trout	231	13.9	12	11.35	0.499	11	10.12	0.519
Rainbow Trout	515	33.9	7	9.711	0.206	6	9.710	0.137

Yellowstone Cutthroat Trout

Corwin Springs Section

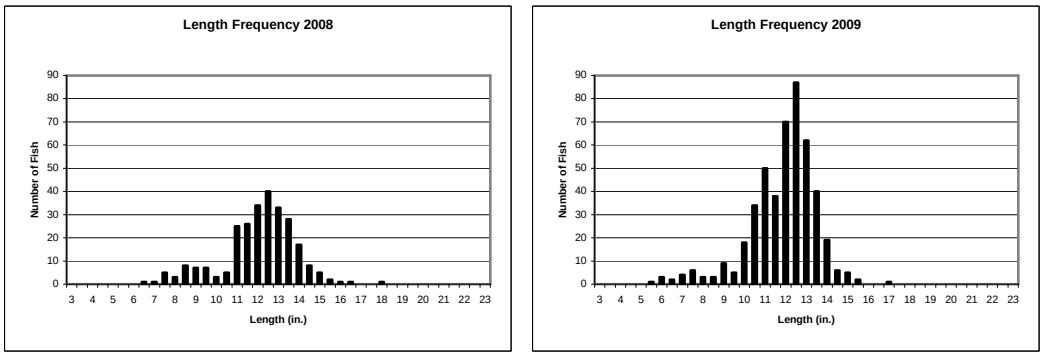
In 2009, the abundance estimate for Yellowstone cutthroat trout in the Corwin Springs Section was 363 fish/mile (≥ 7 in.). This is up from 248 fish/mile (≥ 7 in.) in 2004, the last time an abundance estimate was produced for Yellowstone cutthroat in this section (Figure 2). It

should be noted that the 2009 estimate is biased as a result of limited recapture of marked fish in the 7.0 – 9.99 inch range.



- Figure 2: Abundance estimates for Yellowstone cutthroat trout (≥ 7 in.) in the Corwin Springs Section from 2000-2009. Error bars represent +/- 2 SD. No abundance estimates were made in 2006 and 2008. The section was not sampled in 2003, 2005, and 2007.

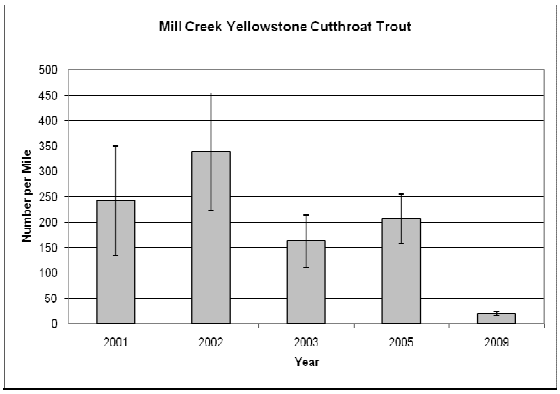
The length-frequency histograms show that abundance of fish in almost all length groups have increased. This is likely due to increased sampling effort in 2009 as compared to 2008. Fish in the 8.5, 9.5, 14.5, 16.0, 16.5, and 18.0 length groups saw slight decreases in abundance. The length-frequency distributions for 2008 and 2009 indicate that the population is weighted toward larger, older fish (Figure 3). This may be a result of limited reproduction and recruitment in this population or limited habitat for smaller, younger fish.



- Figure 3: Length-frequency distributions for captured Yellowstone cutthroat trout in the Corwin Springs Section for 2008 and 2009.

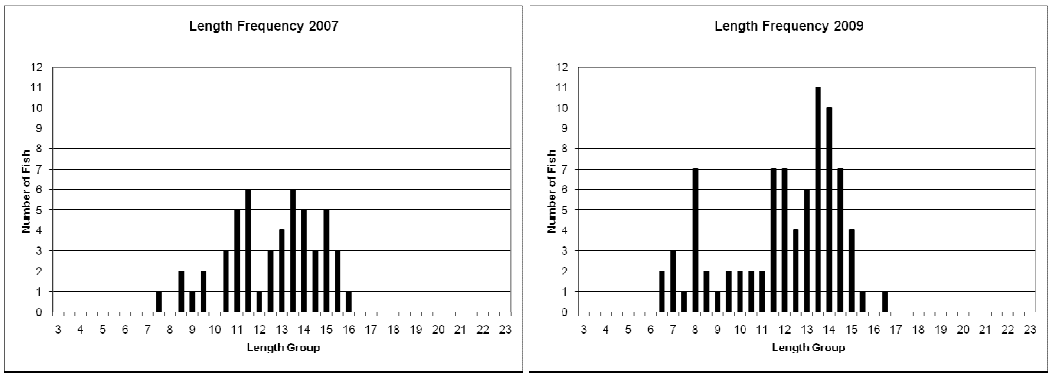
Mill Creek Section

The abundance estimate for Yellowstone cutthroat trout in this section in 2009 was 20 fish/mile (≥ 10 in.) (Figure 4). It should be noted that the 2009 estimate only includes fish that were 10 inches and greater in length and previous estimates include fish were 7 inches and greater in length. The different length groups used to produce the estimates account for some of the decrease seen in abundance from previous years. Future sampling will determine if the decrease in abundance is truly reflective of the population or an issue with poor sampling efficiency caused by a factor other than a small population.



- Figure 4: Abundance estimates for Yellowstone cutthroat trout (≥ 7 in.) in the Mill Creek Section from 2001-2009. The 2009 estimate only represents fish 10 in. and larger. Error bars represent +/- 2 SD. No abundance estimates were made in 2007. The section was not sampled in 2004, 2006, and 2008.

The length-frequency histograms show that most length groups increased in abundance of fish from 2007 to 2009. Those that did not increase either remained stable or decreased slightly (Figure 6). These histograms should be used with caution. In 2007, the sampling effort was limited to marking runs only because of early runoff that did not allow for recapture efforts on this section. As a result the length frequency histogram may not be truly representative of the population at that time.

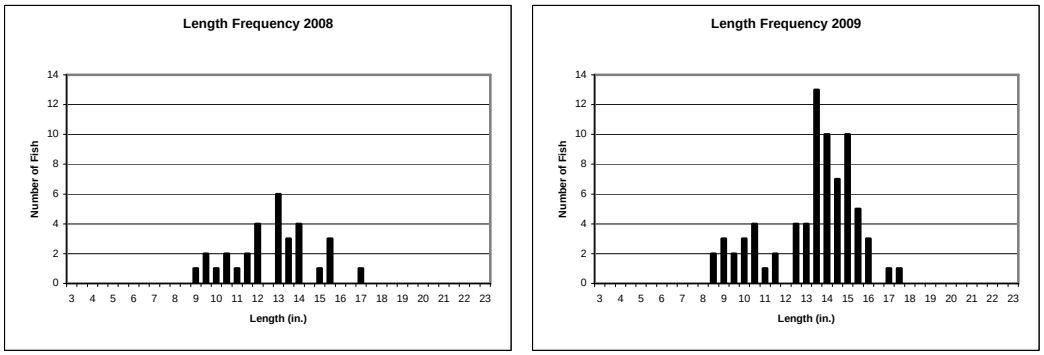


- Figure 5: Length-frequency distribution for captured Yellowstone cutthroat trout in the Mill Creek Section for 2007 and 2009.

Springdale Section

Seventy-five Yellowstone cutthroat trout were captured in this section in 2009. This is up from the 31 captured in 2008 and the 43 captured in 2006. This section was not sampled in 2007. The cutthroat captured in 2009 ranged from 9.3-17.2 inches in total length. The length-frequency histograms show an increase in abundance of fish in all length groups with the exception of fish in the 11.0 –13.5 inch groups. There continues to be a lack of fish less 8.5 inches in length (Figure 6). There appears to be an increase in abundance and recruitment of Yellowstone cutthroat in this section of the river, but they are still low enough that I am not able to produce a population estimate. These continued low numbers 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 recent increase that has been detected could be the result of improved and increased river habitat caused by the recent reworking of the many braided and high water channels of the river in this section as well as better water levels that have allowed a number of these channels to remain active throughout the entire water year. Continued monitoring will be required to

determine if the habitat and flows continue to improve and the abundance of Yellowstone cutthroat continues to increase in this section.

