Montana Fish, Wildlife & Parks

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

Annual Report for 2005

Federal Aid Project F-113-R-5

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Abstract

This report documents current trends for trout populations in the Yellowstone River and the Shields River. Adult trapping and fry trapping in tributaries of the Yellowstone River are discussed. 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. The Yellowstone cutthroat trout population in the Springdale section is continuing to decline and drought may be a factor.

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 Objective

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 which 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 2005 (July 1, 2004 to June 30, 2005), 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. **Estimates of trout abundance in two sections of the Yellowstone River based on spring sampling in 2005.**

B. **Estimates of brown and rainbow trout abundance in three sections of the Shields River based on spring sampling in 2005.**

C. **Summary of gillnet catches at Dailey Lake: spring 2005.**

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 2005 these meetings included work supporting the Upper Shields Watershed and Southern Crazy Mountain Watershed Associations and the Upper Yellowstone Watershed Basin, educational seminars for local school children, and meetings with local angling groups 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.

Procedures

Electrofishing

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 electorfishing the entire section. 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 14 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 during the recapture run.

Yellowstone River Survey Sections

In spring 2005, trout were sampled in the Mill Creek and Springdale sections of the Yellowstone River (Table 1 and Figure 1). Both of these sections are part of the long-term monitoring sections on the Yellowstone River.

Electrofishing of these sections was completed through the use of jet boats mounted with boom electrofishing equipment. The Springdale section was completed with a 22-foot aluminum Wooldridge outboard jet boat, a Coffelt VVP-15, and 6500-watt Honda generator. An 18-foot aluminum Wooldridge outboard jet boat, a Coffelt VVP-15, and 4500-watt generator were used to complete the Mill Creek Section. On both boats the anodes were stainless steel droppers suspended from twin booms at the bow and the hulls served as the cathodes.

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. About fourteen days later each section was sampled again.

I estimated fish abundance using a partial log-likelihood model and a modified Peterson model (Chapman 1954) available in Fisheries Analysis + software from Montana Fish, Wildlife and Parks (MFWP, 2004). 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 1: Survey Sections where trout abundance was sampled in the Yellowstone River in 2005.

Section Name	Survey Date	Length (ft)	Approximate Location		
Mill Creek	04/15/05	23,443	Upper	North	45.41958
			Boundary	West	110.64223
			Lower	North	45.45718
			Boundary	West	110.62505
Springdale	03/31/05	25,212	Upper	North	45.69482
			Boundary	West	110.53682
			Lower	North	45.72894
			Boundary	West	110.23812

• Coordinates in decimal degrees are WGS84 datum.

Mill Creek

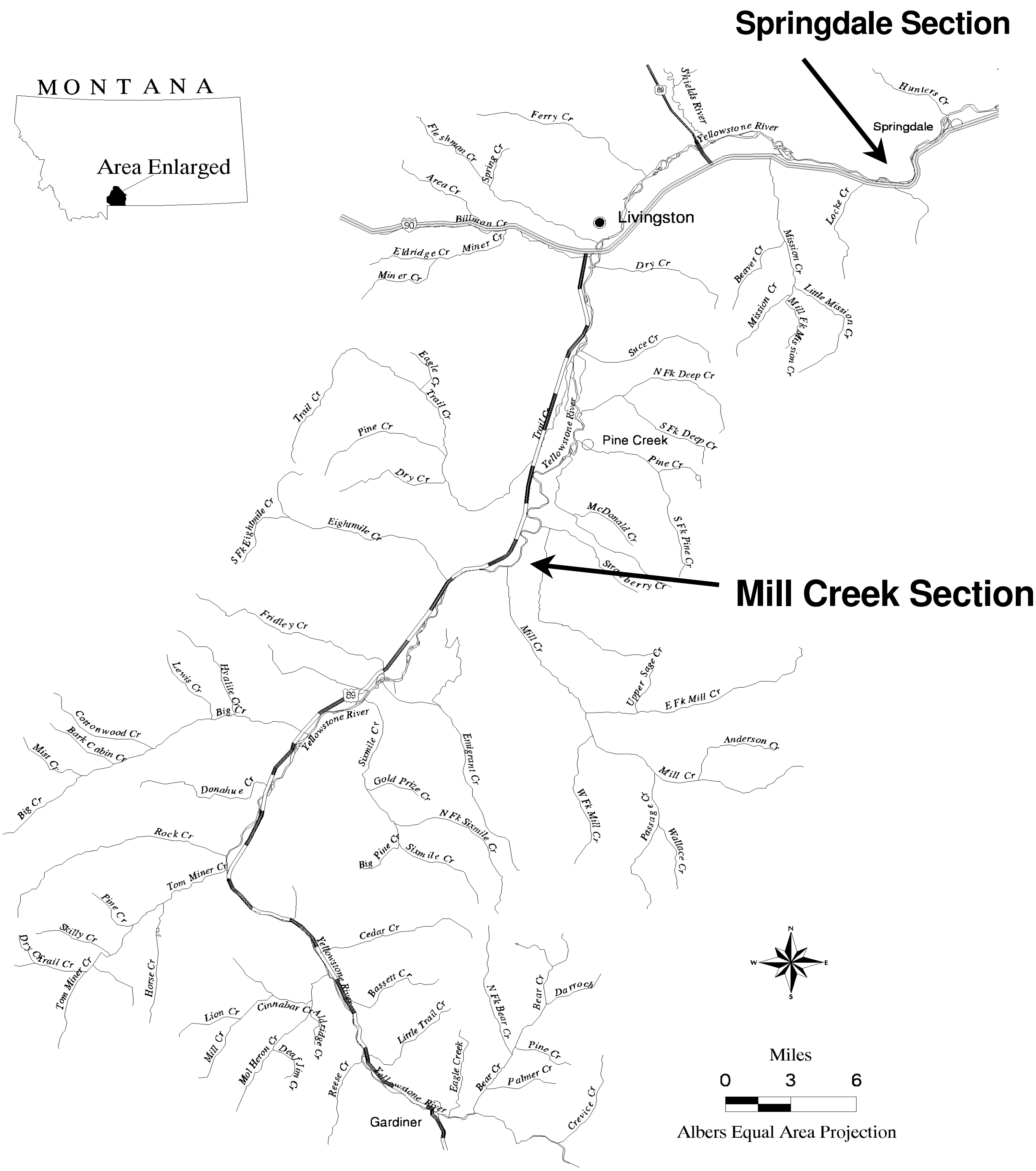
We sampled trout in the Mill Creek Section on April 14 and 15, 2005. The right bank and the middle of the river were sampled on April 14 and we clipped the right pelvic fin of captured fish. We sampled the left bank and the middle of the river on April 15 and clipped the left pelvic fin of captured trout. We did this to examine movement of fish from one side of the river to the other during multiple sampling days. Scale samples were taken from trout for aging.

The Mill Creek section was recaptured on April 27 and 28, 2005. We sampled the right bank and middle on April 27 and the left bank and middle on April 28. All captured trout received an anal fin clip.

Springdale

The Springdale Section was sampled on March 29, 30, and 31, 2005. We did multiple passes (4-8) in each sub-section rather than sampling one entire bank and then the other. We did this to reduce the number of days fish were exposed to electricity and multiple captures of the same fish. Scale samples were taken from trout for aging.

On April 12 and 13, 2005, we recaptured the Springdale section again using the methodology used in March 2005. All captured trout received an anal fin clip.



• Figure 1: Map of the Upper Yellowstone River drainage displaying the location of the 2005 sampling sections.

Shields River Survey Sections

In spring 2005, we electrofished the Convict Grade, Todd, and Zimmerman sections of the Shields River (Table 2 and Figure 2). We sampled the McLeod Section in fall 2005 (Table 2 and Figure 2).

A fiberglass drift boat mounted with mobile electrofishing gear was used to sample the Convict Grade and Todd sections of the Shields River. The gear included a 4,500-watt 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.

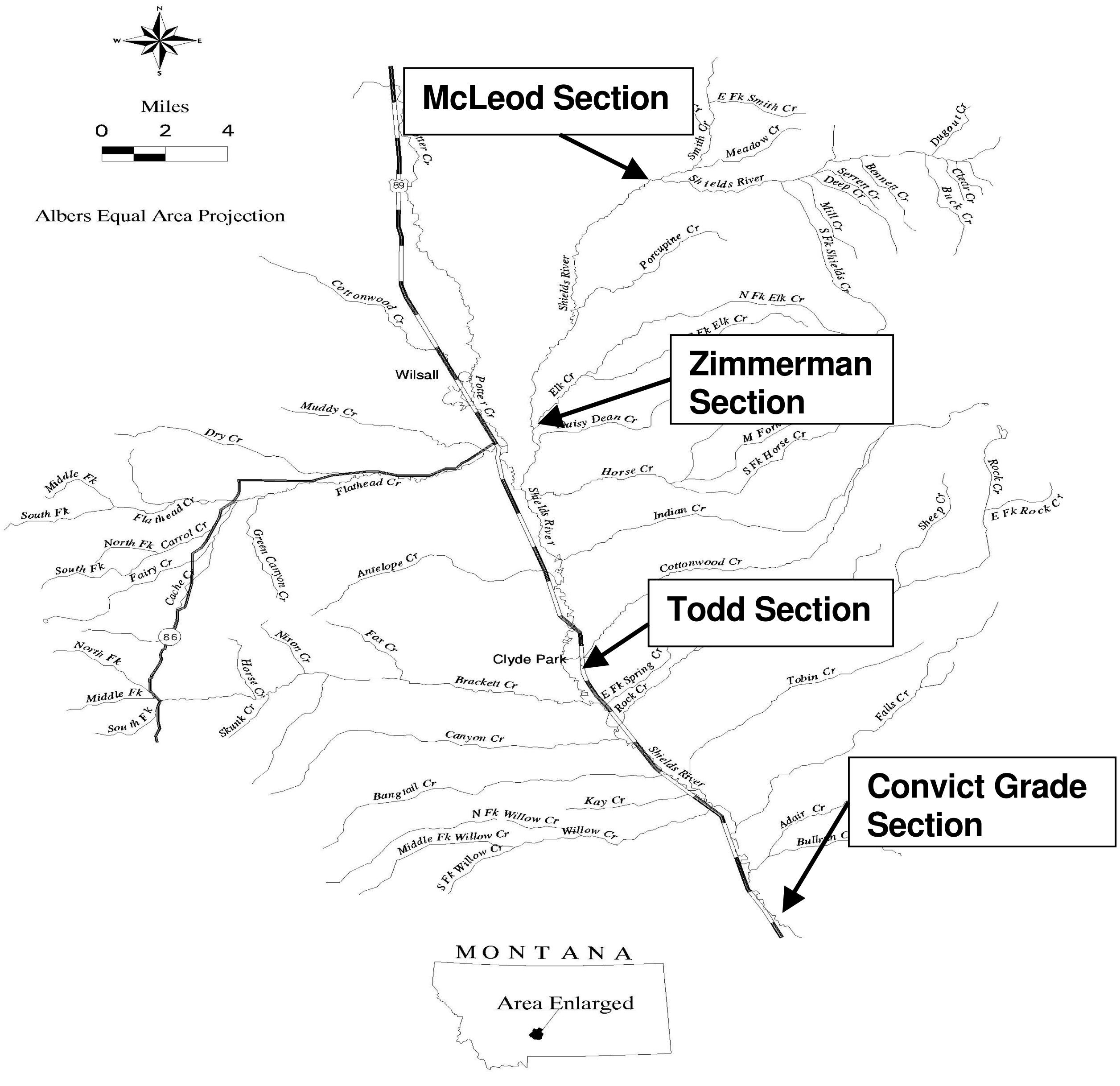
We used a Coleman Crawdad mounted with mobile electrofishing gear to sample the Zimmerman section. The cathode consisted of rolled metal fabric that was hung over the side of the boat in a PVC case and the anode was a single hand-held (mobile) electrode connected to the power source by 30 feet of cable.

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 and mountain whitefish were marked with fin clips and returned to the stream. Recapture sampling in each section occurred 14 days later.

I produced trout abundance estimates using FA+, a computer program developed by FWP for processing electrofishing data (MFWP, 2004). Brown trout abundance in the Todd 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 2: Survey Sections where trout abundance was sampled in the Shields River in 2005.

Section Name	Survey Date	Length (ft)	Approximate Location		
McLeod	09/26/05	750	Upper Boundary	North West	46.16705 110.55433
			Lower Boundary	North West	N/A N/A
Zimmerman	03/08/05	4,224	Upper Boundary	North West	46.02599 110.64086
			Lower Boundary	North West	46.01728 110.64012
Todd	03/09/05	7,500	Upper Boundary	North West	45.69482 110.53682
			Lower Boundary	North West	45.72894 110.23812
Convict	03/07/05	6,758	Upper Boundary	North West	45.74017 110.48244
			Lower Boundary	North West	45.72618 110.46278



• Figure 2: Map of the Shields River drainage displaying the location of the 2005 sampling locations.

Convict Grade

We electrofished the Convict Grade Section March 7,2005. Fish were marked with a left pelvic fin clip and a scale sample for aging was collected from trout.

We recaptured the section on March 21, 2005 and marked all captured fish with an anal fin clip.

Todd

We sampled the Todd Section on March 9, 2005. Fish were collected using the previously described protocol. Trout and whitefish were marked with an anal fin clip and a scale sample for aging was collected from trout.

We recaptured the section on March 23, 2005. All captured trout and whitefish were marked with an upper caudal clip.

Zimmerman

The Zimmerman Section was marked on March 8, 2005. We marked captured trout and whitefish with a right pelvic clip and took a scale sample from trout for aging.

We completed the recapture on March 22, 2005. Trout and whitefish were marked with an anal fin clip.

McLeod

On September 26, 2005, we electrofished a small reach of the McLeod Section. We started at the Hill Road Bridge and electrofished downstream approximately 250 yards due to mechanical failure.

My intent is to make this a long-term monitoring section of reasonable length. The section will be used to assess trout populations in the upper Shields River. There is currently no long-term monitoring section in this portion of the river.

Dailey Lake

Dailey Lake gillnetting

Gillnet sampling in 2005 was similar to previous years in regard to timing and location of nets in the lake (Figure 3).

We set the gill nets in the evening of May 9, 2005. The set consisted of two sinking and two floating experimental gill nets. All nets were set from the waters edge on shore with the exception of the southeast floating gill net that was set off shore because of the large number of cattails in that area.

We pulled the nets on the morning of May 10, 2005. Members of Upper Yellowstone Walleyes Unlimited removed the fish from the nets. 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.

Fish Stocking

Dailey Lake is 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).

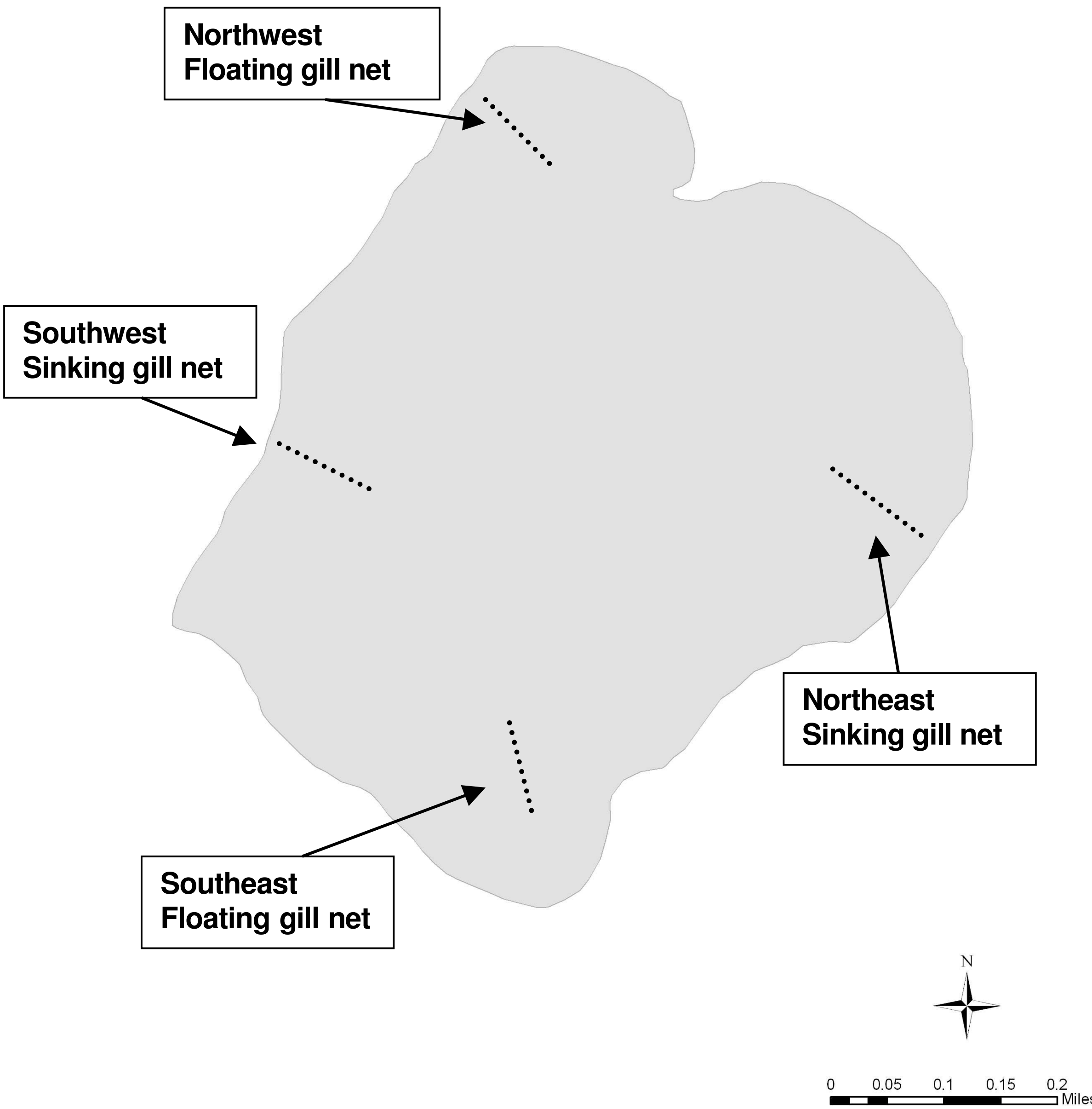
Dailey Lake was planted with 25,852 rainbow trout in 2005. The 20,850 fish from the Ennis National Fish Hatchery were transferred from the hatchery truck to a live well in a boat and were distributed randomly throughout the lake in an effort to reduce predation. The 5,002 fish from Big Springs Trout Hatchery were released directly from the truck into the lake.

In 2005, 9,856 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. The walleye were released directly from the truck into the lake.

Water

Water is diverted from Sixmile Creek in the spring and fall to supplement natural water levels in Dailey Lake

Dailey Lake



• Figure 3: Map of Dailey Lake showing location of floating and sinking gill nets in spring 2005.

Fish Trapping

Adult Trapping

We trapped adult fish on Locke Creek during the spring spawning run to assess use of this creek by Yellowstone cutthroat trout from the Yellowstone River. The trap was an upstream box with leads extending from both sides of the box to the bank. The leads consisted of vertical pieces of conduit strung on steel cable.

We placed the upstream trap in Locke Creek just upstream of the railroad bridge on May 16, 2005. The trap was operated and checked daily with the exception of most weekends. Operation of the trap ended on June 27. All captured fish were measured to the nearest 0.1-inch and were weighed to the nearest 0.01 pound. All captured fish were released upstream of the trap.

Fry Trapping

Fry trapping was completed in July and August to assess recruitment of Yellowstone cutthroat trout from spawning tributaries back to the Yellowstone River. We used drift nets set at the mouth of tributaries to capture the fry as the migrated to the Yellowstone River. Fry trapping was done in Mulherin, Cedar, Big, Mill, Nelson Spring, DePuy's Spring and Locke Creek.

Results and Discussion

Yellowstone River Trout Abundances

We 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 Yellowstone cutthroat and brown trout in the Mill Creek Section and rainbow trout data from the Springdale Section (Table 3). Rainbow trout from Mill Creek and brown trout from Springdale did not fit the partial log-likelihood model well. I used the partial log-likelihood estimate for these sections because of little difference in the estimate when Modified Peterson was used. Low numbers of recaptured fish were likely the reason this data did not fit the partial log-likelihood model. Movement of fish from winter habitat to spring/summer habitat and the beginning of migration for rainbow trout spawning may have caused the low numbers. Rainbow and Yellowstone cutthroat trout estimates for 2005 do not include fish that appeared to be hybrid crosses between rainbow and Yellowstone cutthroat trout. Capture of identifiable hybrid fish is too low to calculate abundance.

• Table 3: Population abundance model results for the Yellowstone River by section and species for 2005. N represents number of fish per mile.

Section (mark date)				Overall model			Pooled model	
Fish Species	**N**	**SD**	**DF**	**Chi-square**	**P**	**DF**	**Chi-square**	**P**
Mill Creek (4/15)								
Cutthroat Trout	207	24.1	5	3.25	0.660	2	3.25	0.196
Rainbow Trout	649	34.0	8	7.51	0.483	7	7.02	0.427
Brown Trout	316	34.5	9	15.1	0.087	4	8.76	0.067
Springdale (3/31)								
Cutthroat Trout	*	*	*	*	*	*	*	*
Rainbow Trout	379	45.2	6	4.23	0.644	4	2.43	0.655
Brown Trout	212	17.0	9	14.29	0.112	7	14.19	0.047

Mill Creek Section

We sampled the Mill Creek Section in April 2005 to assess population trends in Yellowstone cutthroat, rainbow and brown trout. I used the partial log-likelihood model to produce abundance estimates for all trout species. Fish seven inches and larger were used to produce abundance estimates. Results, by species, are presented below.

Yellowstone Cutthroat Trout

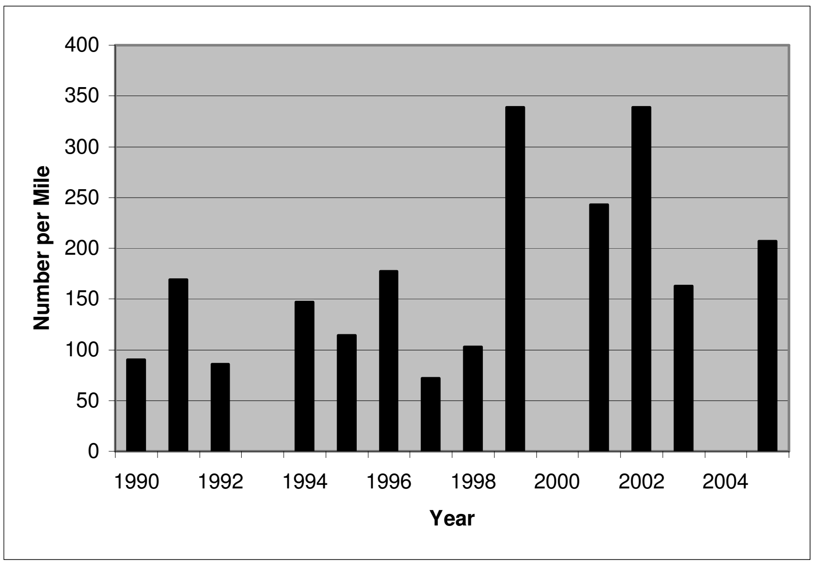
Yellowstone cutthroat abundance in the Mill Creek Section was 207 fish/mile (≥7 in.). This is a slight increase from 163 fish/mile (≥7 in.) in 2003 (Tohtz 2003) (Figure 4). This section was not sampled in 2004. Cutthroat abundance continues to be above the 15-year average of 170 fish/mile (≥7 in.). The length-frequency histogram of Yellowstone cutthroat captured in 2005 had a typical distribution with the exception of lacking an abundance of small fish. Small fish are not sampled efficiently and are not well represented in the sample. The bulk of the fish are in the 11.0 to 14.5 inch range (Figure 5). The smallest fish captured was 3.5 inches and the largest was 19.1 inches in total length.

Rainbow Trout

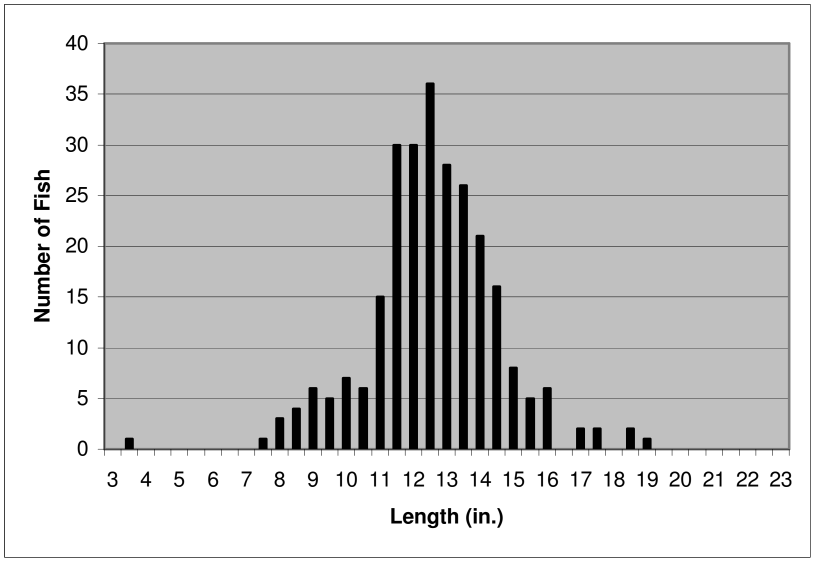
The 2005 abundance estimate for rainbow trout was 649 fish/mile (≥ 7in.). This is up slightly from 598 fish/mile (≥ 7in.) in 2004 continuing an upward trend in abundance that began 2001(Figure 6). The length-frequency distribution for rainbow trout in 2005 shows a typical distribution of fish by length. There is a strong group of fish in the 4-7 inch range indicating good potential for recruitment of juveniles to mature fish next year (Figure 7).

Brown Trout

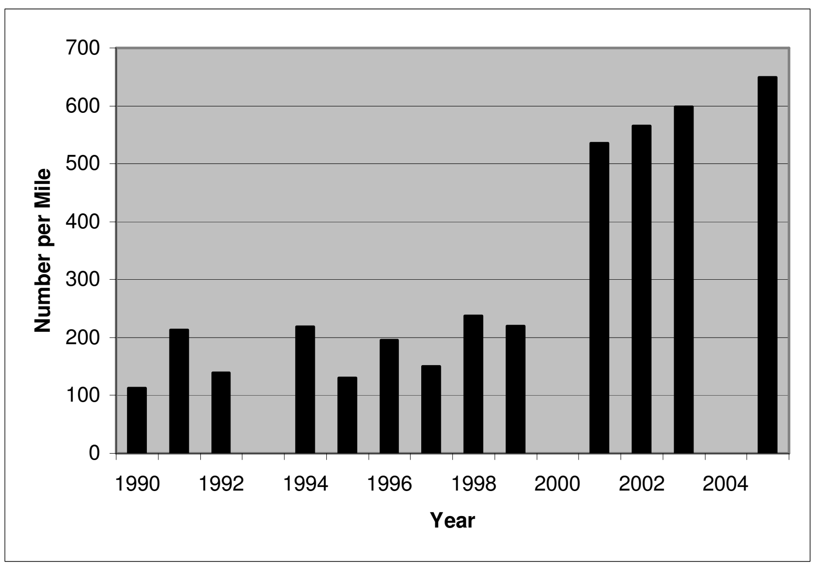
Brown trout abundance in the Mill Creek Section was 316 fish/mile (≥ 7 in.) (Figure 8). In 2003, the abundance was 290 fish/mile (≥ 7 in.) (Tohtz 2003). The 2005 estimate is below the 15-year average of 363 fish/mile (≥ 7 in.). The length-frequency histogram for brown trout shows a wide distribution of fish length. It also heavily weighted toward fish from 15-19 inches in length (Figure 9). There appears to have been limited recruitment for the past few years as indicated by low numbers fish from 4.0 to 13.5 inches in length, potentially a result of ongoing drought conditions. A significant decline in brown trout abundance in the Mill Creek Section is likely in 2006.