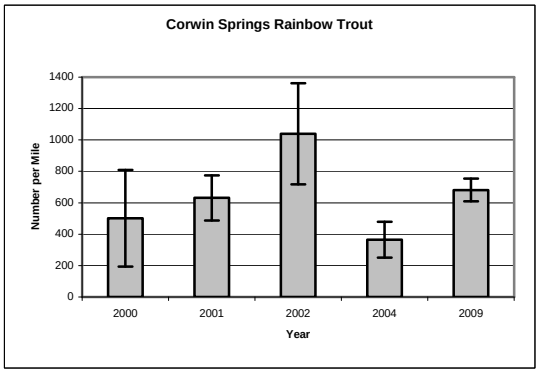


- Figure 6: Length-frequency distribution for captured Yellowstone cutthroat trout in the Springdale Section for 2008 and 2009.

Rainbow Trout

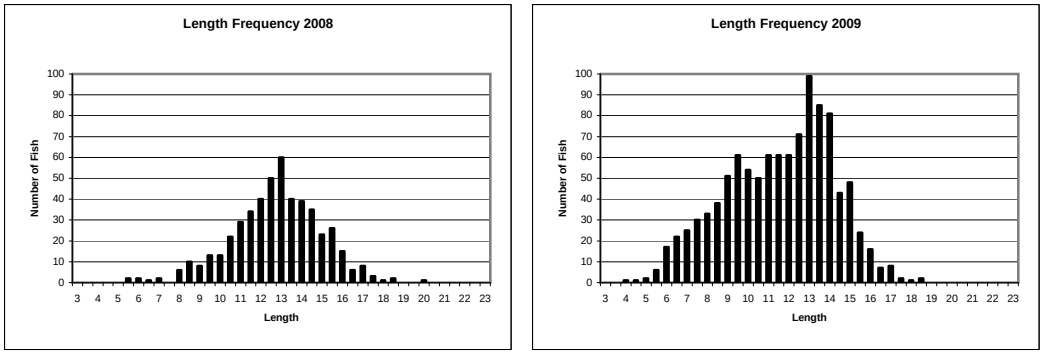
Corwin Springs Section

In 2009, the abundance estimate for rainbow trout in the Corwin Springs Section was 681 fish/mile (≥ 7 in.). This is up from 365 fish/mile (≥ 7 in.) in 2004, the last time an abundance estimate was done for rainbow trout in this section (Figure 7). No abundance estimates were produced in 2006 and 2008 because of limited data. This section was not sampled in 2003, 2005, or 2007.



- Figure 7: Abundance estimates for rainbow trout (≥ 7 in.) in the Corwin Springs Section from 2000-2009. Error bars represent +/- 2 SD. No abundance estimates were made in 2006 and 2008. The section was not sampled in 2003, 2005, and 2007.

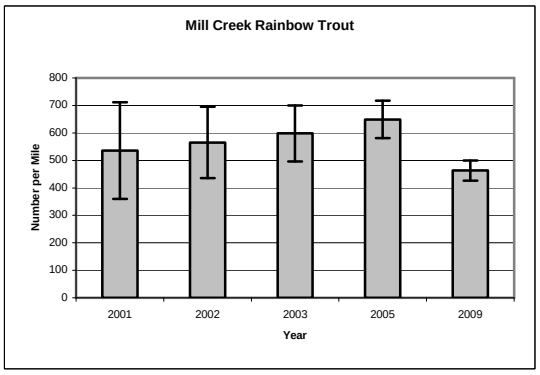
The length-frequency histograms show a large increase in abundance of fish for all length groups, especially in the 5.0-11.0 length groups (Figure 8). These increases may be the result of rainbow movement as part of spring spawning, an increase in recruitment and survival in this population, the increase in sampling effort in 2009 as compared to 2008, or a combination of these factors.



- Figure 8: Length-frequency distributions for captured rainbow trout in the Corwin Springs Section for 2008 and 2009.

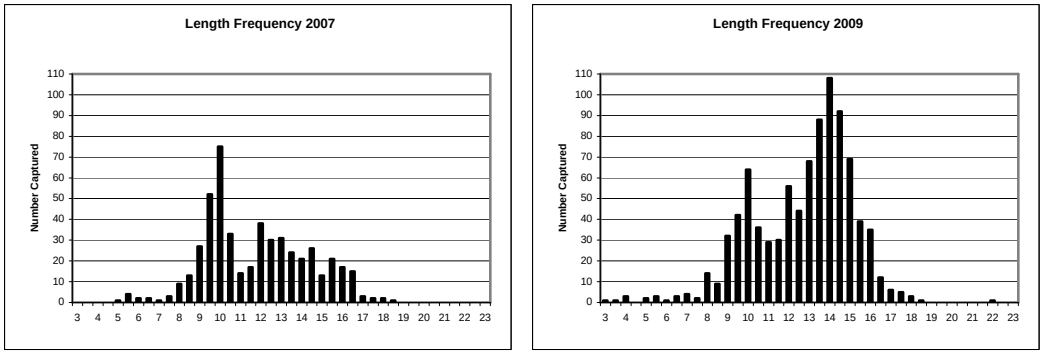
Mill Creek Section

In 2009, the abundance estimate for rainbow trout was 463 fish/mile (≥ 7 in.) in this section. This is down from estimates of over 500 fish/mile (≥ 7 in.) in 2001 through 2003 and a high of 649 fish/mile (≥ 7 in.) in 2006 (Figure 9). This section was not sampled in 2004, 2006, or 2008. There was not an abundance estimate produced in 2007 due to lack of a recapture run that year. The trend for rainbow trout in this section appears to be stable.



- Figure 9: Abundance estimates for rainbow trout (≥ 7 in.) in the Mill Creek Section from 2001-2009. Error bars represent +/- 2 SD. No abundance estimate was made in 2007. The section was not sampled in 2004, 2006, or 2008.

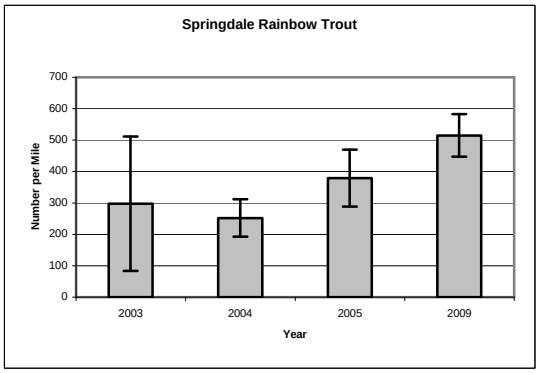
The length-frequency histograms for this section show a similar distribution for both years with the exception of the increase in abundance of fish in the 12.0-16.0 inch range in 2009 (Figure 10). The increase in abundance is likely the result of higher sampling effort in 2009 as compared to 2007, but may be the result of increased recruitment.



- Figure 10: Length-frequency distributions for captured rainbow trout in the Mill Creek Section in 2007 and 2009.

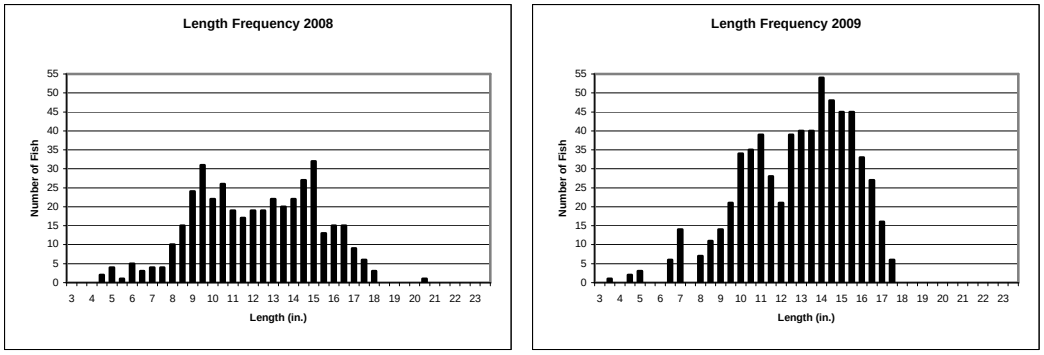
Springdale Section

In this section, the abundance estimate for rainbow trout was 515 fish/mile (≥ 7 in.) in 2009. This is up from 298, 252, and 379 fish/mile (≥ 7 in.) in 2003, 2004, and 2005, respectively (Figure 11). There were not enough fish recaptured in 2006 and 2008 to produce an abundance estimate and the section was not sampled in 2007.



- Figure 11: Abundance estimates for rainbow trout (≥ 7 in.) in the Springdale Section from 2003-2009. Error bars represent +/- 2 SD. No abundance estimates were made in 2006 and 2008. The section was not sampled in 2007.

The length-frequency histograms for this section show a similar distribution for both years with an increase in abundance from 2008 to 2009 (Figure 12). The increase in abundance is likely the result of increased sampling efficiency created by the use of two boats simultaneously to sample the section in 2009.