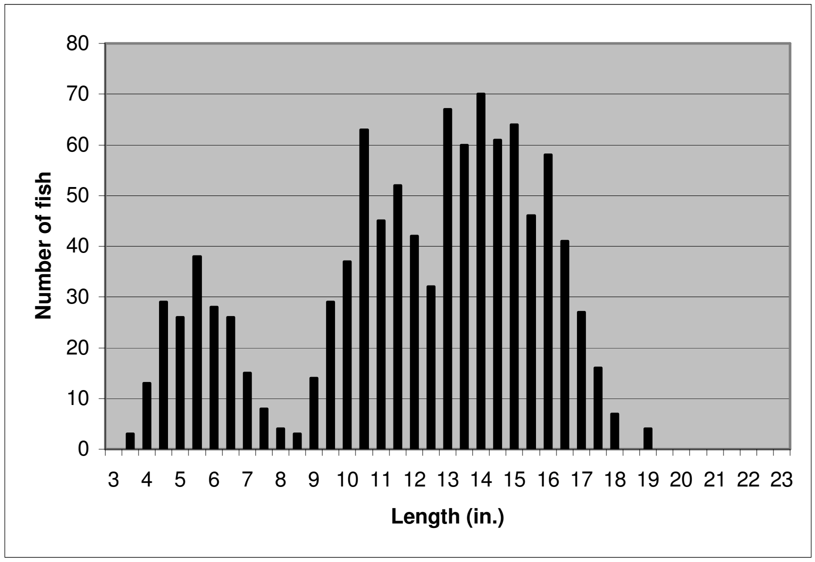
- Figure 4: Population abundance estimates for Yellowstone cutthroat trout (≥ 7in.) in the Mill Creek Section from 1990-2005. The section was not sampled in 1993, 2000, and 2003.



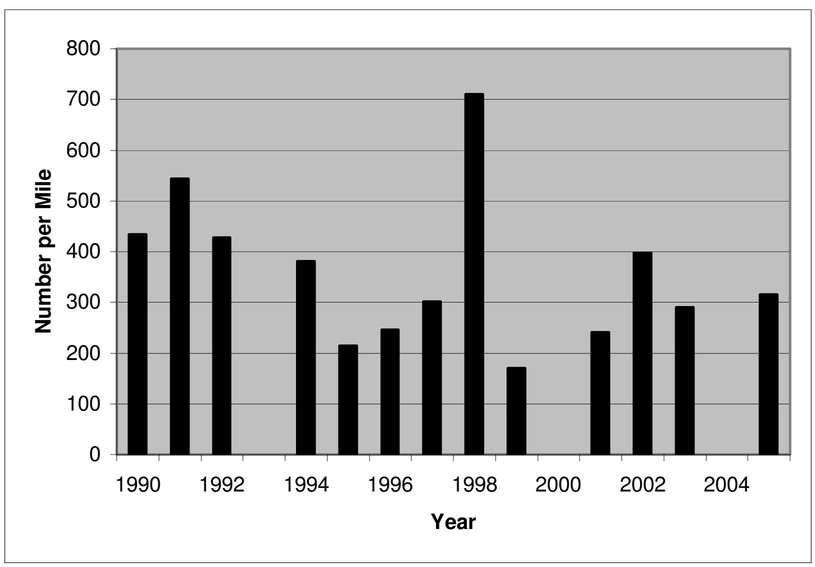
• Figure 5: Length-frequency distribution for all captured Yellowstone cutthroat trout in the Mill Creek Section in 2005.



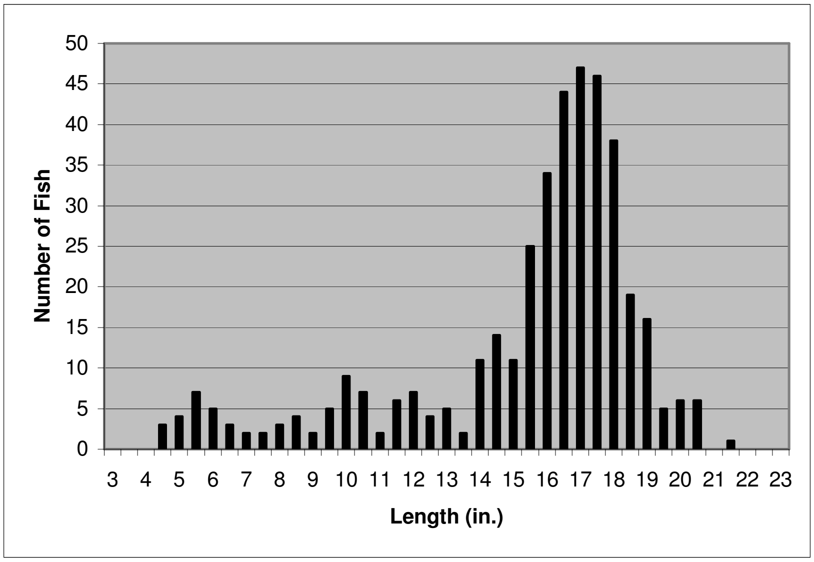
• Figure 6: Population abundance estimates for rainbow trout (≥ 7 in.) in the Mill Creek Section from 1990-2005. The section was not sampled in 1993, 2000, and 2004.



• Figure 7: Length-frequency distribution for all captured rainbow trout in the Mill Creek Section in 2005.



• Figure 8: Brown trout (≥ 7 in.) abundance estimates for the Mill Creek Section from 1990-2005. The section was not sampled in 1993, 2000, and 2003.



- Figure 9: Length-frequency distribution for all captured brown trout in the Mill Creek Section in 2005.

Summary

Trout populations in the Mill Creek Section are doing well. Abundance has increased since 2003 for all species and rainbow trout are still on an increasing trend that began in 2001. Length-frequency histograms indicate that this trend for rainbow trout is likely to continue. The length-frequency histogram for Yellowstone cutthroat shows a lack of small fish and may be a result of difficulty of sampling small fish. The length-frequency histogram for brown trout indicates that brown trout abundance may drop in the future as a result of poor recruitment, likely caused by drought.

A large amount of snow and rain occurred during the period between the marking run and the recapture run and may have influenced fish movement and abundance estimates. It should also be noted that the river was much more turbid during the recapture runs which likely improved our capture efficiency over the marking run.

Springdale Section

We sampled the Springdale Section in March and April 2005 to assess population trends in Yellowstone cutthroat, rainbow and brown trout. I used the partial log-likelihood model to produce abundance estimates for rainbow and brown trout. There was not enough Yellowstone cutthroat data to produce an abundance estimate. Fish seven inches and larger were used to produce abundance estimates. Results, by species, are presented below.

Yellowstone Cutthroat Trout

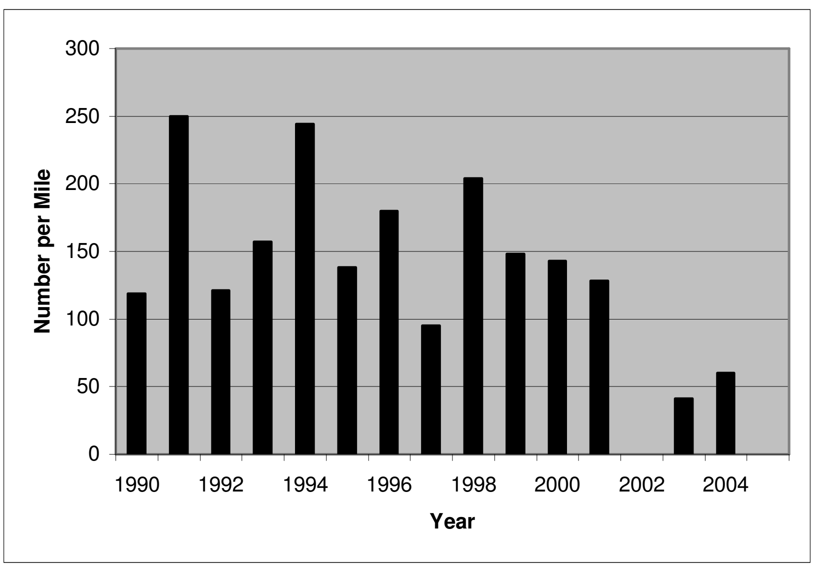
I was unable to produce an abundance estimate for Yellowstone cutthroat trout in the Springdale section in 2005 (Figure 10). We captured 45 cutthroat, but there were not enough recaptures for a valid estimate. Cutthroat ranged in total length from 10.0-17.6 inches. By comparison, in 2004, a total of 64 cutthroat were captured. They ranged in total length from 5.8-15.9 inches. The decline in abundance that began in 1999 appears to be continuing and is cause for concern. This decline coincides with ongoing severe drought. The length-frequency distribution indicates poor recruitment of 4-7 inch fish, probably yearlings, from 2004 into larger length groups. There was good recruitment of 8-11 fish from 2004 into larger groups in 2005. No 5-7 inch fish in were captured in 2005 (Figure 11). The lack of these smaller fish could be a result of sampling efficiency, continued drought, poor spawning success, or a combination of any of these factors.

Rainbow Trout

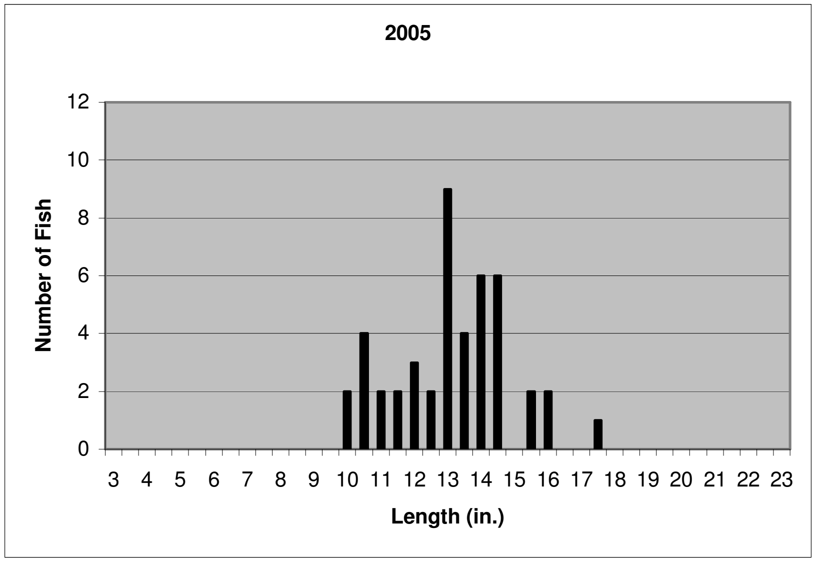
In the Springdale Section, rainbow trout abundance in 2005 was 379 fish/mile (≥ 7 in.). This was a significant increase over the 2004 estimate of 252 fish/mile (≥ 7 in.) (Figure 12). The 2005 estimate is above the 15-year average of 373 fish/mile (≥ 7 in.). The declining trend from 2001 to 2004 has reversed and the population appears to be increasing. The length-frequency distributions for rainbow trout indicate good recruitment of 4-7 inch fish into larger length groups. There was an increase in frequency of larger fish in 2005 and there appears to be a good group of 4-7 inch fish in the population, although not as large as this cohort was in 2004 (Figure 13).

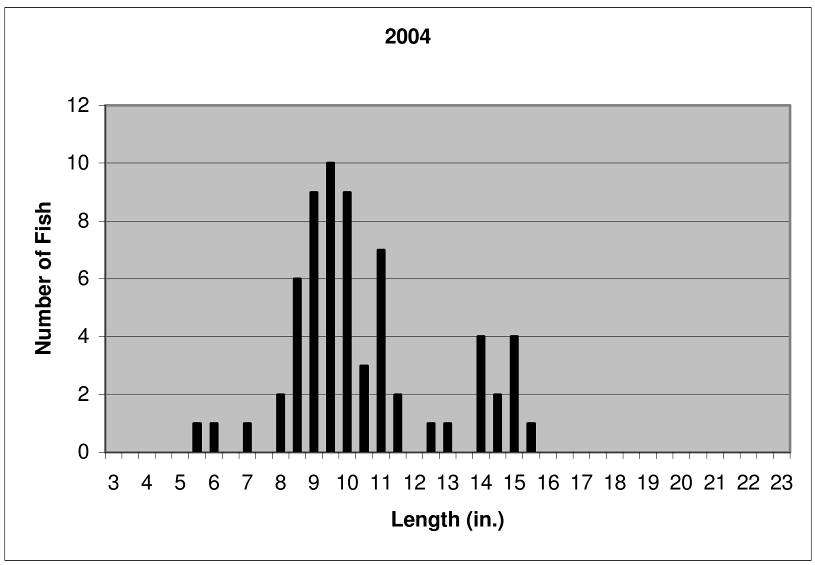
Brown Trout

For the Springdale Section in 2005, the population abundance estimate for brown trout was 212 fish/mile (≥ 7 in.) (Figure 14). This estimate did not fit the partial log-likelihood model. I used the partial log-likelihood estimate because it appears to be valid when compared to the estimate produced using Modified Peterson. The trend of decline since 2001 has reversed and the population increased significantly from the 2004 estimate of 137 fish/mile (≥ 7 in.). The 2005 estimate is just below the 15-year average of 245 fish/mile (≥ 7 in.). The length-frequency distribution of brown trout shows a strong group of fish from 10-14 inches and a shift to more fish in the 18-19 inch range. There appears to be a limited group of fish in the 4-7 inch range, likely a result of poor capture efficiency for smaller fish (Figure 15).

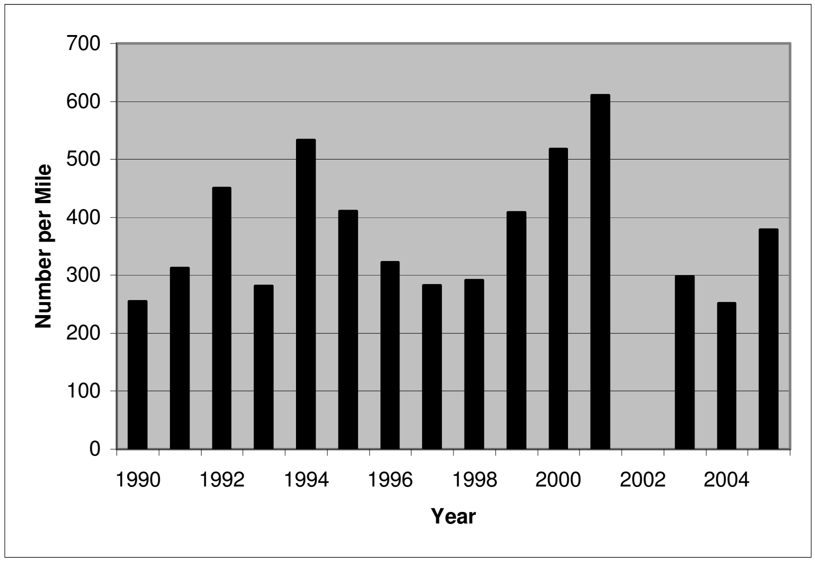


• Figure 10: Abundance estimates for Yellowstone cutthroat trout (≥ 7 in.) in the Springdale Section from 1990-2005. No sampling occurred in 2002 and no estimate could be made in 2005.