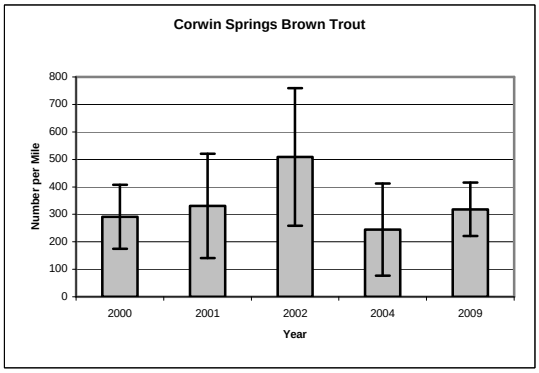


- Figure 12: Length-frequency distributions for captured rainbow trout in the Springdale Section in 2008 and 2009.

Brown Trout

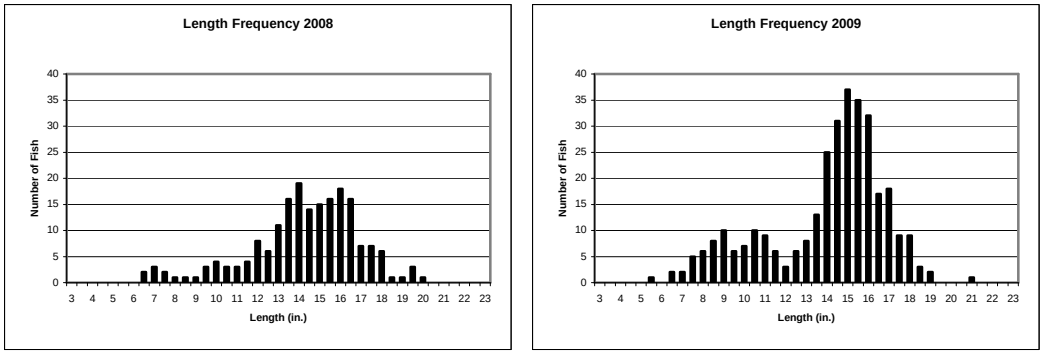
Corwin Springs Section

In 2009, the abundance estimate for brown trout in the Corwin Springs Section was 318 fish/mile (≥ 7 in.). This still below the high of 509 fish/mile (≥ 7 in.) in 2002, but is up from in 245 fish/mile (≥ 7 in.) in 2004 (Figure 13). It should be noted that the 2009 abundance estimate is biased by limited numbers of recaptured fish from 7.0 to 13.99 inches in total length. No abundance estimates were made in 2006 and 2008 because of limited data. The section was not sampled in 2003, 2005, or 2007.



- Figure 13: Abundance estimates for brown trout (≥ 7 in.) in the Corwin Springs Section from 2000-2009. Error bars represent +/- 2 SD. No abundance estimates were made in 2006 and 2008. The section was not sampled in 2003, 2005, and 2007.

The length-frequency histograms for brown trout show an increase in abundance of fish from 7.5-11.5 and 14.0-19.0 inches in length and a decrease in fish from 12.0-13.5 inches in length in 2009 (Figure 14). The increases are likely a result of increased sampling effort in 2009 as compared to 2008.

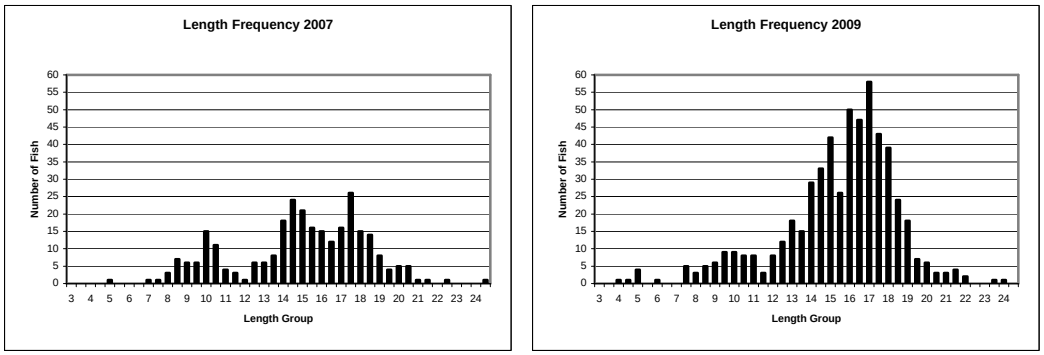


- Figure 14: Length-frequency distributions for captured brown trout in the Corwin Springs Section for 2008 and 2009.

Mill Creek Section

In 2009, an abundance estimate for brown trout in the Mill Creek Section was not produced because of a lack of adequate recapture data. This appears to be a function of fish movement into or out of the sampling section.

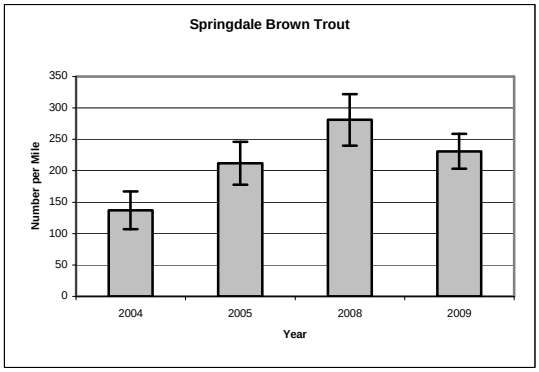
A total of 522 brown trout were collected in 2009. They ranged from 4.1-24.2 inches in total length. This is much higher than the 282 brown trout were collected in 2008. Those trout ranged from 5.0-24.8 inches in total length. The length-frequency histograms show an increase in abundance in fish from 12.0-19.0 inches in length (Figure 15). This may be the result of increased sampling effort in 2009 as compared to 2007, increased recruitment, or a combination of both.



- Figure 15: Length-frequency distribution for captured brown trout in the Mill Creek Section for 2007 and 2009.

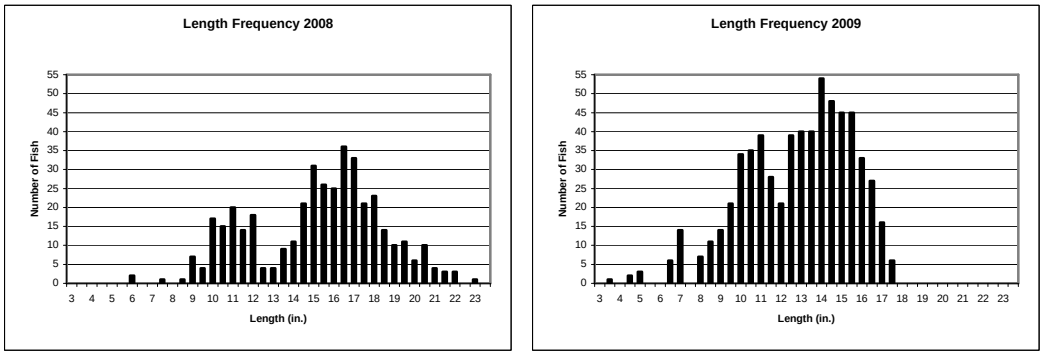
Springdale Section

In 2009, the abundance estimate for brown trout in the Springdale Section was 231 fish/mile (≥ 7 in.). This is down slightly from 281 fish/mile (≥ 7 in.) in 2008, but remains higher than the estimates for 2004 and 2005 (Figure 16). This section was not sampled in 2006 and no abundance estimate for brown trout was completed in 2007.



- Figure 16: Abundance estimates for brown trout (≥ 7 in.) in the Springdale Section from 2004-2009. Error bars represent +/- 2 SD. No abundance estimate was made in 2006 and the section was not sampled in 2007.

In 2009, a total of 629 brown trout were collected. They ranged from 7.3-24.4 inches in total length. This is much higher than the 405 brown trout were collected in 2008. Those trout ranged from 6.0-23.2 inches in total length. The length-frequency histograms show an increase in abundance and a shift toward fish larger than 10.0 inches in length (Figure 17). This may be the result of increased recruitment and survival or increased sampling efficiency due to the use of two boats simultaneously for sampling this section in 2009.



- Figure 17: Length-frequency distribution for captured brown trout in the Springdale Section for 2008 and 2009.

Eastern Brook Trout

Corwin Springs Section

Two Eastern brook trout with total lengths of 9.0 and13.1 inches were captured in 2008. In 2009, five Eastern brook trout were captured in this section. They ranged in total length from 7.6 to 11.0 inches. It is apparent that Eastern brook trout are rare, in this section, in the spring and may be increasing slightly.