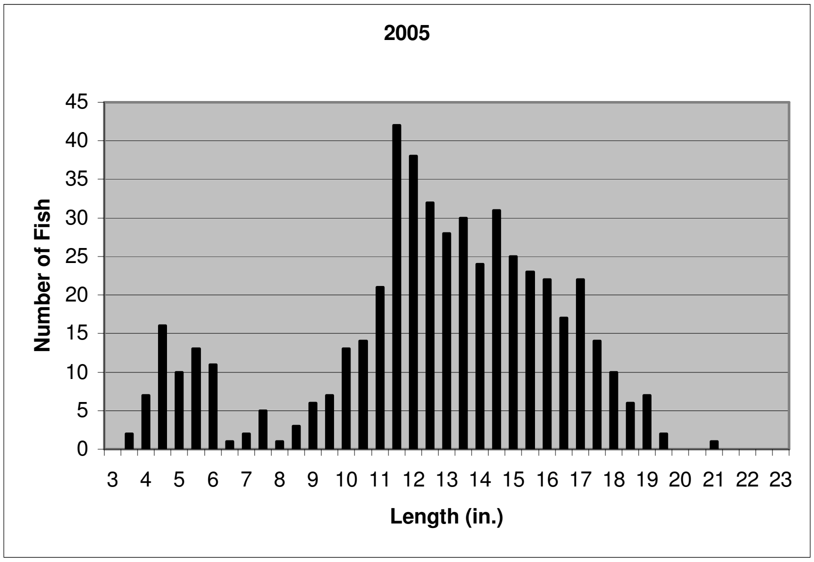


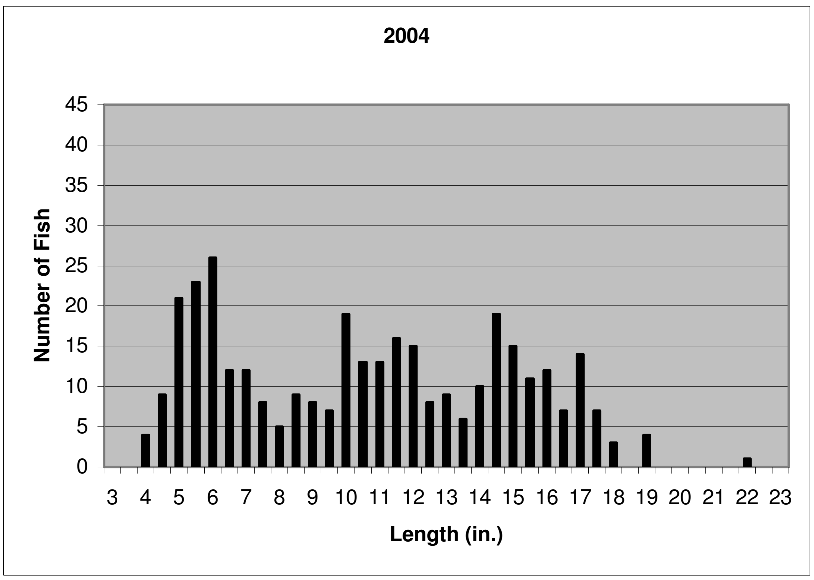


- Figure 11: Length-frequency diagrams for all captured Yellowstone cutthroat trout in the Springdale Section in 2004 and 2005.

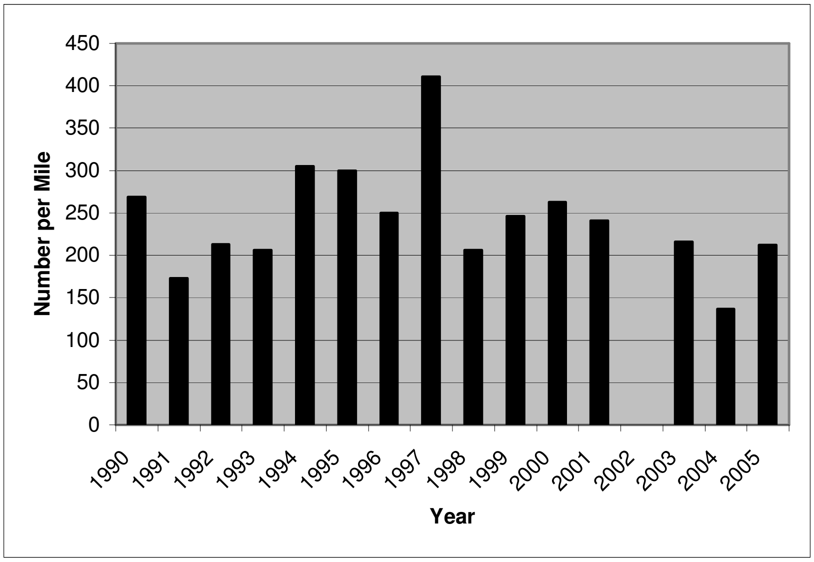


• Figure 12: Population abundance estimates for rainbow trout (≥ 7 in.) in the Springdale Section from 1990-2005. The section was not sampled in 2002.

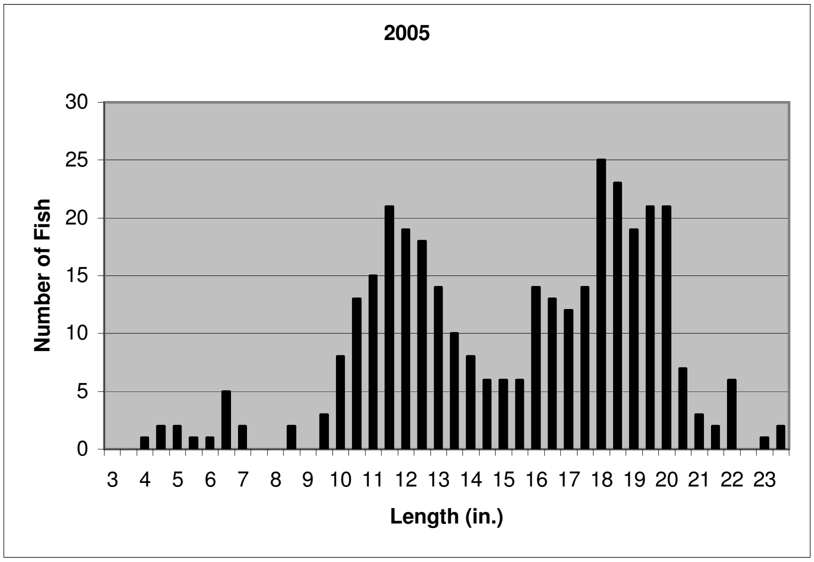


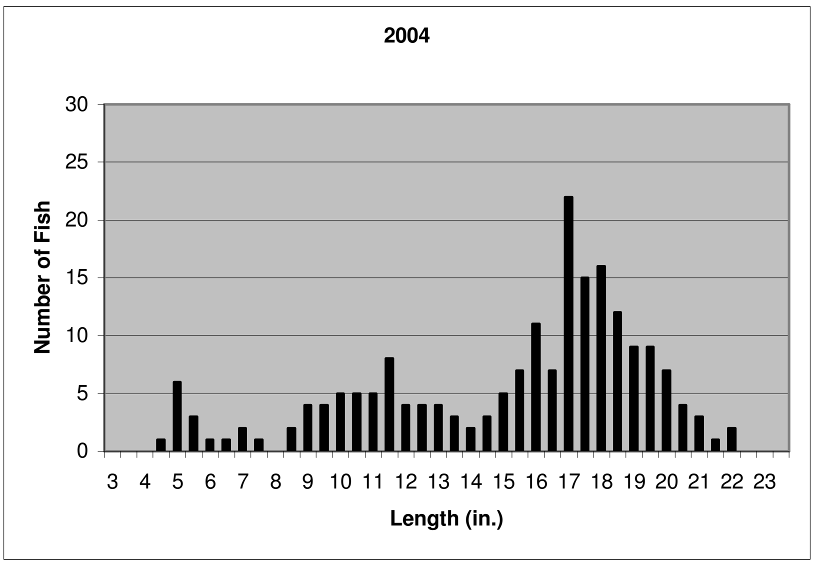


- Figure 13: Length-frequency diagrams for all captured rainbow trout in the Springdale Section in 2004 and 2005.



• Figure 14: Population abundance estimates for brown trout (≥ 7 in.) in the Springdale Section from 1990-2005. The section was not sampled in 2002.





- Figure 15: Length-frequency distributions for all captured brown trout in the Springdale Section in 2004 and 2005.

Summary

Trout populations in the Springdale Section are doing well with the exception of Yellowstone cutthroat. Rainbow and brown trout abundance has stopped declining and appears to be rebounding. Yellowstone cutthroat are continuing to decline in abundance, likely tied to continued drought that may be limiting access to spawning tributaries. Monitoring and investigation of this decline will be priority for 2006.

In the Springdale Section, it appears that warm weather and increased flows triggered a large movement of rainbow and brown trout between the mark and recapture runs. This resulted in the capture of more fish, including possible immigrants, during the recapture run and may have influenced abundance estimates.

We generally do not sample trout less than 7.0 inches in total length efficiently in the Yellowstone River. This can skew length-frequency histograms by showing less smaller fish than may actually be present.

Shields River Trout Abundances

We 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 brown and rainbow trout from the Convict Grade Section and brown trout from the Zimmerman Section (Table 4). A Modified Peterson (Chapman 1954) was used to produce an abundance estimate for brown trout in the Todd section because the data did not fit the partial log-likelihood model, as a result of low numbers of recaptured fish. Rainbow trout estimates for 2005 do not include fish that appeared to be hybrid crosses between rainbow and Yellowstone cutthroat trout.

• Table 4: Population abundance model results for the Shields River by section and species for 2005. N represents the number of fish per mile. * 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 (3/7)								
Brown Trout	200	23.4	6	2.03	0.916	5	1.91	0.861
Rainbow Trout	328	109.3	2	3.55	0.170	1	2.89	0.089
Todd (3/10)								
Brown Trout	161	16.3	*	*	*	*	*	*
Zimmerman (3/8)								
Brown Trout	61	7.2	7	4.06	0.772	5	3.68	0.596

Convict Grade Section

We sampled the Convict Grade Section in March 2005 to assess population trends in Yellowstone cutthroat, rainbow and brown trout. I used the partial log-likelihood model to produce abundance estimates for brown and rainbow trout. Fish seven inches and larger were used to produce abundance estimates. Rainbow and brown trout populations are stable, but Yellowstone cutthroat were not captured. Results, by species, are presented below.

Brown Trout

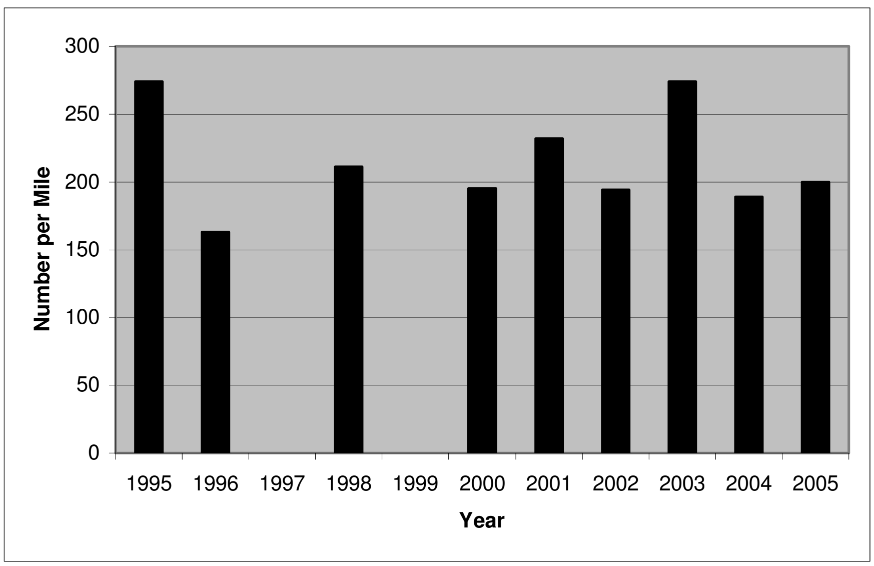
In 2005, abundance of brown trout in the Convict Grade Section was 200 fish/mile (≥ 7 in.) (Figure 16). Abundance increased from 189 fish/mile (≥ 7 in.) in 2004. This population has fluctuated around the long-term average of 217 fish/mile (≥ 7 in.) over the previous 10 years. The length-frequency distribution for brown trout in the Convict Grade Section suggests a strong cohort in the 4-6 inch range in 2005 and healthy numbers between 13 and 17 inches (Figure 17).

In general, brown trout populations in the Convict Grade Section appear stable.