Mill Creek Section

In 2007, one Eastern brook trout with a total length of 9.5 was captured in this section. In 2009, two Eastern brook trout were captured in this section that were 11.9 and 14.1 inches in total length. Eastern brook trout continue to be rare, in the spring, in this section.

Shields River Procedures

In spring 2009, we surveyed the Convict Grade and Zimmerman Sections of the Shields River (Table 3 and Figure 18).

A fiberglass drift boat mounted with mobile electrofishing gear was used to sample the Convict Grade Section 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.

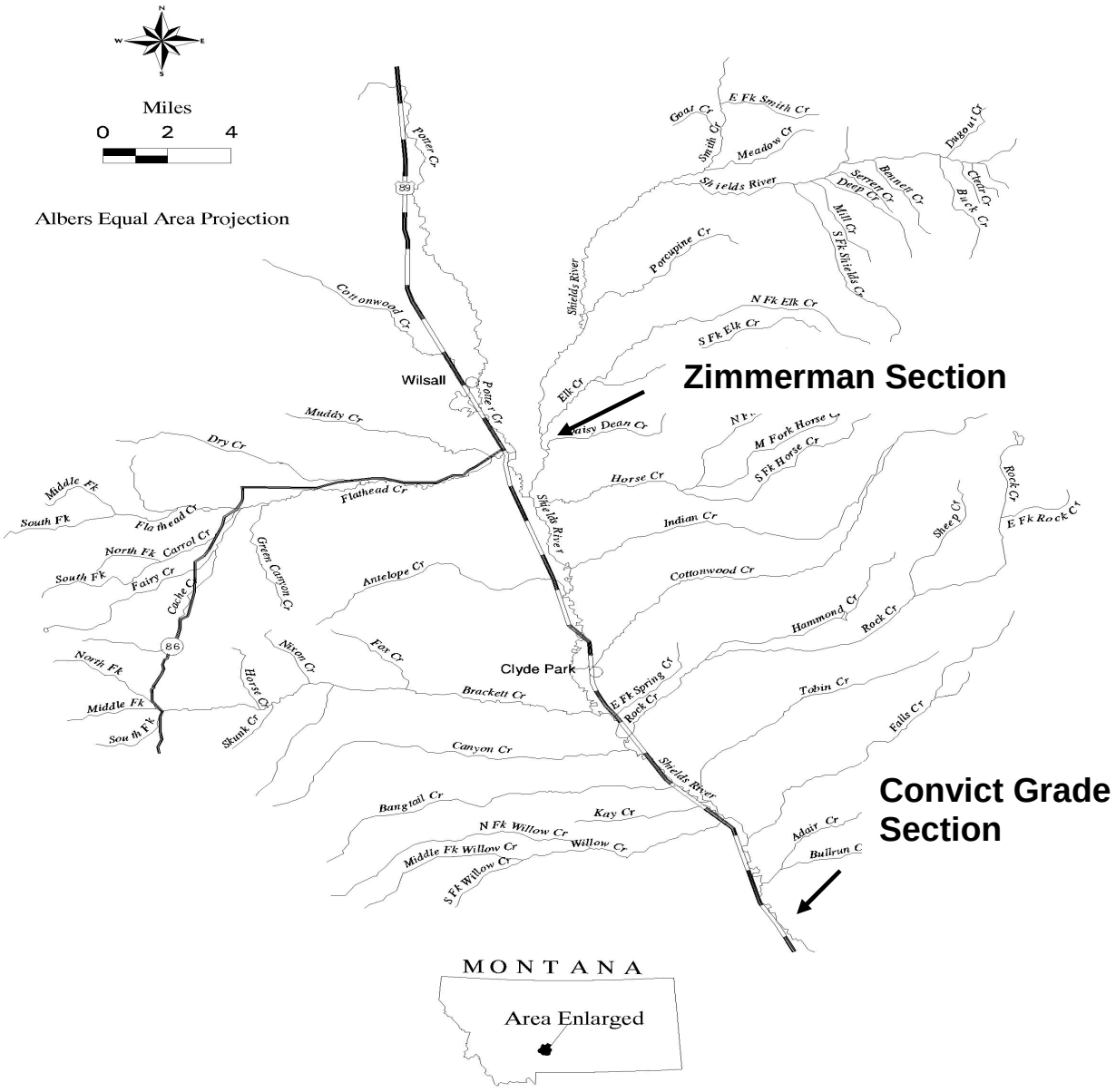
We used a Coleman Crawdad boat mounted with mobile electrofishing gear to sample the Zimmerman Section. The gear included a 3,500-watt Honda EG3500X generator and a Coffelt VVP-15. The cathode consisted of two braided steel cables that were hung over each side of the boat and the anode was a single hand-held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

In all cases, fish were collected in live cars, identified to species, 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 the Convict Grade section occurred 9 days after the marking effort. In the Zimmerman Section the sampling was done 6 days after the marking effort.

I produced trout and whitefish abundance estimates in the Convict Grade and Zimmerman Sections using FA+, a computer program developed by FWP for processing electrofishing data (MFWP, 2004). The partial log-likelihood model was used for all 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 estimated in the Shields River in 2009.

Section Name	Survey Date	Length (ft)	Approximate Location		
Convict	03/16/09	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



• Figure 18: Map of the Shields River drainage displaying the location of the 2007 sampling locations

Convict Grade

On March 16 and 17, 2009, 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 26, 2009 and marked all captured trout with an anal fin clip.

Zimmerman

The Zimmerman Section was marked on April 1, 2009. 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, 2009. Captured trout and whitefish were marked with an anal fin 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. I used the partial log-likelihood model for all of the estimates (Table 4). 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. Results, by species and section, are presented below.

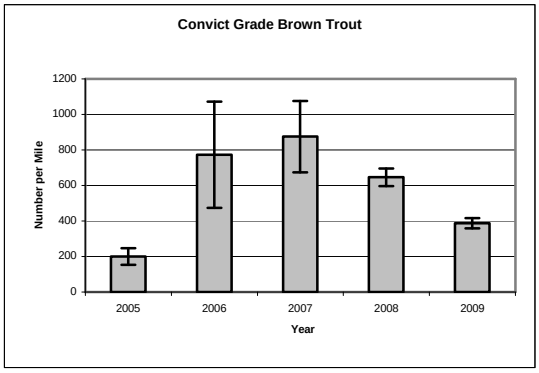
- Table 4: Population abundance model results for the Shields River by section and species for 2009. N represents the number of trout (≥7 inches) per mile for Convict Grade and per 1,000 ft. for Zimmerman and number of whitefish (≥10 inches) per 1,000 ft. for Zimmerman. * indicates that the Modified 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 (3/16)								
Brown Trout	388	14.5	9	12.36	0.194	7	10.32	0.171
Rainbow Trout	430	47.1	5	5.71	0.335	3	4.74	0.191
Zimmerman(4/1)								
Brown Trout	104	9.1	8	5.84	0.665	6	1.95	0.924
Mountain Whitefish	48	2.6	3	2.83	0.419	3	2.83	0.419

Brown Trout

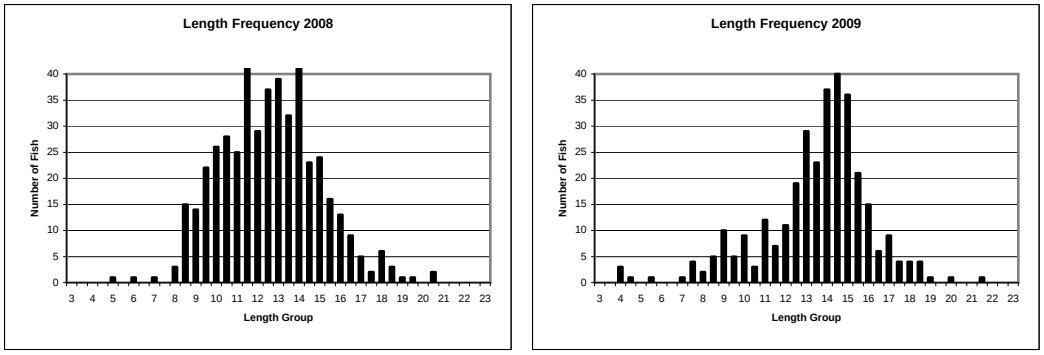
Convict Grade Section

In 2009, the abundance estimate for brown trout in the Convict Grade Section was 388 fish/mile (≥ 7 in.) (Figure 19). This is a decrease from 646 fish/mile (≥ 7 in.) in 2008 and 875 fish/mile (≥ 7 in.) in 2007. The 2009 abundance still remains about twice as high as those for 2003-2005.