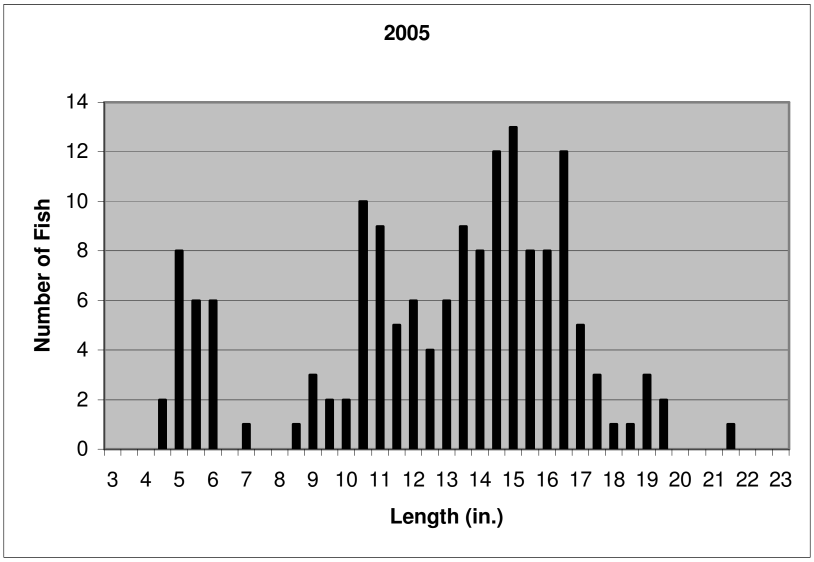
Rainbow Trout

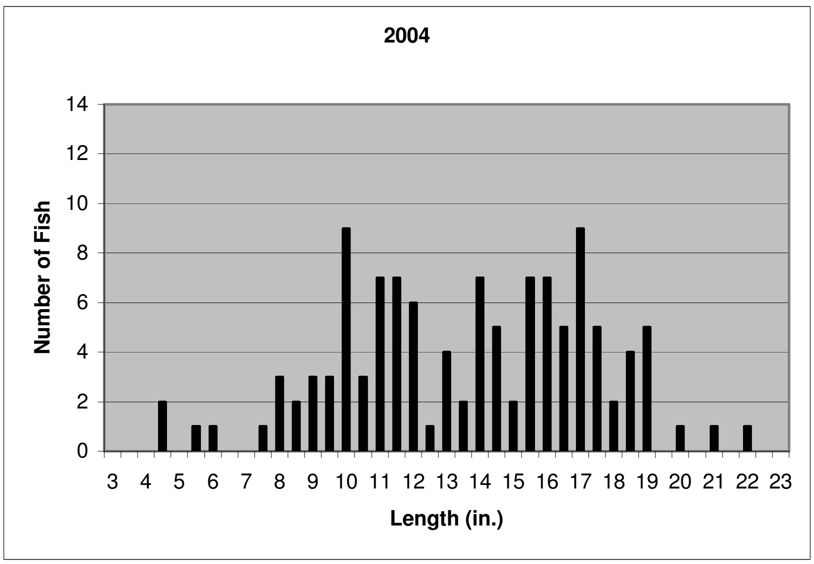
Rainbow trout abundance in 2005 increased to 328 fish/mile (≥ 7 in.) from 296 fish/mile (≥ 7 in.) in 2004 (Figure 18). Abundance of rainbow trout in this section is very difficult to estimate and has only been done in 2000, 2001, 2004, and 2005. This is likely a function of rainbow movement during spring spawning migrations. Rainbow trout present in this section are probably a combination of migrant fish from the Yellowstone River and resident fish. In 2005, rainbow length-frequency distribution indicates good recruitment of fish in to the 7-10 inch range even though a strong cohort was not detected in 2004. The inability to capture small fish efficiently may explain this. There is a larger cohort of fish in the 3-6 inch range that should contribute to the population in the future (Figure 19).

The Convict Grade rainbow population appears stable and shows potential to increase in the future.

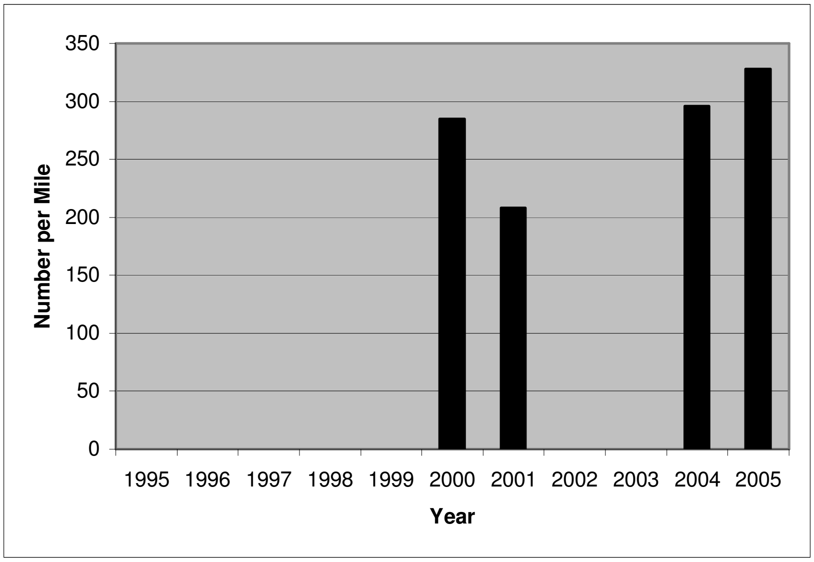


• Figure 16: Abundance estimates for brown trout (≥ 7 in.) in the Convict Grade section from 1995-2005. The section was not sampled in 1997 and 1999.

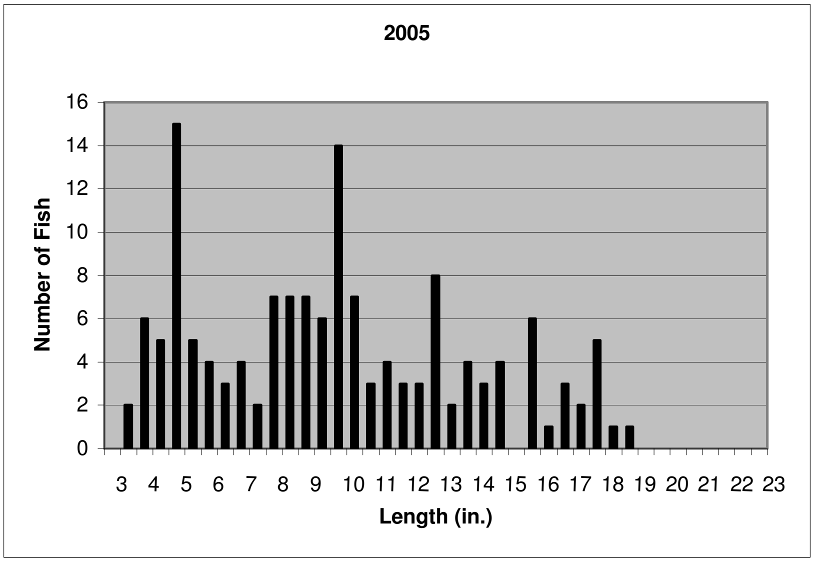


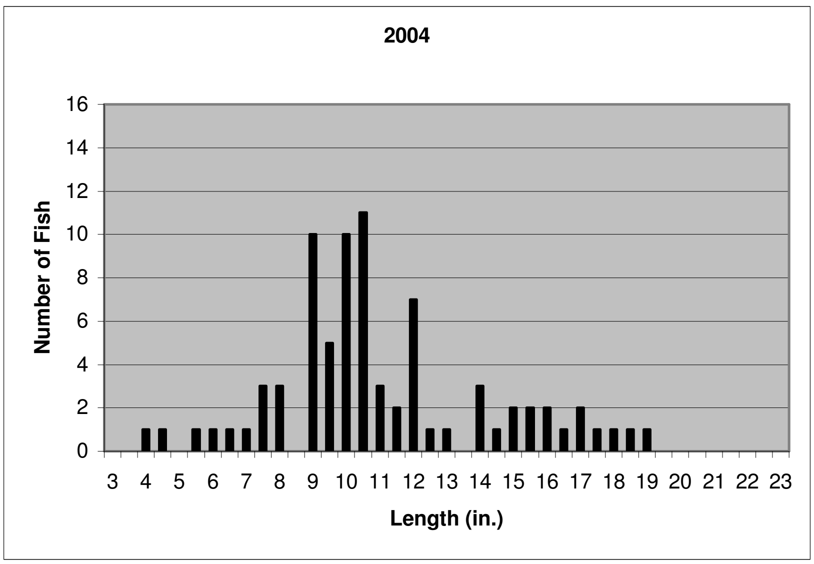


• Figure 17: Length-frequency distributions for all captured brown trout in 2004 and 2005.



- Figure 18: Abundance estimates for rainbow trout (≥ 7in.) in the Convict Grade section from 1995-2005. The section was not sampled in 1997 and 1999. There was not enough data to produce estimates for 1995,1996, 1998, 2002, and 2003.





• Figure 19: Length-frequency distribution of all captured rainbow trout in the Convict Grade Section in 2004 and 2005.

Todd Section

In 2005, brown trout data for the Todd Section did not fit the log-likelihood model as a result low numbers of recaptured fish in the in the 7-12 inch and 18-20 inch range. As a result, I used Modified Peterson (Chapman 1954) to produce the abundance estimate. Fish seven inches and larger were used to produce abundance estimates. Brown trout appear to be declining, while rainbow and Yellowstone cutthroat are scarce. Results, by species, are presented below.

Brown Trout

Brown trout abundance in the Todd section was 161 fish/mile in 2005, a decrease from 200 fish/mile (≥ 7in.) in 2004 (Figure 20). Although not sampled in 2002 and 2004 there appears to be a downward trend in brown trout abundance, possibly a result of long-term drought. The length-frequency distribution of brown trout shows a typical distribution of fish weighted toward larger fish. Overall numbers of fish in all length groups appear to be a lower than would be expected for a healthy population. There are two cohorts of smaller fish that should continue to recruit to larger length groups next year (Figure 21).

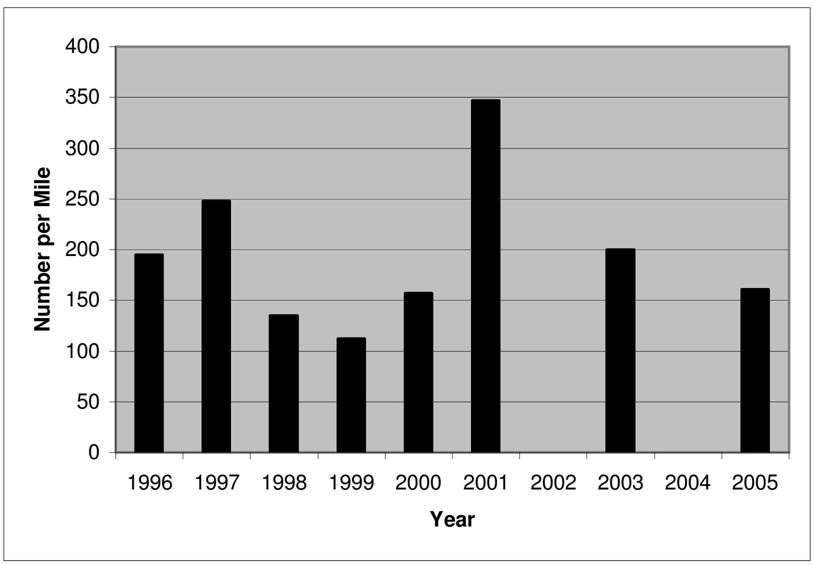
Brown trout in the Todd Section appear to be continuing to decline, while the length-frequency distribution suggest future recruitment may reverse this trend.

Yellowstone Cutthroat Trout

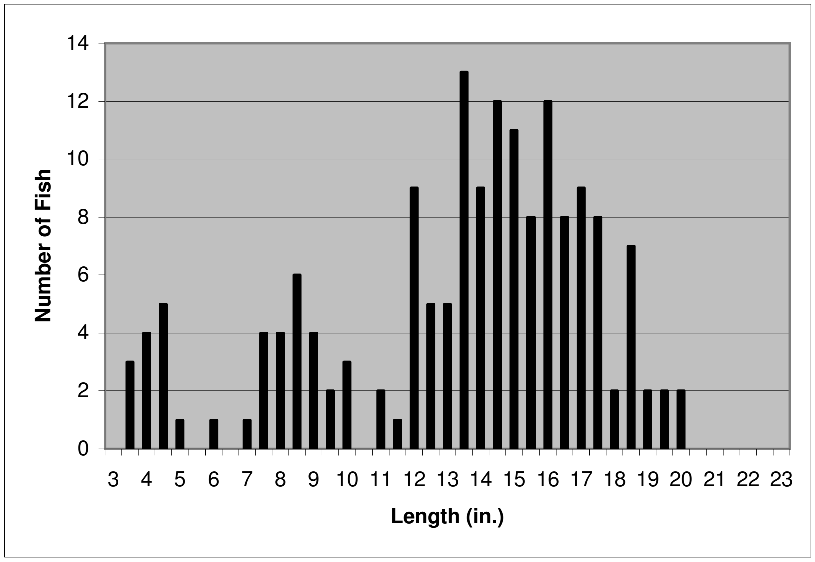
In the Todd Section, only four Yellowstone cutthroat trout were captured in 2005. They ranged from 10.9-12.5 inches in total length (Figure 22). The section was not sampled in 2004 and in 2003 only two cutthroat were captured. They were 15 and 3.1 inches in total length. It is apparent that this section supports very low numbers of Yellowstone cutthroat trout in late winter/early spring.

Rainbow

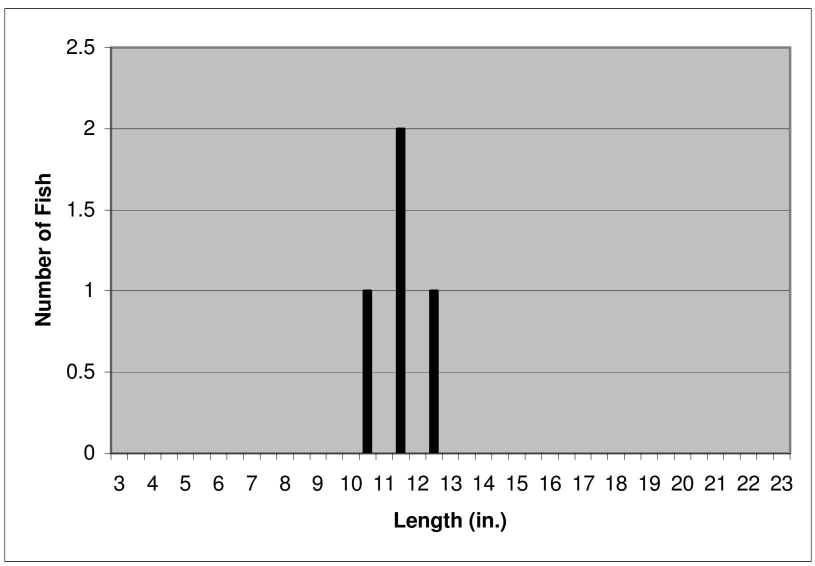
In 2005, only two rainbow trout were captured in the Todd Section. They were 19.5 and 13.8 inches in total length. Only two rainbow were captured in 2003 and were 19.0 and 16.2 inches in total length. Rainbow are rare in the Todd Section in late winter/early spring.