- Figure 19: Abundance estimates for brown trout (≥ 7 in.) in the Convict Grade section from 2005-2009. Error bars represent +/- 1 SD.

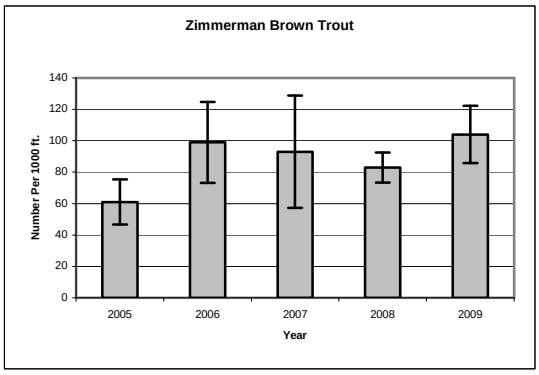
The length-frequency distribution for brown trout in the Convict Grade Section shows a large drop in abundance of fish in the 8.0-14.0 inch range from 2008 to 2009. There was an increase in the abundance of most fish in the 14.5-18.5 inch range from 2008 to 2009 (Figure 20). This may be an indication of poor recruitment among the smaller and younger fish in the population along with the decrease in the overall population estimate as indicated above.



- Figure 20: Length-frequency distributions for all brown trout sampled in the Convict Grade Section in 2008 and 2009.

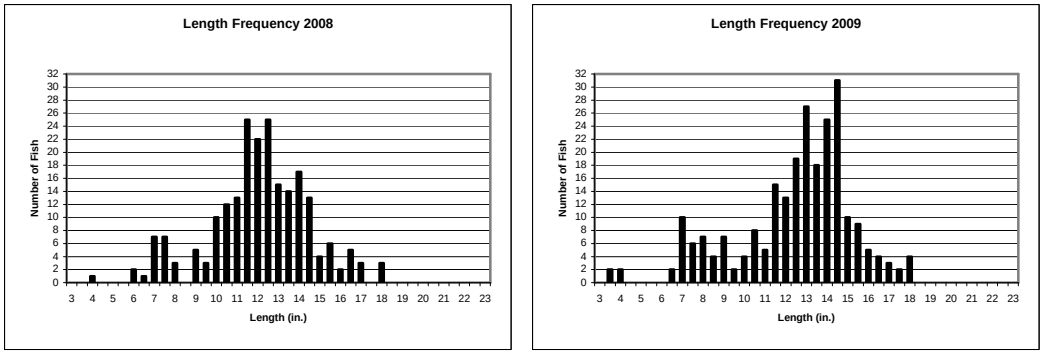
Zimmerman Section

The abundance estimate for brown trout in the Zimmerman Section was the highest it has been since 2005 at 104 fish/1,000 feet (≥7 in.) (Figure 21). Estimates were 83, 93, and 99 fish/1,000 feet (≥7 in.) in 2008, 2007, and 2006, respectively. 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.).



- Figure 21: Abundance estimates for brown trout (≥ 7 in.) in the Zimmerman Section from 2005 - 2009. Error bars represent +/- 1 SD.

The length-frequency distribution for brown trout in the Zimmerman Section shows increases in abundance of fish in the 6.5-9.0 and 13.0 –18.0 inch ranges from 2008 to 2009. Decreases were seen in the 9.5 –12.5 inch range (Figure 22). The increases indicate good recruitment of larger, older fish and smaller younger fish. The decrease that was seen appears to be related to the low number of fish seen in the 6.0 –9.5 inch range in 2008 recruiting into the 9.5 –12.5 inch range in 2009.



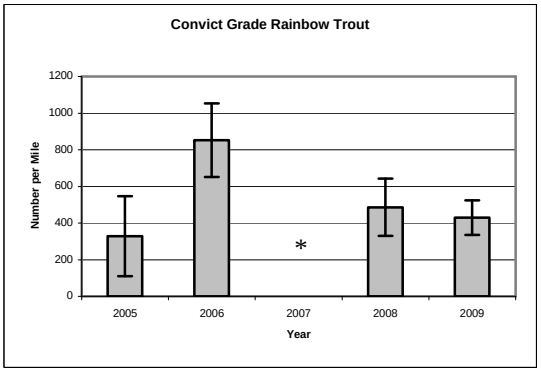
- Figure 22: Length-frequency distributions for all brown trout sampled in the Zimmerman Section in 2008 and 2009.

Rainbow Trout

Convict Grade

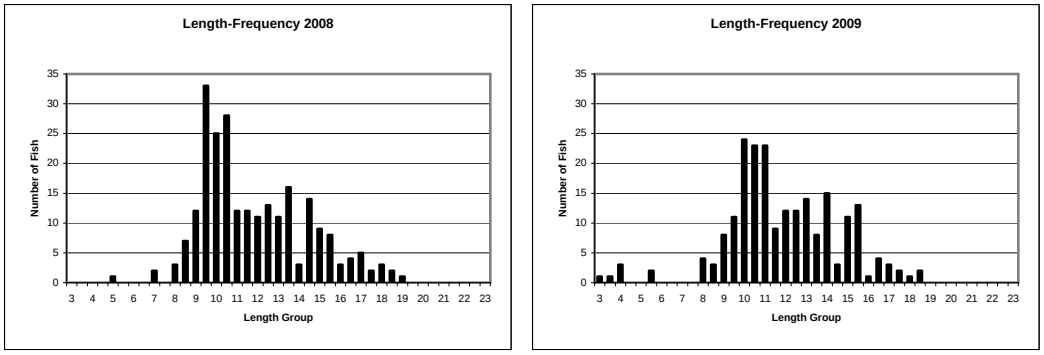
The abundance estimate for rainbow trout in was 430 fish/mile (≥ 7in.), down slightly from was 486 fish/mile (≥ 7in.) in 2008. This is slightly more than half of the 2006 estimate of 852 fish/mile (≥ 7in.) in and remains higher than the 2005 estimate of 328 fish/mile (≥ 7in.) (Figure 23).

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 23: Abundance estimates for rainbow trout (≥ 7in.) in the Convict Grade section from 2005-2009. Error bars represent +/- 1 SD. * There was not enough data to produce an estimate for 2007.

There was little or no change in the abundance of fish in each length group of rainbow trout from 2008 to 2009 with the exception of large decreases in the 9.5, 13.5, and 14.5 inch groups and large increases in the 11.0 and 14.0 inch groups (Figure 24). The changes that were seen may simply be the result of sampling efficiency in relation to spawning movements of rainbow trout in this section.

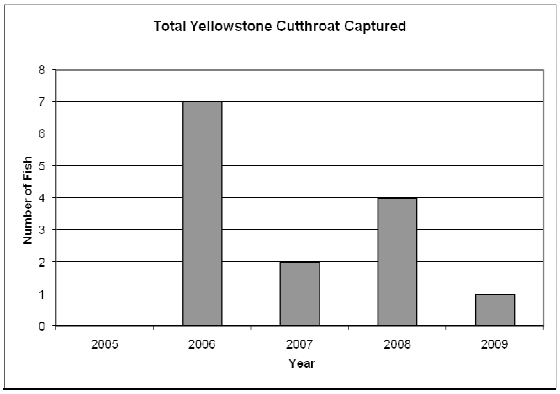


- Figure 24: Length-frequency distributions for rainbow trout sampled in Convict Grade in 2008 and 2009.

Yellowstone Cutthroat Trout

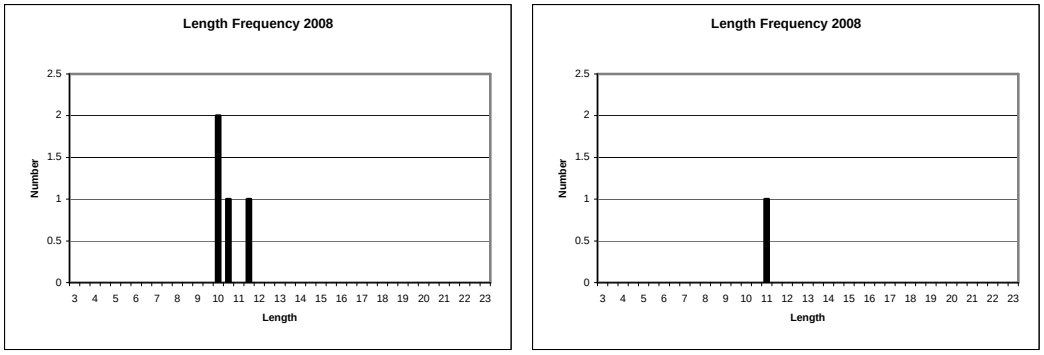
Convict Grade

In 2009, only one Yellowstone cutthroat trout was captured in the Convict Grade Section. This the lowest value since 2006 (Figure 25). No fish were captured in 2005.



- Figure 25: Number of Yellowstone cutthroat trout captured in the Convict Grade Section for 2005-2009. No Yellowstone cutthroat were captured in 2005.

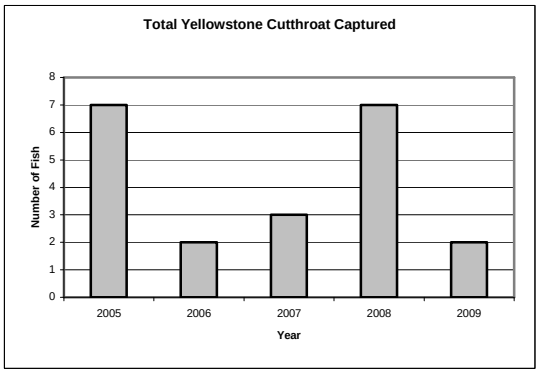
The 2008 and 2009 length frequencies are presented below. The fish captured in 2009 was 11.3 inches in total length. Four Yellowstone cutthroat trout were captured in 2008. They were ranged from 10.1 to 11.6 inches in total length (Figure 26).



- Figure 26: Length-frequency distributions for Yellowstone cutthroat trout sampled in the Convict Grade Section in 2008 and 2009.

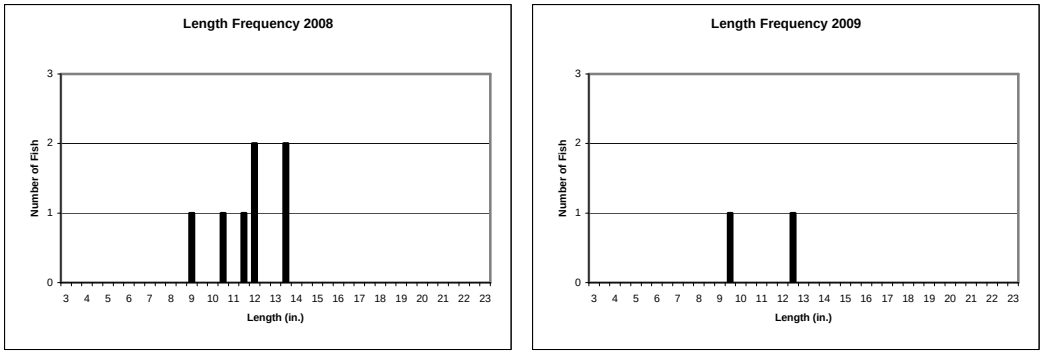
Zimmerman Section

In 2009, only two Yellowstone cutthroat trout were captured in the Zimmerman Section. This is down from seven in 2008 and three in 2007 (Figure 27). 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 27: Number of Yellowstone cutthroat trout captured in the Zimmerman Section for 2005-2009.

The length-frequency distributions for Yellowstone cutthroat in this section are presented below (Figure 28). Fish from 9.5-13.5 inches were collection in 2008 and fish from 9.5-12.5 inches were collected in 2009.

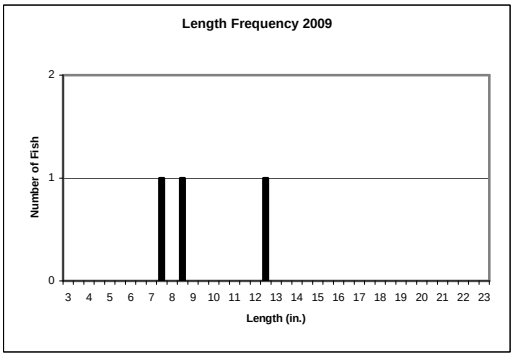


- Figure 28: Length-frequency distributions for Yellowstone cutthroat trout sampled in the Zimmerman Section in 2008 and 2009.

Eastern Brook Trout

Zimmerman Section

In 2009, three eastern brook trout were captured in the Zimmerman Section. These fish ranged in length from 7.7-12.7 inches (Figure 29). This is the only monitoring section on the Shields that eastern brook trout were captured in for 2009.

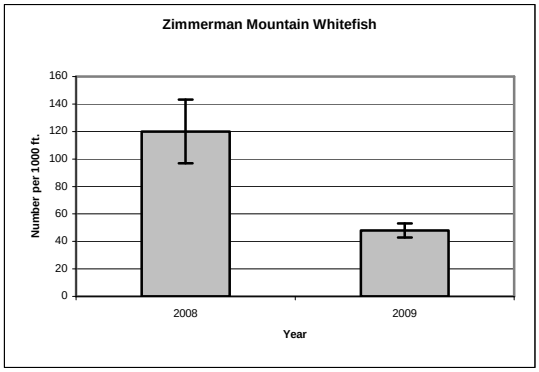


- Figure 29: Length-frequency distribution for all eastern brook trout sampled in the Zimmerman Section in 2009.

Mountain Whitefish

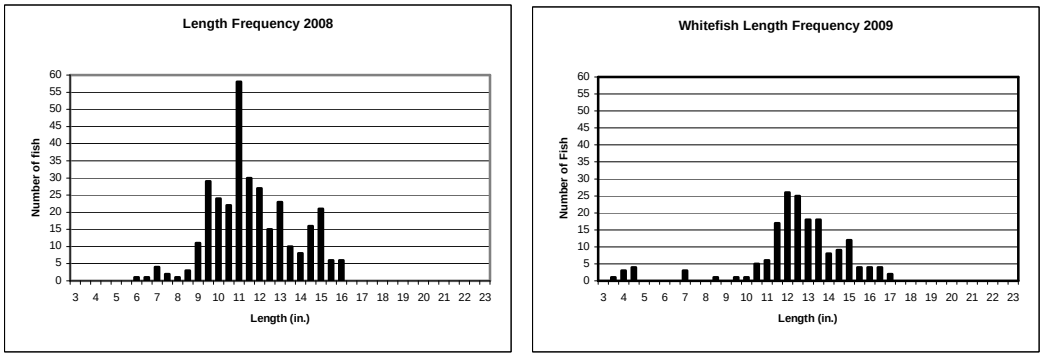
Zimmerman Section

The abundance estimate for mountain whitefish in 2008 was 486 fish/1000 ft. (≥ 10in.). In 2009, the estimate dropped to 48-fish/1000 ft. (≥ 10in.) (Figure 30). During both years fish less than 10 inches were 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. More data needs to be collected to determine what the trend for mountain whitefish in this section is.



- Figure 30: Abundance estimates for mountain whitefish (≥ 10 in.) in the Zimmerman Section for 2008 and 2009.

The length frequency distribution is presented below (Figure 31). The distribution shows a decrease in abundance in almost all length groups. This could be the result of poor recruitment, sampling efficiency, or seasonal fish movements.



- Figure 31: Length-frequency distribution for mountain whitefish sampled in the Zimmerman Section in 2008 and 2009.