- Figure 20: Abundance estimates for brown trout (≥ 7 in.) in the Todd Section from 1996-2005. The section was not sampled in 2002 and 2004.



• Figure 21: Length-frequency distribution of all captured brown trout in the Todd Section in 2005.



• Figure 22: Length-frequency distribution of all captured Yellowstone cutthroat in the Todd section in 2005.

Zimmerman Section

We sampled the Zimmerman Section in March 2005 to assess population trends in Yellowstone cutthroat, brook and brown trout. I used the partial log-likelihood model to produce abundance estimates for brown trout. Fish seven inches and larger were used to produce abundance estimate. The Brown trout population appears to be declining and Yellowstone cutthroat and brook trout are rare. Results, by species, are presented below.

Brown Trout

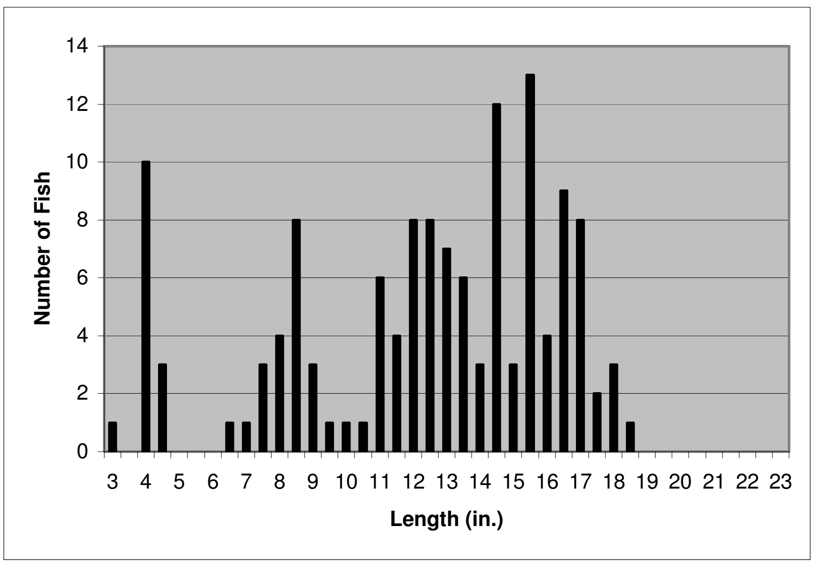
The abundance estimate for brown trout in the Zimmerman Section was 61 fish/1,000 feet (≥ 7 in.). This section has not been sampled since 1995. In 1995, the abundance estimate for brown trout was 102 fish/1,000 feet (≥ 7 in.). More data needs to be collected to see if this is a true decline in abundance of brown trout in this section. The length frequency distribution for brown trout in the Zimmerman Section displays good distribution of fish indicating the presence of multiple year classes. There are groups of smaller fish present in relatively strong numbers that indicate potential for good recruitment next year (Figure 23).

Yellowstone Cutthroat Trout

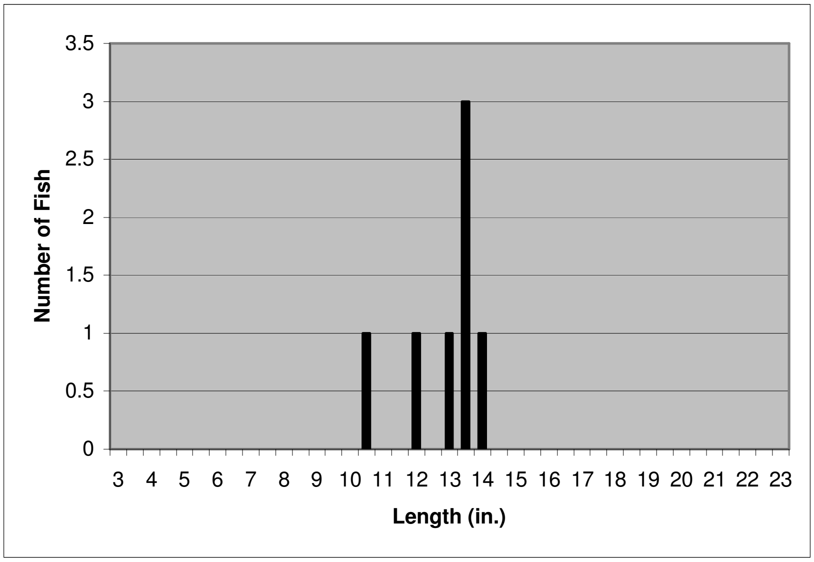
In 2005, not enough Yellowstone cutthroat trout were captured in the Zimmerman Section to produce an abundance estimate. Only seven cutthroat ranging from 10.6-14.1 inches in total length were captured (Figure 24). Yellowstone cutthroat in the Zimmerman Section are rare in late winter/early spring.

Brook Trout

In the Zimmerman Section on one brook trout that was 4.9 inches in total length was captured in 2005. Brook trout are very rare in this section in late winter/early spring.



- Figure 23: Length-frequency distribution for all captured brown trout in the Zimmerman Section in 2005.



- Figure 24: Length-frequency distribution for all captured Yellowstone cutthroat in the Zimmerman Section in 2005.

McLeod Section

The McLeod Section was not completely surveyed in 2005 due to mechanical problems with the generator. In the portion that was electrofished, a total of six Yellowstone cutthroat were captured. They ranged in length from 8.3-14.7 inches. Three brown trout were captured and ranged from 8.9-14.5 inches in length. Eight brook trout ranging in length from 3.2-11.7 inches were captured as well. Capture efficiency was minimal at best, for the portion of the McLeod Section that was completed, due to the generator. Because of the limited data no generalizations can be made about the trout populations in this section.

Dailey Lake

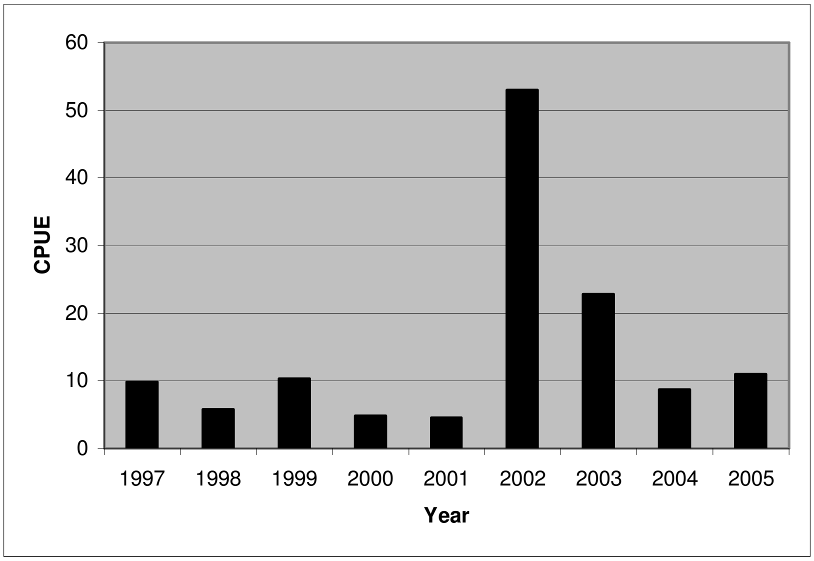
Gillnetting

Fisheries in Dailey Lake are primarily sampled using gill nets. This technique is prone to wide variability in sampling efficiency. During the time that the nets were set a significant storm front had moved into the Paradise Valley, which may have suppressed fish movement and affected efficiency. Continued drought and low water levels in Dailey Lake may have also affected these fish populations.

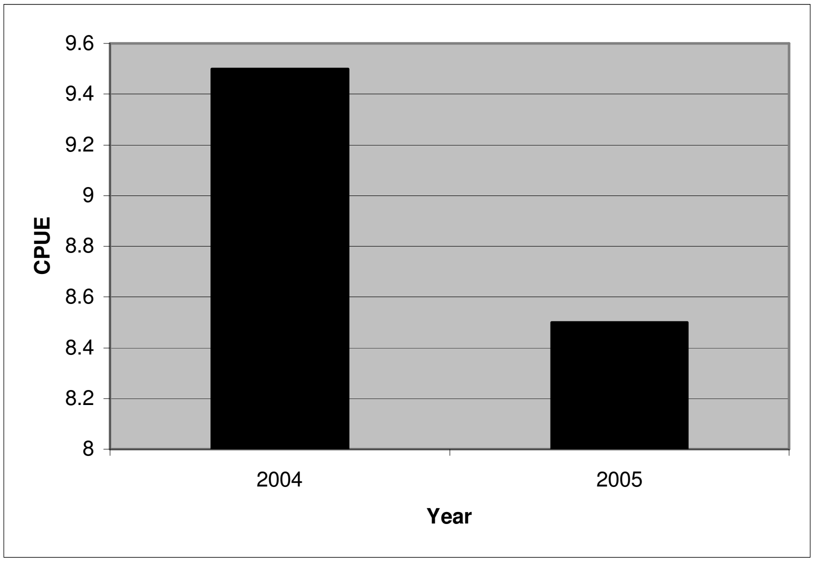
Fish populations in Dailey Lake in 2005 appear to be reduced in abundance, but average lengths are similar to previous years.

Rainbow

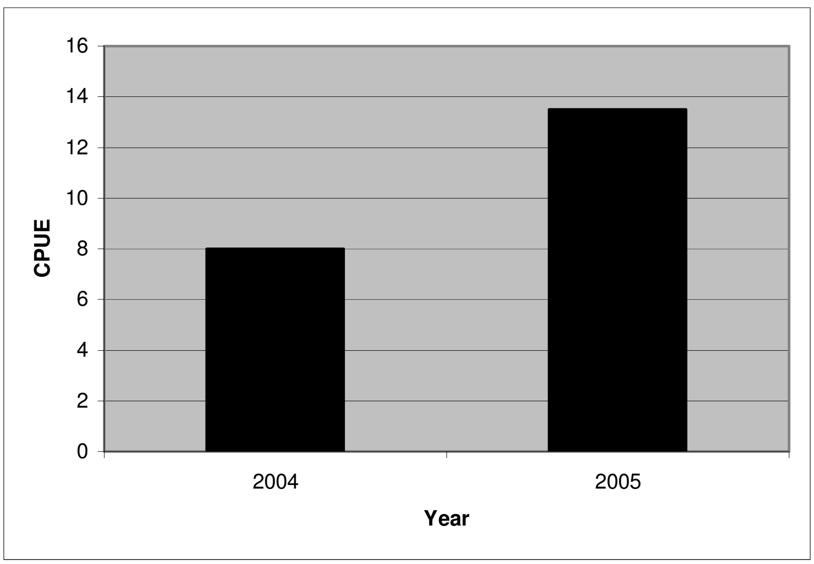
Catch-per-unit effort (CPUE) for rainbow trout in all nets was up slightly for rainbow trout compared to 2004 (Figure 25). CPUE for rainbow in floating nets was substantially lower in 2005 as compared to 2004 (Figure 26). CPUE in sinking nets was much higher in 2005 than in 2004 (Figure 27). It is apparent that during the time of netting, most rainbow were higher in the water column. A large midge hatch occurred during netting and may have influenced CPUE especially in the sinking nets. The average length of rainbow trout captured continued to increase from the low in 2003 of 9.1 inches to 15.2 inches in 2005 (Figure 28). This is just below the 8-year average of 15.3 inches from 1997-2004. In 2005, the length-frequency distribution of rainbow trout in Dailey Lake is clearly weighted toward larger fish in the 12-17 inch range. The distribution is not as spread across lengths and shows no fish in the 6-8 inch range as was seen in 2004 (Figure 29). This could be a result of drought and low water levels, poor recruitment of the 2004 fish plants, or sampling efficiency.



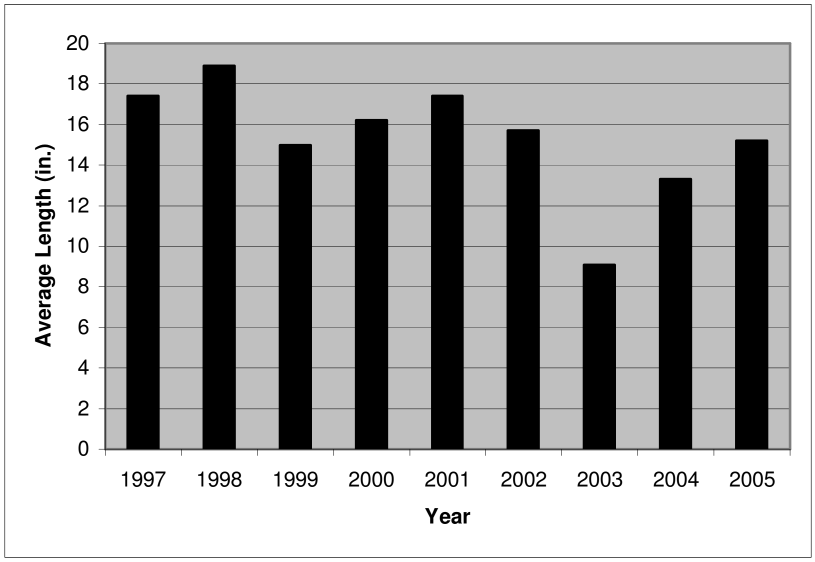
• Figure 25: Catch-per-unit-effort for rainbow in all gill nets for 2005



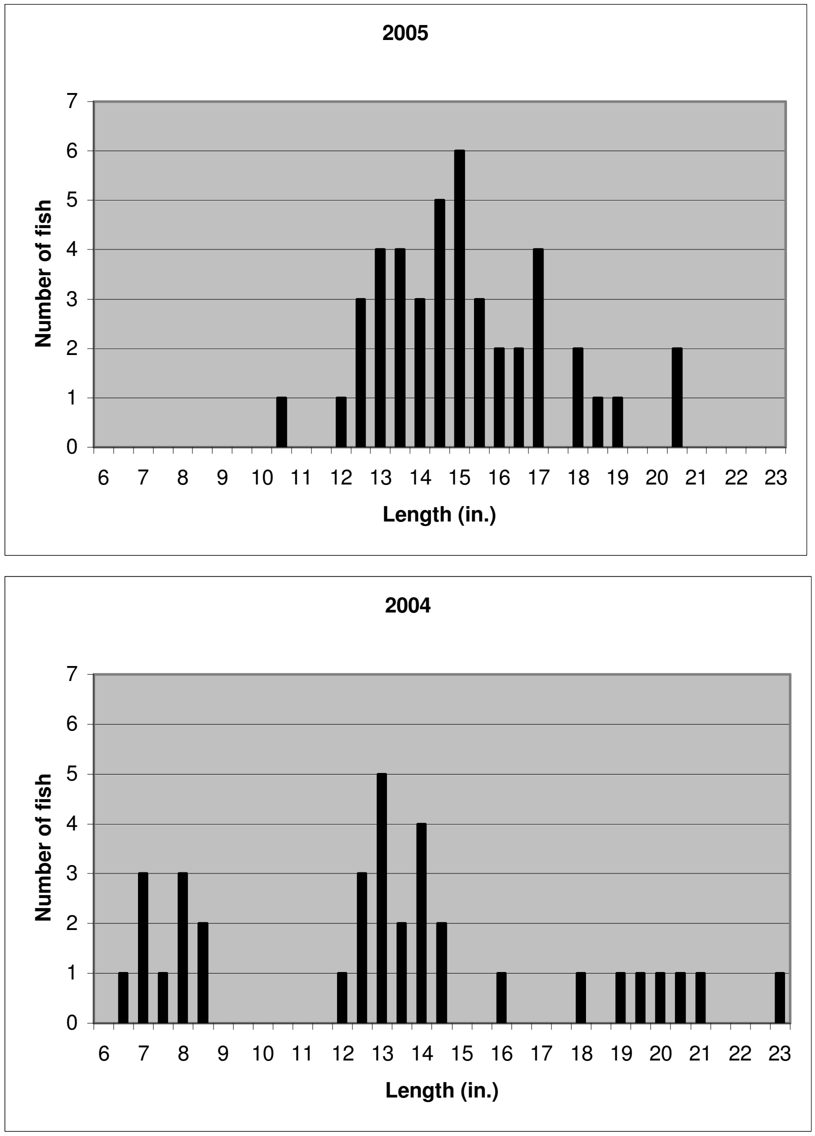
• Figure 26: Catch-per-unit-effort for rainbow trout in floating gill nets for 2004 and 2005.



• Figure 27: Catch-per-unit-effort for rainbow trout in sinking gill nets for 2004 and 2005.



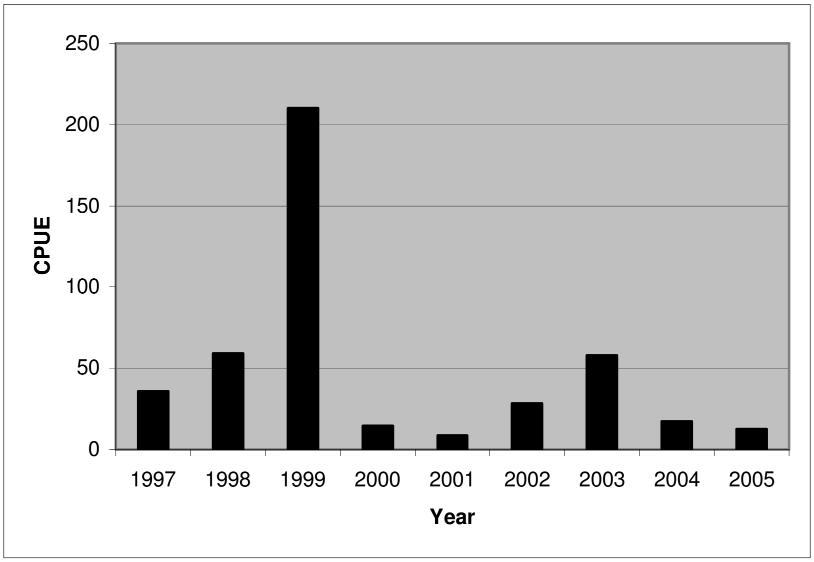
• Figure 28: Average length of rainbow trout captured from 1997 through 2005.



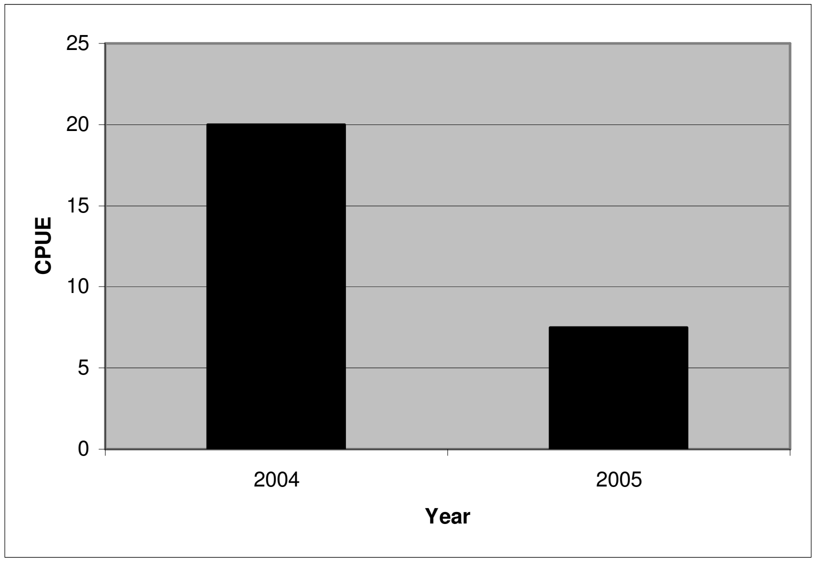
• Figure 29: Length-frequency distribution for rainbow trout in 2004 and 2005.

Yellow Perch

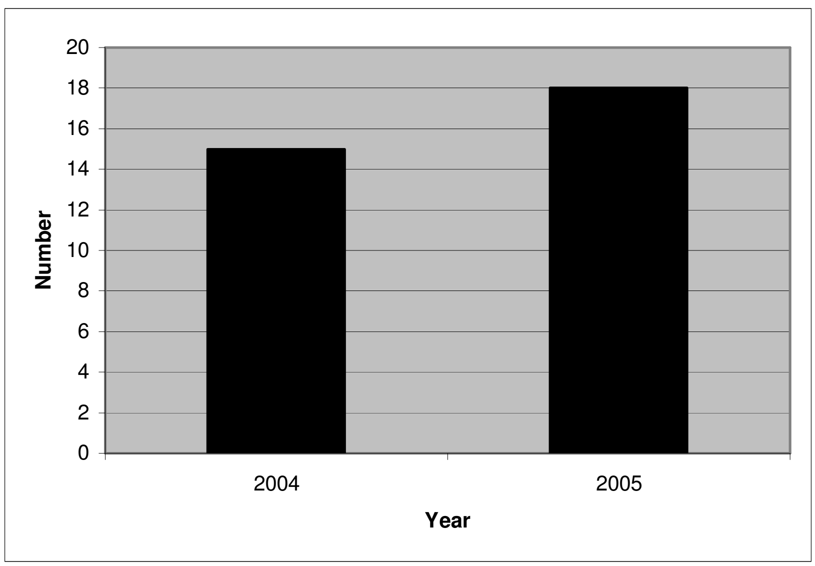
The CPUE for yellow perch in all nets was down from 17.5 in 2004 to 12.8 in 2005. This continues the decline that occurred between 2003 and 2004 (Figure 30). The average CPUE for yellow perch in all nets is 54 for 1997-2004. This average is skewed by the high CPUE in 1999. The average is 31.7, if the 1999 data is dropped. In 2005, CPUE for yellow perch was lower for the floating nets and higher for the sinking nets than it was in 2004 (Figures 31 and 32). This suggests that during the time of netting the majority of the perch were lower in the water column. The average length of yellow perch decreased slightly to 7.9 inches in 2005 (Figure 33). This is just below the average length of 8.4 inches for 1997-2004. The length-frequency distribution for yellow perch in 2005 is weighted toward 7-inch fish and shows a reduction in abundance of fish in the 8.5-11 inch range. Perch in the 6-inch range were significantly reduced as well (Figure 34). This could be a result of drought and low water levels or sampling efficiency.



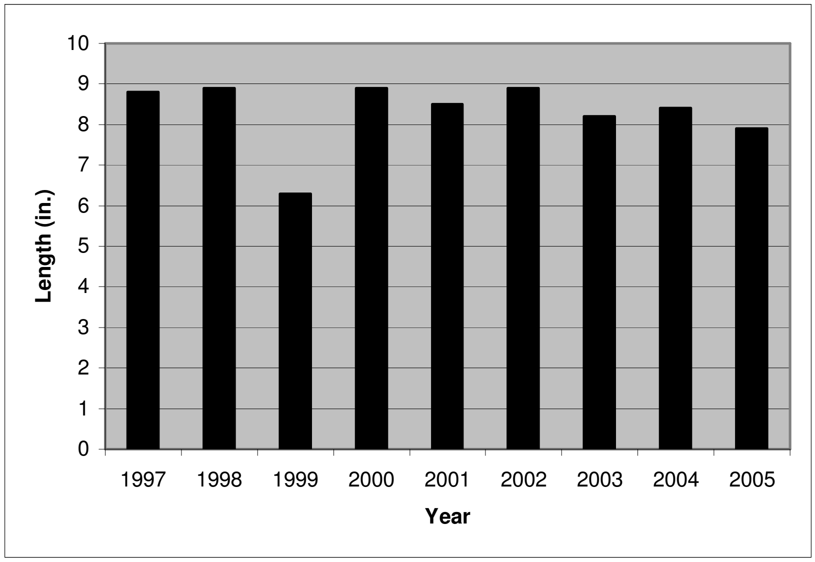
• Figure 30: Catch-per-unit-effort for yellow perch in all nets in 2005.



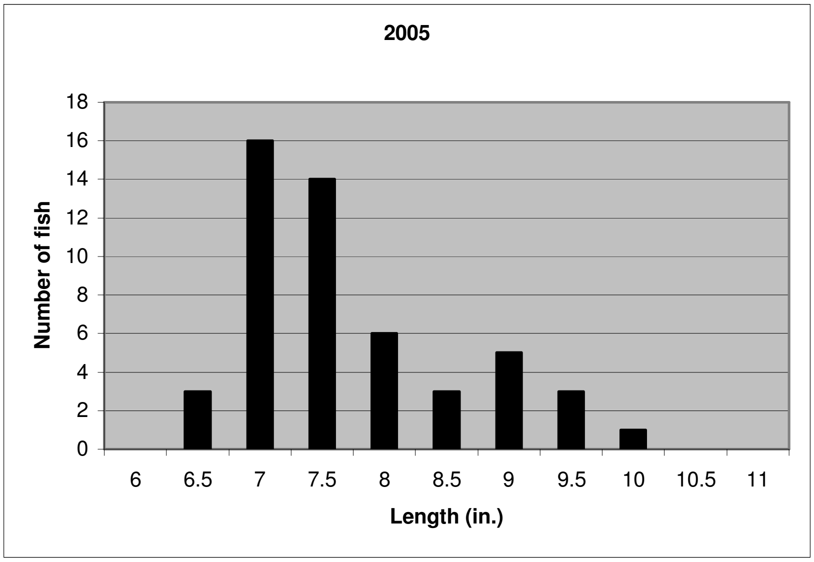
• Figure 31: Catch-per-unit-effort for yellow perch in floating nets in 2004 and 2005.

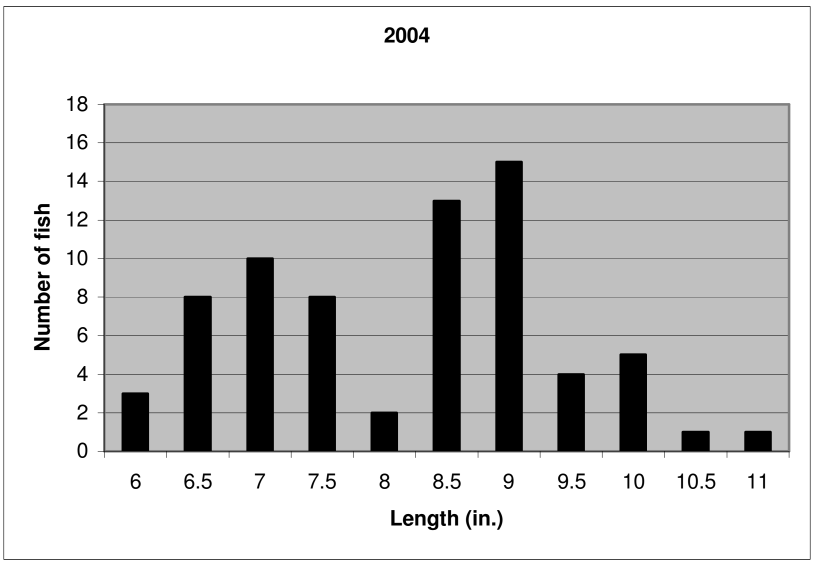


• Figure 32: Catch-per-unit-effort for yellow perch in sinking nets in 2004 and 2005.



• Figure 33: Average length of yellow perch from 1997-2005.