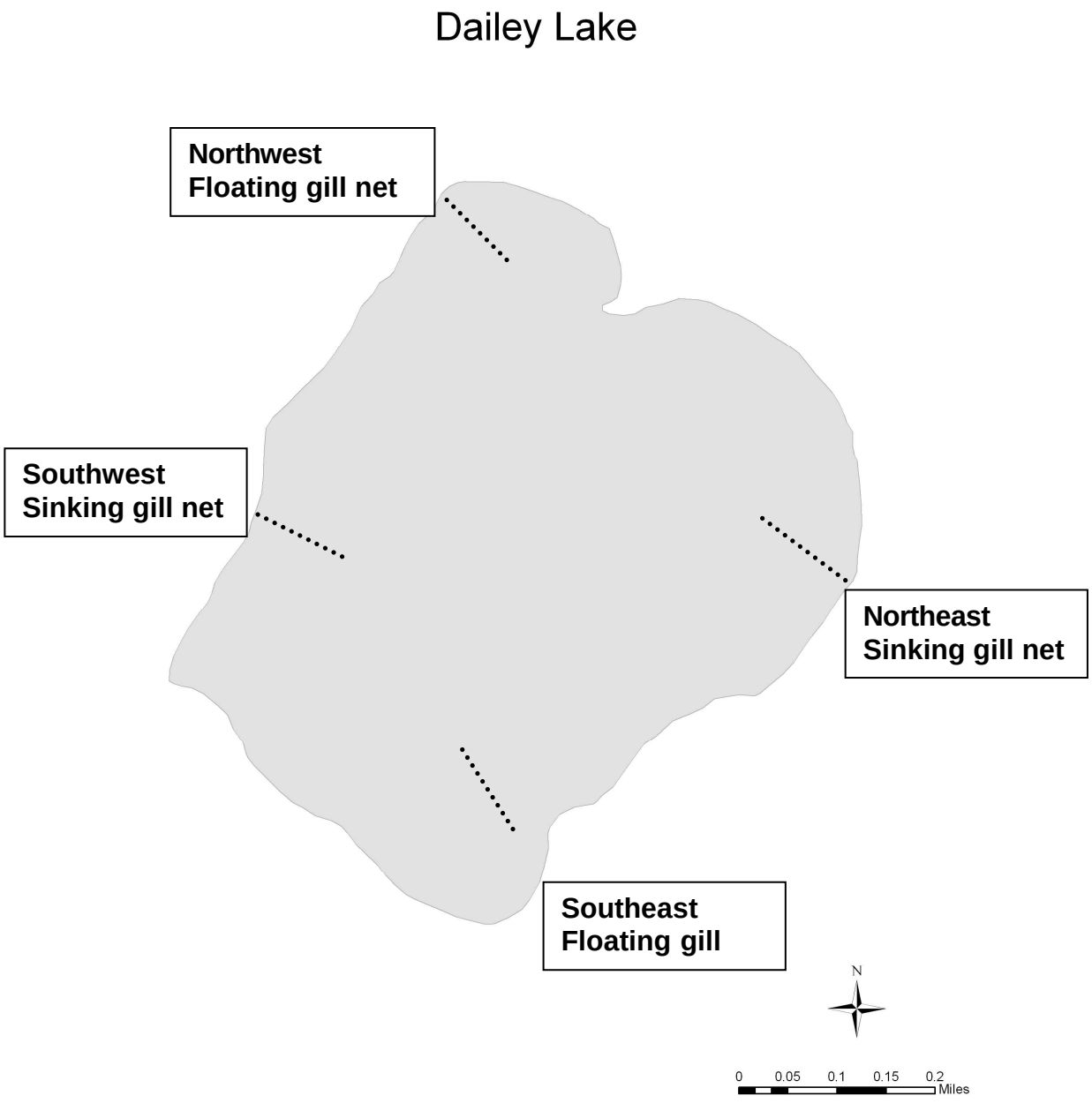
Dailey Lake Procedures

Gillnetting

Gillnet sampling in 2009 was similar to previous years in regard to timing and location of nets in the lake (**Error! Reference source not found.**).

We set the gill nets the evening of May 18, 2009. 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 19, 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 32: Map of Dailey Lake showing locations of floating and sinking gill nets in spring 2009.

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

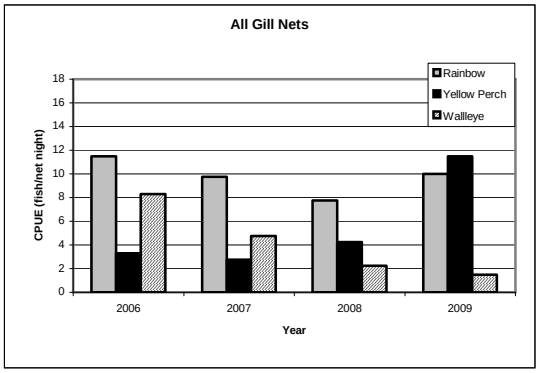
Catch-per-unit effort (CPUE) for rainbow trout in all nets was 10.0 fish/net night in 2009. This is up from 7.75 fish/net night in 2008 and 9.75 fish/net night in 2007 (Figure 33). The average CPUE for rainbow trout in all nets was 9.75 fish/net night for 2004-2008. The CPUE of 9.5 was an increase from 6.0 fish/net night for rainbow in floating nets in 2007 and 2008 (Figure 34). CPUE in sinking nets increased significantly to 10.5 fish/net night from 1.25 fish/net night in 2008 and is down slightly from 13.5 fish/net night in 2007 (Figure 35).

Yellow Perch

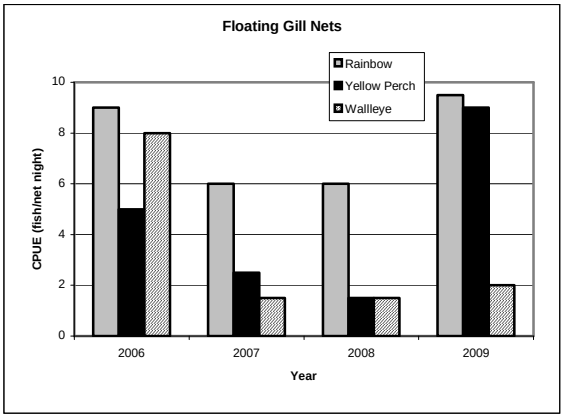
The CPUE of 11.5 fish/net night for yellow perch, in 2009, in all nets was up from 4.25 fish/net night in 2008. This is the second increase that has occurred in the decline that began between 2003 and 2004 and continued through 2007 (Figure 33). The average CPUE for yellow perch in all nets was 8.12 fish/net night for 2004-2008. In 2009, CPUE for yellow perch in the floating nets was 9.0 fish/net night compared to 2.5 and 1.5 in 2007and 2008, respectively (Figure 34). The CPUE for sinking gill nets was 1.5fish/net night in 2008 and increased to 10.0 fish/net night in 2009 (Figure 35).

Walleye

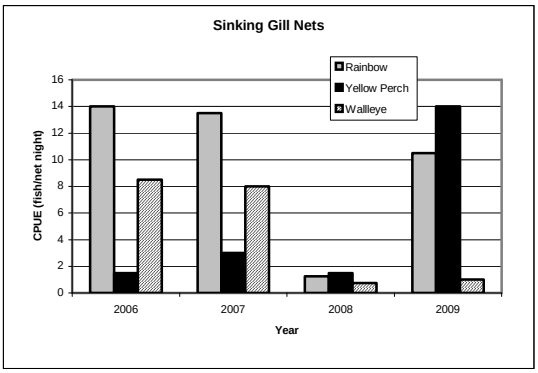
CPUE for walleye in all nets has continued to decrease from 4.75 fish/net night in 2007 and 2.25 fish/net night in 2008 to 1.5 fish/net night in 2009 (Figure 33). The average CPUE for walleye in all nets is 7.18 fish/net night for 2004-2008. In 2007and 2008, CPUE in floating nets was 1.5 fish/net night. In 2009, that increased slightly to 2.0 fish/net night (Figure 34). The CPUE of 1.0 fish/net night for the sinking nets was up from 0.75 fish/net night in 2008 but still well below the 8.0 fish/net night in 2007 (Figure 35).



- Figure 33: Catch-per-unit-effort for rainbow, yellow perch, and walleye in all gill nets for 2006 - 2009



- Figure 34: Catch-per-unit-effort for rainbow, yellow perch, and walleye in floating gill nets for 2006 - 2009.



- Figure 35: Catch-per-unit-effort for rainbow, yellow perch, and walleye in sinking gill nets for 2006 - 2009.

Average Length

Rainbow trout

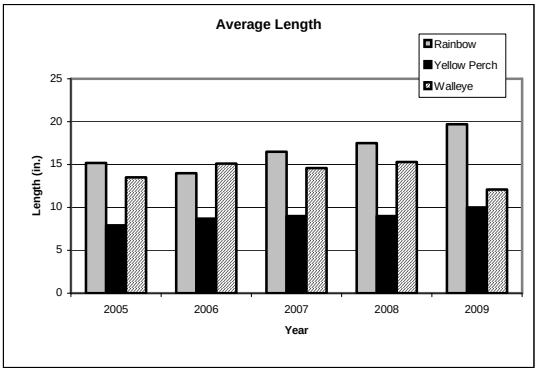
The average length of rainbow trout captured in 2009 was 19.7 inches. This is up from 17.5 in 2008, and has continued to increase from 13.3 inches in 2004 to (Figure 36). This also remains higher than the average length of 14.99 inches for the previous 10 years. These increases are biased by the fact that no smaller rainbow trout were captured as in previous years. Captured rainbow trout ranged from 16.9-25.9 inches in total length.

Yellow Perch

In 2009, the average length of yellow perch increased from 9.0 inches to 10 inches (Figure 36). This is higher than the average length of 8.38 inches for the previous 10 years. Captured yellow perch ranged from 8.7-11.4 in. in total length.