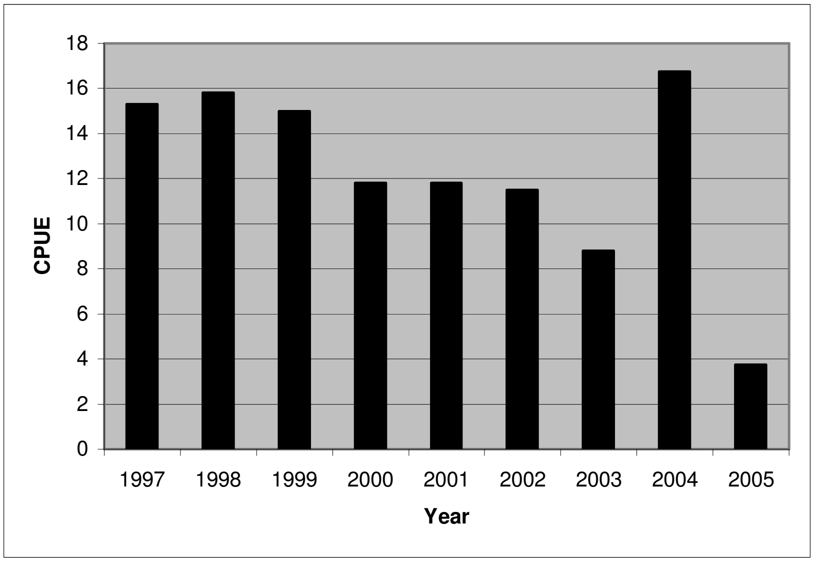




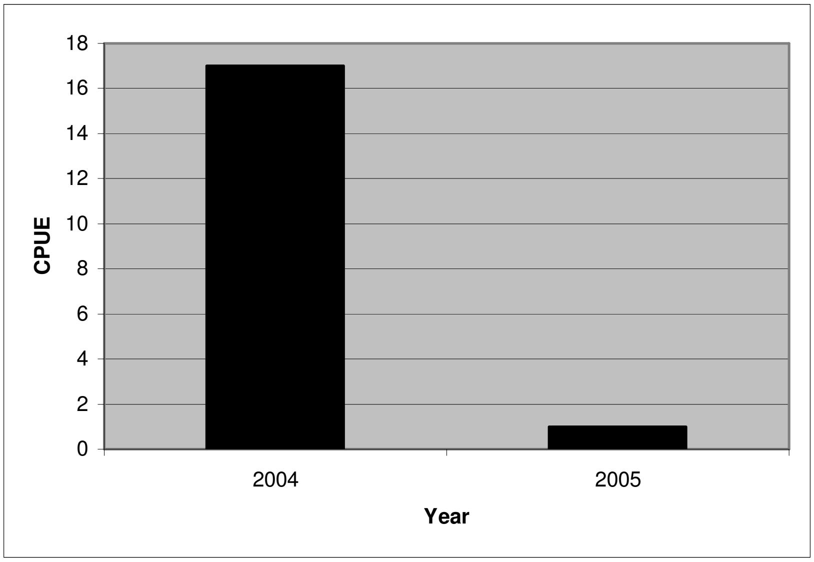
- Figure 34: Length-frequency distribution for yellow perch for 2004 and 2005.

Walleye

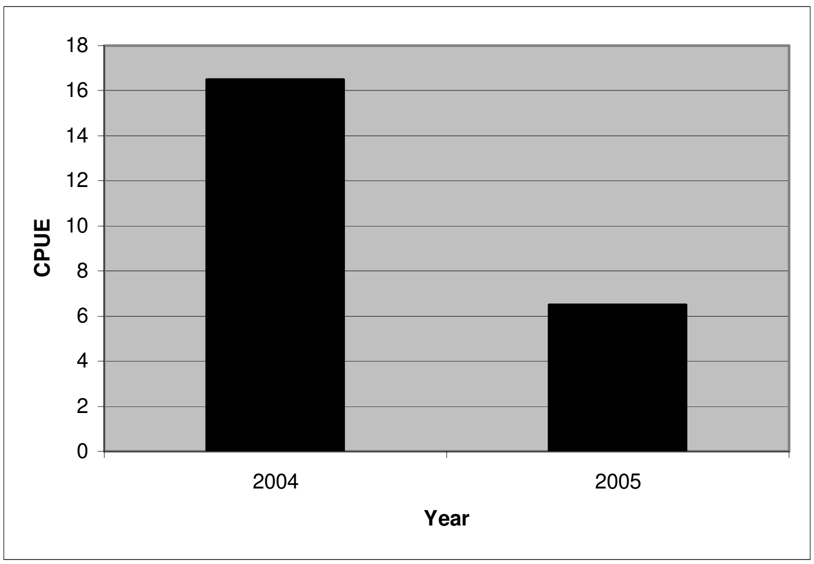
CPUE for walleye in all nets in 2005 was 3.8. This is much lower than 16.8 and 8.8 in 2004 and 2003, respectively (Figure 35). In 2005, CPUE in floating nets was significantly lower than 2004 (Figure 36). CPUE was also lower in 2005 for the sinking nets (Figure 37). The average length of walleye in 2005 was 13.5 inches, which is slightly larger than the average length of 13.4 inches in 2004 (Figure 38). It is also larger than the average length of 13.0 inches for 1997-2004. The length-frequency distribution of walleye in 2005 is dramatically different than that in 2004. It is limited to fish from 9.5-18.5 inches in length and is dramatically reduced in abundance (Figure 39). Continued monitoring will reveal if this is a change in the population caused by drought and low water levels or a side effect of sampling efficiency.



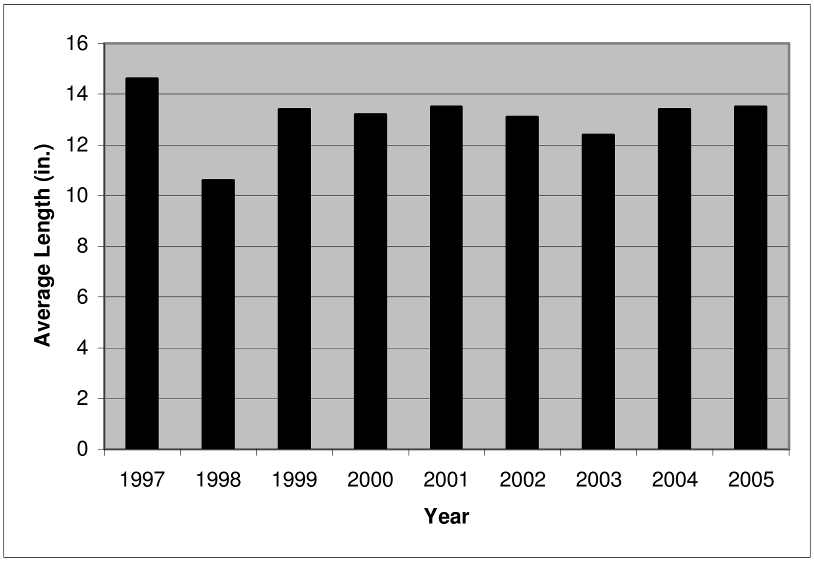
• Figure 35: Catch-per-unit-effort for walleye captured in all gill nets for 1997 through 2005.



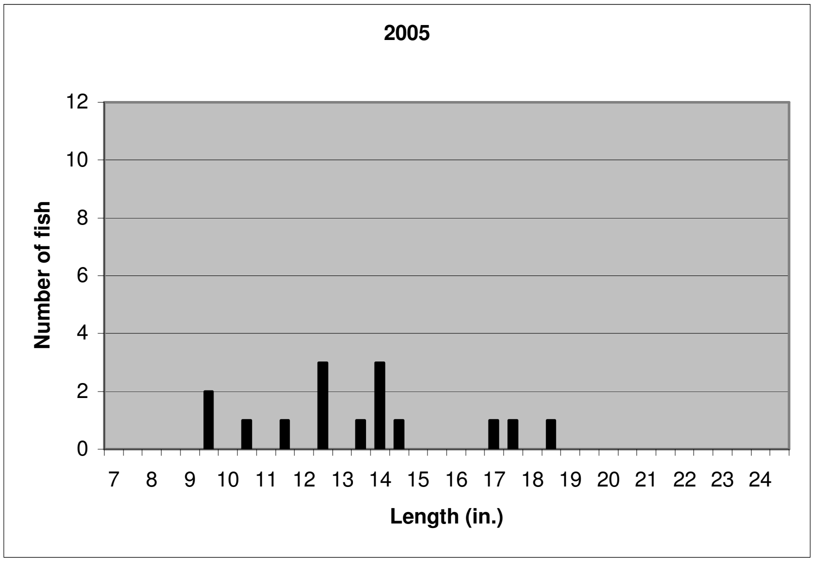
• Figure 36: Catch-per-unit-effort for walleye captured in floating gill nets in 2004 and 2005.

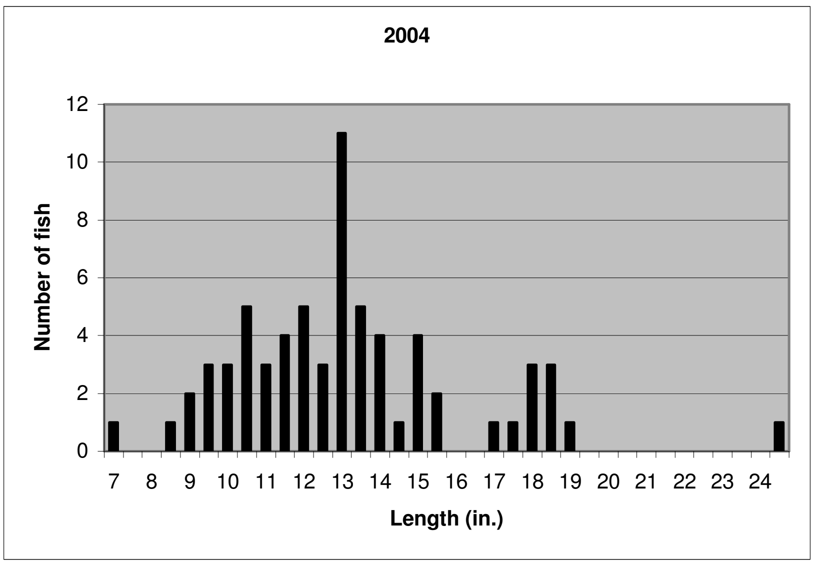


• Figure 37: Catch-per-unit-effort for walleye captured in sinking gill nets in 2004 and 2005.



• Figure 38: Average length of walleye captured from 1997 through 2005.





• Figure 39: Length-frequency distribution of walleye in 2004 and 2005.

Stocking

Walleye

On June 15, 5,000 walleye from the Miles City Fish Hatchery were stocked into Dailey Lake. They averaged 1.3 inches in length. On September 8, the Miles City Fish Hatcher stocked 4,856 walleye with an average length of 3.7 inches into Dailey Lake (Table 5). All walleye stocked in 2005 were from eggs collected at Fort Peck Lake in Spring 2005.

• Table 5:Walleye stocking information from 2000-2005.

Year	Date	Strain	Length (in.)	Number
2000	June 16	Fort Peck	1.3	5,000
	Aug. 9	Fort Peck	2.8	5,000
			Total	10,000
2001	June 20	Fort Peck	1.3	5,000
	Aug. 21	Fort Peck	3.2	5,000
			Total	10,000
2002	July 1	Fort Peck	1.7	5,000
	Aug. 15	Fort Peck	2.6	3,542
			Total	8,542
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

Rainbow

On May 10, Dailey Lake was stocked with 20,850 young-of-the-year rainbow trout from Ennis National Fish Hatchery. The plant consisted of 10,850 Arlee strain rainbow that averaged 5.04 inches in length and 10,000 Eagle Lake strain rainbow that averaged 3.45 inches in length. Eagle Lake strain young-of-the-year rainbow from Bluewater Springs Trout Hatchery were planted on June 10. There were 5,002 fish that had an average length of 4.8 inches (Table 6).

• Table 6: Rainbow stocking information from 2000-2005.

Year	Date	Strain	Length (in.)	Number
2000	June 21	Eagle Lake	3.7	10,000
	Apr. 20	Arlee	2.5	10,140
	Apr.10	DeSmet	4.6	4,769
			Total	24,942
2001	Apr. 12	DeSmet	5.2	5,040
	Apr. 12	Arlee	2.8	9,976
	May 18	Eagle Lake	3.8	10,074
			Total	25,090
2002	Apr. 18	W	5.1	5,049
	Apr. 18	Arlee	3.1	10,392
	May 22	Eagle Lake	3.8	10,305
			Total	25,746
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

Water

In Spring 2005, water was diverted from Sixmile Creek to Dailey Lake for 53 days from May 23 to July 14. In the fall, water was diverted to Dailey Lake for 28 days from October 3 through October 30. Water was not diverted past October because the ditch from Sixmile Creek to Dailey Lake flooded private property.

Fish Trapping

Adult Trapping

A one-way adult fish trap was placed in Locke Creek just upstream of the railroad bridge on May 16. The trap was operated and checked daily with the exception of most weekends. Operation of the trap was ended on June 27.

A total of seven fish were captured from May through June. Four of these were Yellowstone cutthroat, one was a rainbow and two were white suckers (Table 7).

• Table 7: Locke Creek adult fish trapping results for 2005.

Date	Species	Length (in.)	Weight (lb.)
May 27	Yellowstone cutthroat	14.7	1.22
May 27	Yellowstone cutthroat	10.4	0.41
May 31	Yellowstone cutthroat	19.9	0.94
June 3	Yellowstone cutthroat	10.6	0.42
June 14	Rainbow	4.1	------
June 22	White Sucker	4.8	0.05
June 24	White Sucker	4.5	------

Fry Trapping

Fry trapping was completed on Big, Cedar, Mill, Emigrant Spring, Armstrong Spring, Nelson Spring, Locke, and Peterson Creeks in 2005. Fry were captured at all locations with the exception of Locke Creek. The most fry were captured at the Cedar Creek trap. It should be noted that the fry traps only sampled a portion of the stream and that the entire out migration was trapped. The numbers below represent the trend of what was captured during the peak of our migration in each stream. The traps in Nelson and Armstrong Spring Creeks were subject to plugging with aquatic vegetation and likely represent reduced capture numbers. This data will be expanded and analyzed in a later report.

• Table 8: Number of trout fry captured in each stream in summer 2005.

Stream	Number of Fry Captured
Big Creek	2,508
Cedar Creek	5,775
Mill Creek	122
Emigrant Spring Creek	19
Armstrong Spring Creek	67
Nelson Spring Creek	30
Locke Creek	0
Peterson Creek	15

Discussion

The continued decline of Yellowstone cutthroat in the Springdale Section is a concern that will be looked at closely over the next few years. It is interesting that abundance of rainbow and brown trout in this section is remaining fairly stable while cutthroat are declining. This could be a result of drought inhibiting access of cutthroat from the river to spawning tributaries. Continued monitoring of the cutthroat population in the river, stream flows, and spawning tributaries should provide a more definite explanation of what is causing this decline.

Abundances for all species in Dailey Lake are down. This may be the result of continued drought and low water levels, sampling efficiency, or a combination of the two. Continued monitoring will help determine if the drop in abundance is indicative of a downward trend or just a natural fluctuation.

In Locke Creek, spawning and recruitment of Yellowstone cutthroat appears to be nonexistent to poor at best. It appears that there may be a lack of connection between the Yellowstone River and Locke Creek as a result of continued drought reducing spring flows in the Yellowstone River. Continued monitoring of stream flows and trapping of adult fish and fry will help determine exactly why production of this tributary is down. It may also provide explanation for the decline in Yellowstone cutthroat numbers in the Springdale Section.

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