Walleye

The average length of walleye in 2009 was 12.1 inches. This is down from 15.3 inches in 2008, and remains lower than the average length of 13.75 inches for the previous 10 years (Figure 36). Captured walleye ranged from 11.7-16.4 inches in total length.

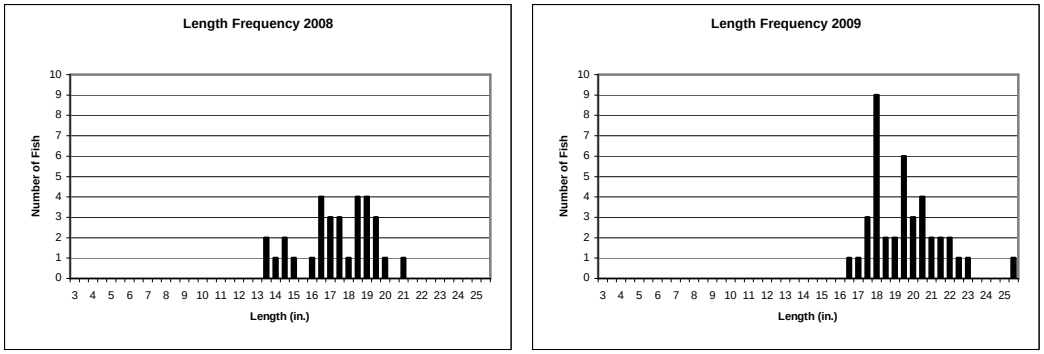


• Figure 36: Average length of rainbow, yellow perch, and walleye captured from 2005 - 2009.

Length Frequency

Rainbow Trout

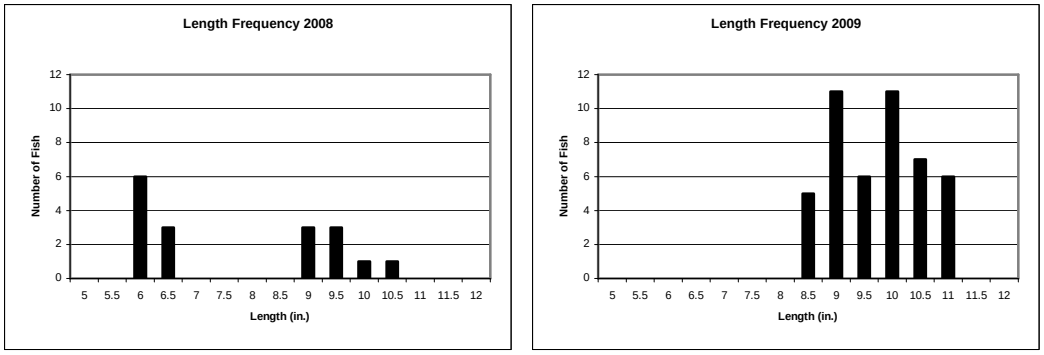
In 2009, the length-frequency distribution of rainbow trout in Dailey Lake was clearly weighted toward fish 16 inches and larger (Figure 37). The lack of fish less than 16 inches indicates a potential lack of survival and recruitment of smaller, younger fish similar to that seen in 2008. This may also be the result of sampling inefficiency on smaller fish. Future monitoring should determine if there is indeed a lack of recruitment.



• Figure 37: Length-frequency distribution for Dailey Lake rainbow trout in 2008 and 2009.

Yellow Perch

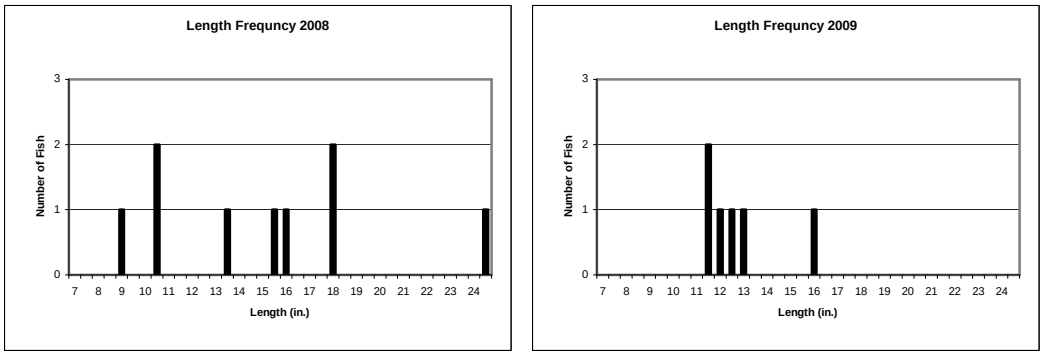
The length-frequency distribution for yellow perch in 2009 is weighted toward fish greater than 8.5 inches in total length. Smaller fish were absent from the sample and abundance of larger fish is up compared to 2008 (Figure 38). Numbers of yellow perch have increased since 2008, but remain low in the sample and there still appears to be poor capture efficiency. It should be noted that there were angler reports of good numbers of fish around 12 inches in length taken through the ice in the winter of 2008-2009. A change in sampling method may improve capture efficiency and provide a more accurate picture of the fishery.



• Figure 38: Length-frequency distribution for Dailey Lake yellow perch in 2008 and 2009.

Walleye

The length-frequency distribution of walleye in 2009 shows a decreased distribution compared to 2008 (Figure 39). Abundance of fish captured in 2009 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. A change in sampling method may improve capture efficiency and provide a more accurate picture of the fishery.



• Figure 39: Length-frequency distribution of Dailey Lake walleye in 2008 and 2009.

Fish Stocking

Dailey Lake has been stocked annually with rainbow trout, Yellowstone cutthroat trout, and walleye in order to maintain a fishery for these species.

Dailey Lake was planted with approximately 20,000 rainbow trout and 5,000Yellowstone cutthroat trout in 2009. Official numbers, average lengths, and stocking dates for these plants were not available at the time of this report. This information will be presented in the 2010 annual report.

In 2009, 10,500 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.

Walleye

On July 1, 2009, Dailey Lake was stocked with 5,000 young-of the-year (YOY) fish from the Miles City Fish Hatchery. The fish averaged 1.6 inches in length. An additional 5,500 YOY walleye were stocked on September 22, 2009. These fish averaged 2.9 inches in length (Table 5).

- Table 5: Walleye stocking information from 2004-2009.

Year	Date	Strain	Length (in.)	Number
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	July 1	Fort Peck	1.5	5,000
	Sept. 19	Fort Peck	3.4	3,650
			Total	8,650
2009	July 1	Fort Peck	1.6	5,000
	Sept. 22	Fort Peck	2.9	5,500
			Total	10,500

Rainbow and Yellowstone Cutthroat

On April 29, 2008, Dailey Lake was stocked with 10,044 young-of-the-year (YOY) rainbow trout from Giant Springs Trout Hatchery. The rainbow trout averaged 3.4 inches in length. Eagle Lake strain YOY rainbow from Bluewater Springs Trout Hatchery were planted on May 14, 2009. There were 10,000 rainbow trout in this plant that had an average length of 3.1 inches. 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). Exact numbers for the plants for 2009 were not available at the time of this report and will be reported in the 2010 report.

- Table 6: Trout stocking information from 2004-2009. * = numbers are approximate and actual numbers will be reported in the 2010 annual report

Year	Date	Strain	Length (in.)	Number
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	10,044
	Sept. 8	Yellowstone	4.4	5,000
	May 14	Eagle Lake	3.1	10,000
			Total	25,044
2009	N/A	Arlee	N/A	10,000*
	N/A	Yellowstone	N/A	5,000*
	N/A	Eagle lake	N/A	10,000*
			Total	25,000*

Discussion

The Yellowstone River trout populations overall continue to do well. Rainbow trout numbers have remained stable with some fluctuation in all sections and are up slightly in the Springdale Section. Brown trout numbers have remained stable in the Corwin Springs and Springdale Sections. Yellowstone cutthroat trout abundances were down from historic levels in all three sections. Future sampling will determine if there is further cause for concern or if these lower numbers are a natural fluctuation.

The Shields River trout populations have over the long term remained fairly stable. This is very encouraging in light of continued drought and dewatering of sections of the river. Yellowstone cutthroat trout continue to remain rare in the mainstem river, in the spring, and their numbers are considerably lower than historic values.

Abundances for rainbow trout and yellow perch in Dailey Lake were up compared to previous years. Abundances for walleye have continued their downward trend. This may be the result of poor recruitment, sampling efficiency, or a combination of both. Continued monitoring and a change in sampling method will help determine if the drop in abundance is indicative of a downward trend, a natural fluctuation or poor sampling efficiency.

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